

MI DENTISTRY HANDBOOK

A COMPREHENSIVE GUIDE TO TREATMENT PLANS AND PRACTICE
IMPLEMENTATION OF MINIMUM INTERVENTION DENTISTRY



,"GC,"



TABLE OF CONTENTS

Introduction

- How to read this guide
- Meet the MI Advisory Board

Welcome

- A note from GC
- Timeline of MI Dentistry milestones

Minimum Intervention Treatment Plan

- Overview of the MITP philosophy and design
- Introduction to key patient categories

MI Early Care

- MI Treatment plans for children
- Risk assessment charts
- Case studies

MI Active Care

- MI Treatment plans for Active Care patients
- Risk assessment charts
- Case studies

MI Care Plus

- MI Treatment plans for Care Plus patients
- Risk assessment charts
- Case studies

Implementing MI into your practice

References



INTRODUCTION

“ORAL HEALTH IS AN ESSENTIAL COMPONENT OF GOOD HEALTH, AND GOOD ORAL HEALTH IS A FUNDAMENTAL HUMAN RIGHT. THE ROLE OF THE DENTAL PROFESSION IS TO HELP THE POPULATION AND DECISION MAKERS TO ACHIEVE HEALTH THROUGH GOOD ORAL HEALTH.”

**FDI VISION 2020:
SHAPING THE FUTURE OF
ORAL HEALTH**

DEAR READER,

ABOUT YOU

It will come as no surprise that you have chosen a career in a caring profession such as dentistry. You care very deeply about the wellbeing and welfare of your patients. You love to see teeth repaired and working as they should. You take personal pride in seeing people leave your practice with an attractive smile. Your goal is to offer the best care possible while also running a successful business and being able to enjoy the fruits of your hard work.

THE CHALLENGES

You know better than anyone that dentistry that only treats the symptoms of disease is not a long term success plan. There is nothing satisfactory about 'drilling, filling and billing' when you know more can be done to support your patients' health holistically. The challenge in today's dentistry is to do minimal intervention of caries and periodontal diseases (for minimal iatrogenic effect), to maintain teeth for life and to stop oral diseases, while at the same time running a profitable practice. In short: doing the best for your patients and operating a thriving business on a preventive care model.

OUR TEAM

To help you overcome these challenges, we have joined forces with a globally recognised team of dentists, trainers, researchers and academics. Together with our dental product knowledge and decades of industry experience here at GC, the Minimum Intervention Dentistry Advisory Board has worked tirelessly to create dental learning events, promote evidence-based dentistry and develop a robust treatment plan that dentists can use to implement MI in their practices.

“I AM CONVINCED THAT MID IS THE MOST SENSIBLE APPROACH TO TREAT AND MAINTAIN MY PATIENTS’ TEETH OF IN THE 21ST CENTURY..”

PROF DR ELMAR REICH

INTRODUCTION

MI TREATMENT PLAN

This document is the culmination of years of discussions among academics and professionals about how minimum intervention dental care can succeed in a modern dental practice in any setting. This guide features the single most important tool for any dentist and dental team member to use right now: the Minimum Intervention Treatment Plan. The MI Treatment Plan is the starting point to caring for patients in all risk categories in a preventive manner, with a dedicated action plan for all evidence-

based treatments. It presents a tried and tested format of treating patients in a holistic manner.

Throughout this guide we will not only explain the MITP in great detail, but also provide you with a step by step implementation process. We have also created a practice toolkit and patient leaflets as essential resources in this process.

Taking the time to work through this guide will not only enhance the level of care you provide your patients, it will fulfil your desire to offer the best dentistry possible. We will

show you how adapting your practice to a minimum intervention setting will transform your patient care, your teamwork and your practice profitability, all while preventing one of the most common diseases in the world.

Ignoring this major development in dentistry will only cause you the daily frustration of treating symptoms of a curable condition.

Welcome to the team. Let's begin!

TAKE ACTION

YOU MIGHT BE ASKING YOURSELF, "THIS IS GREAT, BUT HOW DO I GET STARTED?" IT'S SIMPLE, THERE ARE THREE STEPS:

STEP 1:

Read this comprehensive guide



STEP 2:

Adopt and master the MI Treatment Plan



STEP 3:

Transform your practice



THIS GUIDE FEATURES THE SINGLE MOST IMPORTANT TOOL FOR ANY DENTIST AND DENTAL TEAM MEMBER TO USE RIGHT NOW: THE MI TREATMENT PLAN.

ADVISORY BOARD

The Minimum Intervention Dentistry Advisory Board was formed in 2007 and was responsible for developing and establishing the MI Treatment Protocol and has hosted several symposia at key dental conferences around the world.

The Advisory Board members are dental professionals, practising dentists and academics who have applied MI principles to their patient care for many years and have studied the clinical evidence that supports this approach. taken part and currently take part in key clinical studies, multi-centre randomised clinical trials.

Matteo Basso, Italy. "It's now clear that conservative dentistry made only by filling 'holes' is out-dated. Despite initial good aesthetic results achievable by modern composites, the lack of knowledge and consideration of critical factors for caries development transforms a good dentist (but also a good dental hygienist) into a bad therapist."

Ivana Miletic, Croatia. "I am of the opinion that the MID philosophy of caries risk assessment, prevention, interception of disease and treatment that preserves hard dental tissues should be adopted to the greatest extent possible."

Betul Kargul, Turkey. "Minimally invasive dentistry is a concept that includes all aspects of the profession. It bridges prevention and surgical procedures, which is what dentistry needs today."

Falk Schwendicke, Germany. "I believe all clinicians should be doing MI Dentistry because it's evidence-based, it's a medical and biological approach and gets the best results."

Elmar Reich, Germany
"It is essential for the education of dentists in dental schools to be updated."



LTR FRONT: Piyush Khandelwal, Futoshi Fusejima, Fayçal Iratni. *LTR BACK:* Hidetoshi Funabashi, Falk Schwendicke, Tetsuro Sakuma, Atsuhiro Todo, Matteo Basso, Aylin Baysan, Jose Zalba, Sophie Doméjean, Michel Blique, Mari Ogura, Hervé Tassery, Patricia Gaton, Esther Ruiz de Castaneda, Betul Kargul, Elmar Reich, Sevil Gurban, Ivana Miletic.
ABSENT: Sebnem Turkun

Sevil Gurban, Turkey

"The key to success of practicing MID lies in the clear understanding of balance between pathological and protective factors."

Sophie Doméjean, France. "I am involved in this mission because NOT implementing MID into teaching and practice is just nonsense to me! MI should not be considered a 'special' concept but as 'dentistry itself'; what is not MI is not dentistry."

"IN THE RECENT YEARS, THANKS TO GROWING ORAL HEALTH AWARENESS AMONG GENERAL POPULATION, PATIENTS ARE ACTIVELY LOOKING FOR DENTAL PRACTICES WHO WANT TO IMPROVE THEIR OVERALL DENTAL HEALTH AND NOT JUST TO MAKE BEAUTIFUL FILLINGS."

PIYUSH KHANDELWAL, GC EUROPE

A NOTE FROM GC



“THE CONCEPT OF MINIMAL INTERVENTION DENTISTRY HAS EVOLVED AS A CONSEQUENCE OF OUR INCREASING UNDERSTANDING OF THE CARIES PROCESS AND THE DEVELOPMENT OF ADHESIVE RESTORATIVE MATERIALS.”

**INT DENT J.
2000 FEB;50(1):1-12**

A NOTE FROM GC

DEAR READER,

It is an honour to present you with this publication that our esteemed MI Advisory Board colleagues have compiled with great care and consideration. Our goal as a global company is the same as that of the Advisory Board; to promote the principles of Minimum Intervention Dentistry through sharing knowledge, advancing dental materials and techniques, as well as supporting clinical research around the world.

WHAT IS IT?

Minimum Intervention or MI, is the modern ‘medical’ approach to the management of caries and its principles are very simple:

-  ● To identify and assess any potential caries risk factors early
-  ● To prevent caries occurring by eliminating or minimising risk factors
-  ● To restore demineralised enamel and protect against further damage
-  ● To offer patient recall periods depending on caries susceptibility

The concept of Minimal Intervention Dentistry has evolved as a consequence of our increasing understanding of the caries process and the development of adhesive restorative materials. It is now recognised that demineralised but non-cavitated enamel and dentin can be ‘healed’, and that the surgical approach to the treatment of a caries lesion along with ‘extension for prevention’ as proposed by GV

Black is no longer tenable. We believe that the surgical restoration of caries will become the last course of treatment rather than the first.

YOUR MI PARTNER

GC is committed to sharing the concept of Minimum Intervention Dentistry through various activities and product development. We strive to make the transition for dentists to MI dentistry as easily accessible, evidence-based and business-minded as possible.

As part of this commitment, GC has developed products to help dentists incorporate MI into their treatments:

1. Diagnostic tests for bacteria and saliva that can identify patients at risk from caries
2. CPP-ACP based products (Recaldent™) that help to maintain mineral balance and prevent disease
3. Biomimetic restorative treatments that restore and protect teeth

VISION 2021

At GC we regard the 21st century as the “Century of Health.”. We have set our sights on a target to be the world’s leading manufacturer of dental care products and to support the vitality and well-being of people all over the world by our 100th anniversary in 2021.

To show you how we intend to do this, we thought it would be interesting to map out our efforts in MI Dentistry over the decades against the backdrop of key developments in the history of dentistry.

“AT GC WE REGARD THE 21ST CENTURY AS THE ‘CENTURY OF HEALTH’

MAKOTO NAKAO,
GC CHAIRMAN

MI DENTISTRY MILESTONES

2000 FDI publishes the MI paper in IDJ (FDI commission project)

2000 GC decides to make MI as one of its core philosophies

2004 MI workshop at IADR from GC at Hawaii, HI, USA

GC Japan updated the MI philosophies as "Evolving MI".

2005 MI workshop at IADR GC at Baltimore, MD, USA

2005 GC launches Tooth Mousse containing Recaldent™ and Saliva Check Buffer test.

2006 GC introduces the Plaque Indicator Kit.

2007 GC introduces MI Paste Plus for high risk patients.

2007 at IDS GC introduces EQUIA, a revolutionary bulk-fill restorative.

2007 GC Europe establishes the European MI Advisory Board (MIAB)

2008 GCE hosts Symposium on Minimum Intervention Dentistry at the FDI World Dental Conference in Stockholm, Sweden. GC also launches Saliva-Check Mutans and Dry Mouth Gel.

2009 GC launches first issue of MID, an informative digital turning page edition dedicated to MI Dentistry, written by practising dentists, academics and hygienists.

2011 GC launches Tri Plaque ID Gel and the Restorative Dentistry Guides app.

2013 GC International AG opens new office in Lucerne, Switzerland. Mr Makoto Nakao is appointed as GC Chairman and Kiyotaka Nakao becomes GC President.

2015 GC launches EQUIA Forte and MI Varnish.

2016 GC joins forces with FDI World Dental Federation for the Oral Health for an Ageing Population Partnership.

2017 GC hosts global symposium on MI Dentistry in Japan and launches MI Handbook, a comprehensive guide to MI Dentistry for all oral health professionals



I sincerely hope you recognise the role that you, the oral health professional, has played in this impressive timeline in dentistry. This evolution has been to the ultimate benefit of the patient, and we should all feel inspired and proud of our achievements thus far.

Yours in minimum intervention,

Makoto Nakao
GC Chairman



,'GC,'

MINIMUM INTERVENTION TREATMENT PLAN



‘GLOBALLY, THE BURDEN OF ORAL DISEASES REMAINS HIGH AND THE TRADITIONAL CURATIVE MODEL OF ORAL HEALTH CARE IS PROVING TOO COSTLY, IN TERMS OF BOTH HUMAN AND FINANCIAL RESOURCES, TO REMAIN VIABLE IN THE LIGHT OF THE INCREASING DEMAND’

WHERE EVIDENCE MEETS PRACTICE

"Globally, the burden of oral diseases remains high and the traditional curative model of oral health care is proving too costly, in terms of both human and financial resources, to remain viable in the light of the increasing demand. Worldwide, oral disease is the fourth most expensive disease to treat; dental caries affects most adults and 60–90% of schoolchildren, leading to millions of lost school days each year, and it remains one of the most common chronic diseases; periodontitis is a major cause of tooth loss in adults globally, and oral cancer is the eighth most common cancer and most costly cancer to treat. With oral infection has been associated with issues ranging from pre-term birth and low birth weight to heart diseases, it is now established that poor oral health may be an important contributing factor of several preventable diseases."

Michael Glick, FDI Vision 2020: shaping the future of oral health.

The importance and urgent need for Minimum Intervention Dentistry in the world is evident in statistics about the burden of oral diseases. MID is based on a better understanding of the caries process and the development of new diagnostic technologies and adhesive, bioactive restorative materials. MI can be defined as an approach for dentists to base their treatment plans on four key points.

- 1.** A comprehensive diagnosis of the disease (caries risk assessment/susceptibility, early lesion detection)
- 2.** the possibility to prevent caries and to remineralise early lesions
- 3.** where necessary, minimally invasive operative treatment including refurbishment of previous restorations rather than their systematic replacement
- 4.** patient education

The concept has evolved over more than a decade, by many experts, and is based on sound evidence-based principles. Studies have investigated the treatment decisions used in clinical practice and have shown wide variation in criteria between and within practitioners in different countries. They highlighted that dental practitioners still suffer from a lack of clarity on how to tailor a treatment plan to the individual needs of a patient.

IN MOST PARTS OF THE WORLD, CARIES TREATMENT HAS ADVANCED OVER THE PAST 30 YEARS FROM EXTRACTION, DRILLING AND FILLING TO A MEDICAL MANAGEMENT OF ORAL DISEASES.

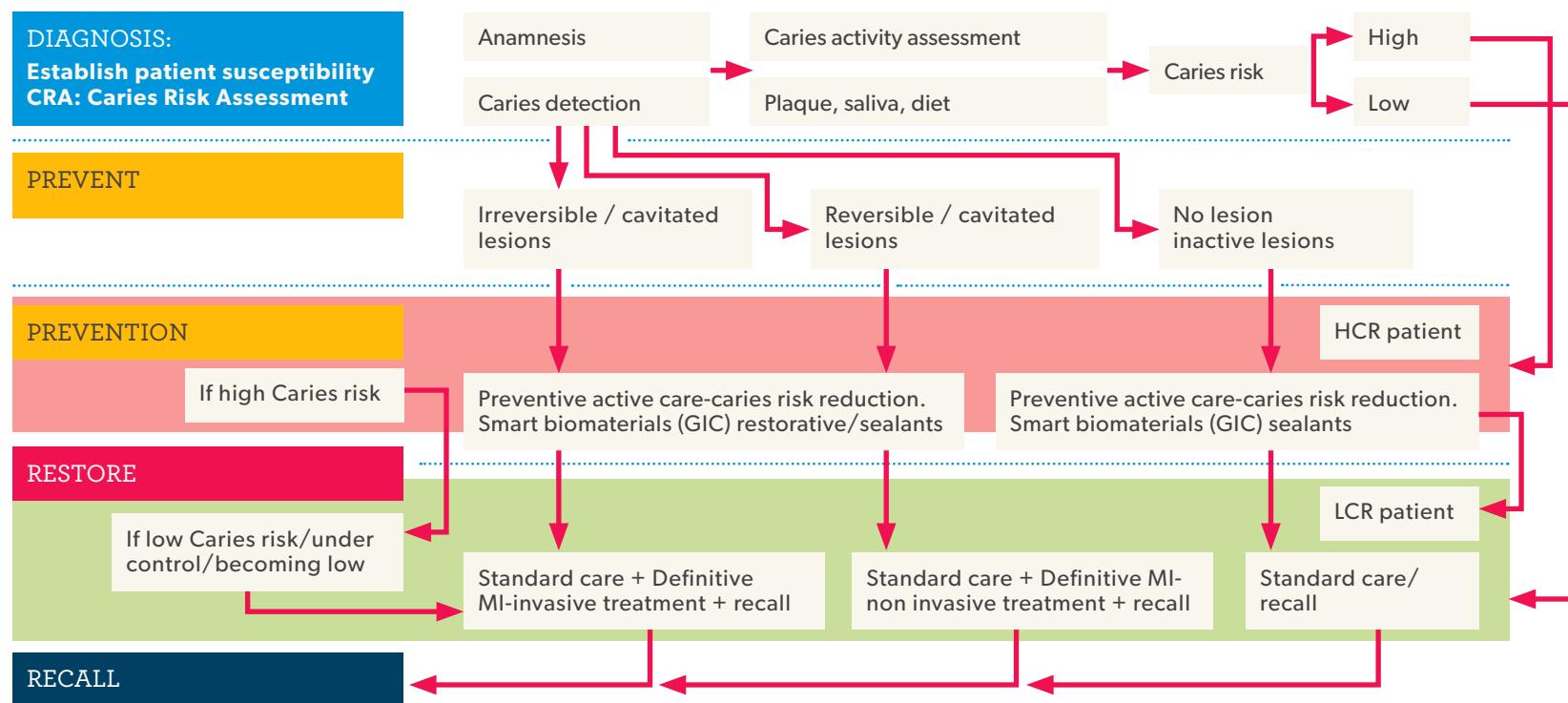
MINIMUM INTERVENTION TREATMENT PLAN

MI TREATMENT PLAN

In response, the MI Advisory Board has developed a Minimal Intervention Treatment Plan (MITP) with the intention that a simple and practical protocol could be used by dentists working in different countries, under different healthcare systems and environmental pressures. The MITP framework is composed of four key phases of patient-centered treatment interlinking with each other.

- **MI Identify:** Helps not only to detect caries lesions but differentiate between active and inactive lesions, the lesion depth and then establish the caries susceptibility of the patient with two categories: caries risk high or low. • **MI Prevent:** Once the risk assessment is established (MI Identify), the amount and intensity of the preventive treatment is selected.
 - **MI Restore:** The restorative approach is chosen according to the depth of the lesion.
 - **MI Recall:** The interval is chosen according to the caries risk diagnosis and may vary between a couple of weeks up to a year. All patients must be recalled to evaluate the efficacy of the preventive therapy and to evaluate the quality of the restorative treatment.

IDENTIFY



THE MITP FRAMEWORK IS COMPOSED OF FOUR KEY PHASES OF PATIENT-CENTERED TREATMENT INTERLINKING WITH EACH OTHER

MINIMUM INTERVENTION TREATMENT PLAN

MI TREATMENT PLAN

The MITP is designed to help dentists achieve the following:

- Minimal intervention to reduce iatrogenic effect
- Maintain teeth for life
- Stop oral diseases
- Improve quality of life

In most parts of the world, caries treatment has advanced over the past 30 years from extraction, drilling and filling to a medical management of oral diseases. Minimally invasive procedures are the new paradigm in healthcare and in dentistry this philosophy integrates prevention, remineralisation and minimal intervention for the placement and replacement of restorations.

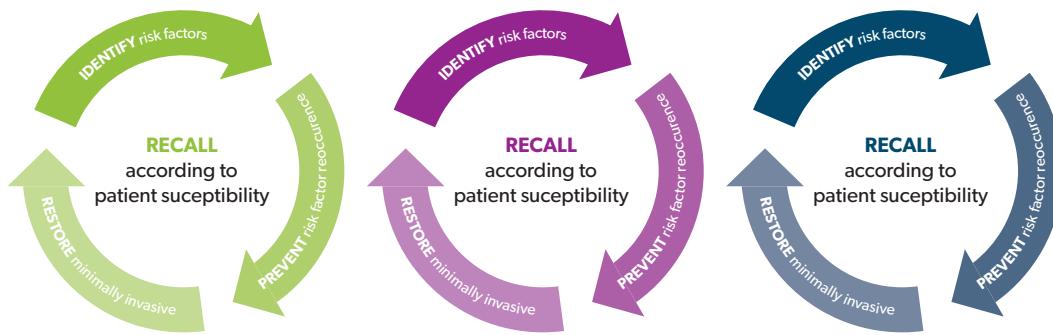
There is sound scientific evidence that proves we can prevent, stop and manage oral diseases in the patient's mouth in order to maintain their teeth for life. This is achieved by the early detection of oral diseases (such as caries and periodontal diseases) and their risk factors. By targeting those risk factors in the patient we are not only able to prevent disease, but also to stop and reverse its effects. Therefore, early treatment is not only drilling but modifying and changing the risk factors.

IDENTIFYING UNIQUE PATIENT GROUPS

While the MITP is an excellent tool for the implementation of a minimally invasive approach, it is essential to take into account the individual patient's age and any other conditions that would have an impact on their general health and the circumstances under which to treat them.

It is well recognised that different age

groups have different risk factors and the preventive strategies also need to be adapted accordingly. To ensure the MI Treatment Plan can be adapted to all types of patients and be tailored to their individual needs, the MI Advisory Board has identified three main categories that further support the preventive and cause-related holistic approach. The three categories are as follows:



EARLY CARE

- children 0 to 5 years:
primary teeth
- children 6 to 14 years:
permanent and primary
teeth (mixed dentition)

MI ACTIVE CARE

>14 years / adults

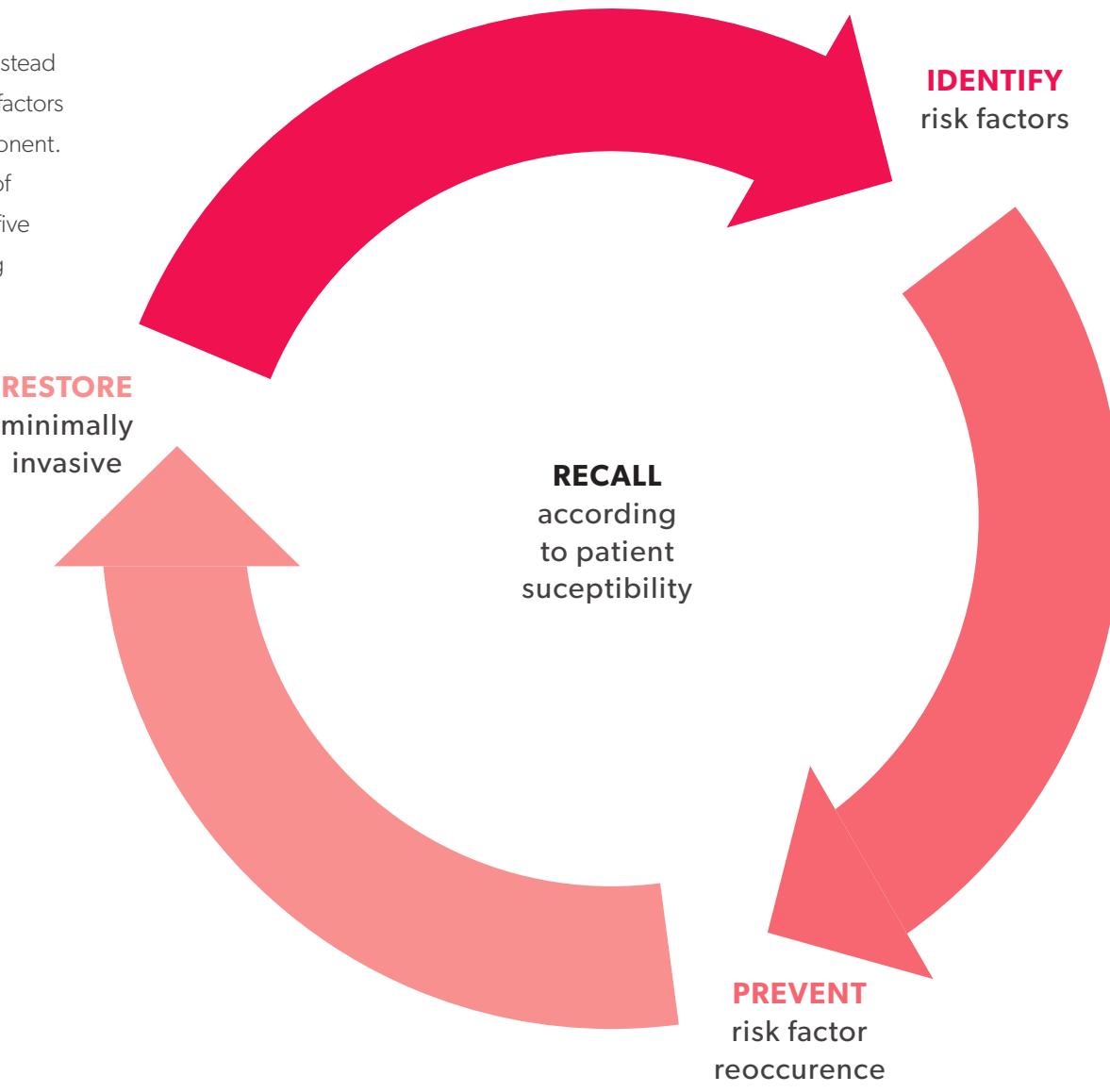
MI CARE PLUS

- special needs patients
- pregnant women
- older adults

MINIMUM INTERVENTION TREATMENT PLAN

MI PREVENT AND RECALL

Dental caries is not an infectious but instead a behavioural disease, where genetic factors also play a role, with a bacterial component. Controlling the intake and frequency of fermentable sugars, to not more than five times daily and removing or disturbing dental plaque from all tooth surfaces using toothbrushes and an effective fluoridated toothpaste twice daily, is the strategy for reducing the burden of dental caries in many communities around the world. These two factors are the main carious risk behaviours.



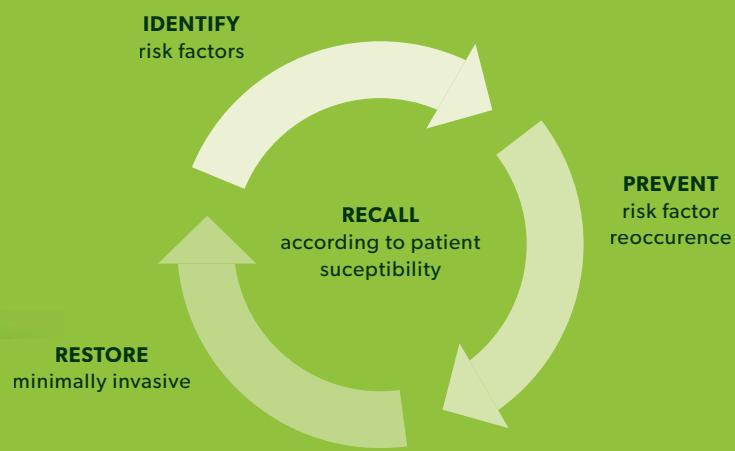
THE NEXT THREE CHAPTERS WILL OUTLINE THE APPROACH FOR EACH PATIENT GROUP IN GREATER DETAIL.

MI Early Care - chapter 4

MI Active Care - chapter 5

MI Care Plus - chapter 6

MI EARLY CARE



“NEW DIAGNOSTIC TOOLS FOR CARIES LESION DETECTION, CARIES RISK ASSESSMENT AND FOCUSED PREVENTIVE TREATMENTS HAVE DECREASED THE NEED FOR AGGRESSIVE INTERVENTION.”

BETUL KARGUL, TURKEY

MI EARLY CARE

Where to start when treating a child patient using the MI approach?

- Consider age
- Identify risk category: Consult checklist (MI Identify)
- Apply preventive care strategies (MI Prevent)
- Restore (MI Restore)
- Recall patients according to their individual needs (MI Recall)

AGE OF CHILD

Dental caries is the most prevalent chronic disease in children worldwide. Childhood can be divided into different periods, according to the age of a child: infant (0-1 years), 1-6 years old and 6-14 years old children. Each stage in childhood is specific when caries risk factors and treatment strategies are considered.

IDENTIFY RISK CATEGORY (MI IDENTIFY)

Since early childhood caries is becoming an increasing problem around the world, making early detection is of prime importance. With the changing aetiology it is

becoming more critical that dentists identify the problem to make the right diagnosis and apply the correct treatment protocol. In addition, in order to have success in the treatment of childhood caries, we need to work as a team with parents to educate them sufficiently.

INFANT (0-1 YEAR)

It is mandatory that every infant receives an oral health risk assessment from his/her primary health care provider or qualified health care professional as soon as the first tooth erupts (Ramos-Gomez et al. 2010a). This initial assessment should evaluate the infant's risk of developing pathology in both hard and soft tissues. Caregivers should also be educated about the infant's oral health, oral hygiene measures, and caries risk factors and to evaluate and optimize fluoride exposure (AAPD Guideline 2013).

1 TO 6 YEARS

Before 6 years of age, there are only primary teeth in the mouth and children are completely dependent on adults. From

the moment the first tooth appears in the mouth, an adult have to clean them using a toothbrush and fluoridated toothpaste twice a day (AAPD Guideline 2014).

Parents/caregivers are also responsible for checking their diet and limit sugar uptake. Early detection of carious lesions, in the form of



white spot, is crucial in this age group and the parents/caregivers play a crucial role to prevent further progression of these initial lesions.

6- 14 YEARS

After 6 years of age, the first permanent tooth erupts into mouth. The complex situation of a mixed dentition makes maintenance of oral health challenging; therefore children in this category still need supervision and guidance by parents/caregivers. Children must be encouraged to take the ownership of their mouth by brushing twice a day using fluoridated toothpaste and eating healthy and balanced diet. The adult supervision will decrease with age, as the child's responsibility will increase gradually.

Caries risk assessment form for children in two age groups are shown in Table 1.

APPLY PREVENTIVE CARE STRATEGIES

(MI PREVENT)

The aim is to reduce risk factors that are identified from the risk assessment charts (Table 1), which are aligned with the child's specific age group and related treatment strategies. An individualized care plan can be created using these charts, which will help to develop the necessary interventions required

and make it easier to track the progress at subsequent recall appointments. With children, it is essential to motivate and educate the patient/ caregiver because they are the ones who will reinforce better oral hygiene habits and healthier eating habits of children.

FLUORIDE

It is known that fluoride is effective in preventing and reversing the early signs of demineralization and in creating tooth surface more resistant to acid attacks. In prevention optimal exposure to fluoride is important and decisions concerning the administration of fluoride are based on the individualized needs of each patient. The use of fluoride for the prevention and control of caries is documented to be both safe and effective (CDC 2001).

Significant cariostatic benefits can be achieved by the use of over-the-counter fluoride-containing preparations such as toothpastes, gels, and rinses, especially in areas without water fluoridation (CDC 2001).

Professionally-applied topical fluoride, such as fluoride varnish, should be considered for high caries risk children at



(AAPD Guideline 2011, Marinho et al. 2013, Marinho et al. 2015).

Please refer to Table 2 for details.

PIT AND FISSURE SEALANTS

In children with recently erupted permanent teeth, studies have shown that fissures have a high risk of occlusal carious lesion. The sealed pits and fissures have a significantly reduced caries risks compared to the surfaces that are neither sealed nor have application of fluoride varnishes (Wright et al. 2016a).



TABLE 1 MI EARLY CARE: CARIES RISK ASSESSMENT FOR 0-6

| A) CLINICAL FINDINGS: If 1 yes, then patient is in high risk | |
|--|--------|
| White spot lesion(s) | YES/NO |
| Developmental Enamel defect(s) | YES/NO |
| Visible cavity or filling (≥ 1 decayed/missing/ filled surface) | YES/NO |
| B) PATIENT FACTORS (increasing caries risk)If 3 yes, then patient is in high risk | |
| Oral factors: | |
| Visible/ old/ acidic plaque | YES/NO |
| No fluoride exposure (toothpaste) | YES/NO |
| General factors: | |
| Mother/guardian with high caries risk | YES/NO |
| Bed-time bottle feeding | YES/NO |
| Breast feeding on demand (after 12 Months) | YES/NO |
| > 3 snacks between meals (including bottle feeding) | YES/NO |
| Special health care needs | YES/NO |
| Low socioeconomic status | YES/NO |
| C) PROTECTIVE FACTORS (reducing caries risk) | |
| Twice a day tooth brushing (fluoride) | YES/NO |
| CPP-ACP exposure | YES/NO |
| Xylitol exposure | YES/NO |
| Healthy balanced diet | YES/NO |
| Regular preventive oral care | YES/NO |

CARIES RISK ASSESSMENT FOR 6 TO 14 YEARS

| A) CLINICAL FINDINGS: If 1 yes, then patient is in high risk | |
|--|--------|
| White spot lesion(s) | YES/NO |
| Developmental Enamel defect(s) | YES/NO |
| Visible cavity or filling (≥ 1 decayed/missing/ filled surface) | YES/NO |
| Approximal carious lesions (bitewings) | YES/NO |
| B) PATIENT FACTORS (increasing caries risk)If 3 yes, then patient is in high risk | |
| Oral factors | |
| Visible/ old/ acidic plaque | YES/NO |
| No fluoride exposure (toothpaste / mouthwash) | YES/NO |
| Defective restorations | YES/NO |
| Low saliva pH | YES/NO |
| High S. Mutans and/or Lactobacillus count | YES/NO |
| Orthodontic appliances | YES/NO |
| General factors: | |
| > 3 snacks between meals | YES/NO |
| Anorexia or bulimia | YES/NO |
| Systemic diseases affecting oral environment | YES/NO |
| Special health care needs | YES/NO |
| Low socioeconomic status | YES/NO |
| C) PROTECTIVE FACTORS (reducing caries risk) | |
| Twice a day tooth brushing (fluoride) | YES/NO |
| CPP-ACP exposure | YES/NO |
| Xylitol exposure | YES/NO |
| Chlorhexidine exposure | YES/NO |
| Healthy balanced diet | YES/NO |
| Regular preventive oral care | YES/NO |
| Fissure protection/ fluoride varnish | YES/NO |

It is standard practice for most dentists to wait for teeth to fully erupt before sealing them. This is due to the fact that proper isolation is not usually possible and that the effectiveness of bonding resin to aprismatic (immature) enamel is poor. At the same time, evidence shows that first and second molars can each take about 1.5 years to fully erupt and that during this period, the caries risk is the highest.

In addition, occlusal pits and fissures are eight times more susceptible to dental caries than smooth surfaces. While it is difficult to isolate a partially erupted molar when the tooth is covered by an operculum and resin-based sealants need a dry environment for their bonding effectiveness, low viscosity glass ionomer cements (GIC) (GC's Fuji Triage) is moisture tolerant and offers chemical adhesion to tooth structure, even in a moist environment. It can be argued that resin-based sealants rely on enamel etching and micromechanical retention and that etching aprismatic enamel does not provide a microretentive surface for an effective resin bond. However Fuji Triage, being glass ionomer cement, allows chemical adhesion, even to aprismatic enamel. Clinical studies indicate that Fuji Triage has

similar retention compared to resin-based sealants at 24 months and report reduced instances of marginal stains and carious lesions (Antonson et al. 2012). The retention of small amounts of GIC sealants could be sufficient to prevent carious lesions in pits and fissures. Fluoride-modified hydroxyapatite (Fluorohydroxyapatite) is much more caries resistant. Once the tooth is fully erupted, dentists still have the option to either renew the existing GIC sealant with a new GIC sealant or replace with resin-based sealant (Ahovuo-Saloranta et al. 2013, Ahovuo-Saloranta et al. 2016).

RESTORE

Restorative treatment in children depends on few factors: status of development of the dentition, caries risk assessment, oral hygiene, compliance of the child and his/her parent/caregiver and likelihood of recall.

In case of need for a restorative treatment, composite resin materials can be used, these materials require complete removal of carious dentin, dry working field and more chair-time (layering technique, use of bonding or etchants).

Specific tooth morphology with thinner enamel and dentin in primary teeth and large pulp chambers in primary teeth and

young permanent teeth, impatience and lack of compliance of a child or difficulties in maintaining dry field may require the use of other adhesive materials like GICs. These materials have several properties that make them favourable to use in children: chemical bonding to hard dental tissues, uptake and release of fluoride, decreased moisture sensitivity and shorter chair-time. Bioactivity of GICs with fluoride release offers the possibility for both interim therapeutic restorations (ITR) (AAPD 2013) and atraumatic restorative treatment (ART) restorations. ITR is a choice for children with multiple open carious lesions, prior to definitive restorations or for very young or uncooperative children. With ITR, traditional cavity preparation and restoration of teeth is either avoided or postponed. With ART technique, only infected dentin is removed towards the pulp with hand instruments protecting the vitality of the pulp and by avoiding the use of rotary instruments, this technique may be better accepted by children (Frencken et al. 2007; Tedesco et al. 2016).

ACTION PLAN FOR EARLY CARE

PATIENT GROUP

To reduce caries risk factors and to stop caries disease progression and/or

remineralise, it is advised to modify the oral health approach:

Oral hygiene: Parents or caregivers are responsible for brushing the child's teeth at least twice a day with fluoridated toothpaste, but with just a "smear" amount. For the children until the age of 2, pea size of fluoridated toothpaste should be used.

For younger children, parents or caregivers should help with maintaining proper oral hygiene. Tooth brushing at least twice a day, especially after meals, cleaning of approximal areas using dental floss or interdental brushes is advised.

Diet: Decrease the use of sweetened

liquids and avoid the use of pacifiers dipped in sugar or syrup. Avoid giving a sugary drink at a nap time or nighttime.

In older children reduce the intake of sweets and sugary drinks and snacking between meals. Snacking more than 3-4 times a day with sugar/starch containing sweets or sodas (Cola soda etc) is not advised. It is recommended to rather have these items with main meals, due to increased salivary flow, which will neutralise the acids more effectively.

Fluoride (F): Professional topical F application every six months. Do not use topical F gels (professional usage) under 6 years of age. F varnishes should be used for 2 or 4 times per year for caries prevention of both primary and permanent teeth.

Casein phosphopeptide-amorphous

calcium phosphate (CPP-ACP): The use of remineralizing agents CPP-ACP support to reduce incidence of early childhood caries (ECC). The CPP-ACP complex has been shown to remineralize tooth surfaces *in situ* when delivered in oral care products. CPP-ACP showed both a short-term remineralization effect and a caries-preventing effect for long-term clinical use. (Kargul et al. 2007, Chen & Wang 2010). This complex has a unique ability to deliver bio-available calcium and phosphate when they are needed most (Gupta & Prakash 2011). Remineralization of white spot lesions is enhanced by the use of F containing CPP-ACP products. CPP-ACP can be included in the routine hygiene and maintenance instructions for reversing or arresting white spot lesions in orthodontic patients and MI Paste Plus promote remineralization of enamel with mild to moderate Molar-Incisor-Hypomineralization (MIH). Casein phosphopeptide-amorphous calcium phosphate with fluoride (CPP-ACPF, Tooth Mousse Plus) can be also recommended to



be used in preventing erosive tooth wear from acidic beverages (Somani et al. 2014, Hani et al. 2016).

Other products may help changing the bacteria in the mouth such as xylitol (in sweets and chewing gums), silver diamine fluoride, chlorhexidine varnish/gel, povidone iodine, probiotic bacteria.

RECALL

Regular recall appointments will allow clinicians to act promptly if the caries risk factors are not in control, as well as remind the parents/ caregivers and patient about the importance of compliance (NICE, 2004). No matter how small the progress, it has to be recognized to further encourage and motivate the parents/caregivers and patients.

The clinician must consider each child's individual needs to determine the appropriate interval and frequency for oral examination; some infants and toddlers with high caries risk should be re-evaluated on a monthly basis. Most children at high risk need to be seen on a three-month interval for re-evaluation, additional counselling and clinical preventive services (e.g., fluoride varnish) while low-risk children can be re-evaluated at six- to 12-month intervals

TABLE 2 THIS TABLE OUTLINES HOW TO IDENTIFY RISK AND IMPLEMENT PREVENTION STRATEGIES TAILORED TO THE CHILD'S AGE

| | MI PREVENT TIPS | MI IDENTIFY TIPS |
|--|--|--|
| 0-3 yr | <p>As soon as the first tooth erupts- parents to start toothbrushing (twice daily)</p> <p>High risk:</p> <ul style="list-style-type: none"> Use fluoridated toothpaste (smear) twice a day Recalident twice a day | <p>Look out for initial carious lesions on smooth surfaces.</p> |
| 3-6 yr | <p>No more than a pea-sized amount of toothpaste should be used.</p> <p>High risk:</p> <ul style="list-style-type: none"> Use fluoridated toothpaste (pea size) twice a day(3 week) Recalident twice a day | <p>Look out for Interproximal surfaces</p> <p>Take bitewing x-rays</p> |
| 6-14 yr | <p>Continue adult supervision and guidance.</p> <p>Protect pits and fissure surfaces</p> <p>Interdental cleaning</p> <p>Use fluoridated toothpaste (pea sized) twice a day</p> <p>High risk</p> <p>Fluoride mouthrinse</p> <p>Chlorhexidine mouthwash (1 week/month)</p> <p>Recalident twice a day</p> <p>Xylitol (6-10gm/day)</p> | <p>Look out for Interproximal surfaces</p> <p>Take bitewing x-rays</p> |
| Restrict carbohydrates and low pH food intake at and in-between meals for all ages | | |
| <i>Note: For high-risk patients, re-evaluate risk factors on recalls and adapt recommendations when needed</i> | | |

(Ramos-Gomez et al 2010b).

Please refer to the MI Recall chapter for the questions that we advise can be addressed during subsequent patient recalls.

CLINICAL CASE REVIEWS SHOWING USE OF MI APPROACH ON PATIENTS IN EARLY CARE GROUP

TREATMENT OF EARLY CARIES
LESION IN A 5-YEAR-OLD CHILD

DR PATRICIA GATON, SPAIN

A 5-year-old child came to the practice due to pain when chewing on right side.

MI IDENTIFICATION

- High risk patient
- High risk parents
- Open cavities
- Presence of acidic plaque shown by GC Tri Plaque ID gel in light blue
- High sugar intake



MI PREVENT STRATEGY

- Parental motivation to become a team!
- For awareness and education of parents GC Tri Plaque ID gel was used
- Hygiene instructions (parents need to be helping and supervising)
- Fluoride toothpaste
- Recaldent: twice a day to help remineralisation and compensate low pH
- Dietary advice: less fermentable

carbohydrate intake

- Sealants (Fujj Triage)
- MI Varnish was applied on the occlusal and vestibular surfaces (recalls every 3 months)

MI RESTORE

- #84 Selective caries removal and restored with EQUIA
- #85 Mesial composite restoration

TREATMENT OF 14-YEAR-OLD CHILD UNDERGOING ORTHODONTIC THERAPY

DR PATRICIA GATON AND DR ESTHER RUIZ, SPAIN

14-year-old patient visits the dental practice for a consultation with a complaint about the aesthetics of the teeth.

MI IDENTIFICATION

- High risk patient
- Deciduous teeth caries
- Snacks between meals
- Needs ortho treatment
- Not very good hygiene
- Acidic saliva pH

MI PREVENT

- Motivational interview was made to explain what ortho devices means in terms

of caries and periodontal risks.

- Hygiene instructions were given because he is a teenager parents need help and supervision
- The patient is advised for toothbrush and rinsing with chlorhexidine 0.12 %: one week per month.
- The other three weeks the patient is advised to use Fluoride toothpaste

- Recaldent (MI Paste Plus) is advised twice a day to help remineralization and compensate low pH.
- Dietary advice: less fermentable carbohydrate intake

MI RECALL

Control visits every three months during ortho treatment.



TREATMENT OF CARIOUS LESIONS IN A 14-YEAR-OLD CHILD

DR MICHEL BLIQUE, LUXEMBOURG

Figures 1&2: The patient was 14 years old in 2009. He consulted us to evaluate caries risk before orthodontic treatment.

RISK FACTORS WERE: Poor oral hygiene, lack of interest for managing caries risk and high consumption of sugared soda. Due to numerous carious lesions (ICDAS 1 to 6) the decision was made to postpone the orthodontic treatment and to implement an MI and prophylactic approach.

MI PREVENT: The strategy was to increase home oral hygiene efficiency, regular Professional Mechanical Toothcleaning (PMTC) after control with Tri Plaque ID Gel (Figure 3), plus Fluoride varnish application.

MI RESTORE: All lesions were treated using the MI approach. Sealing of pits and fissures, and altered surfaces with Fuji Triage. Cavitated lesions were filled with EQUIA GIC (Figures 4-6).

AFTER 18 MONTHS THE SITUATION WAS UNDER CONTROL.

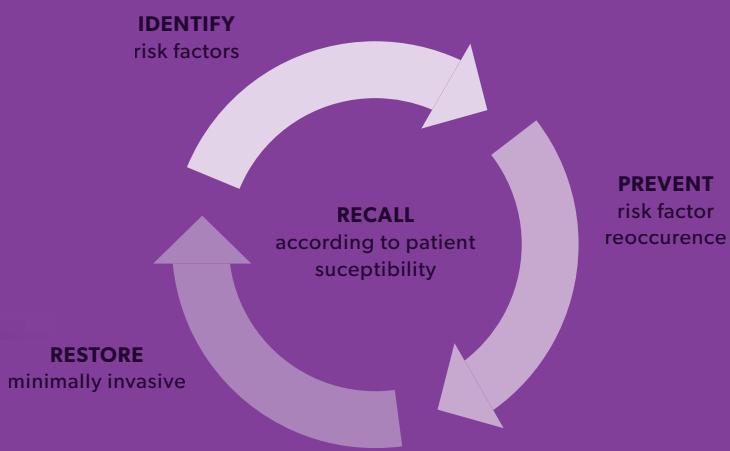
The patient came back every 4 months for evaluation, PMTC and control with Tri Plaque ID Gel, plus a Fluoride varnish application.

AFTER 7 YEARS, THE SITUATION IS STABLE

Today, the patient is now a very motivated patient, and visits us twice a year for caries risk evaluation. His preventive procedure is PMTC with Tri Plaque ID Gel and MI Varnish application. None of the GIC fillings or sealants has had any failure. (Figure 7).



MI ACTIVE CARE



“MINIMUM INTERVENTION CARE IS THE HOLISTIC ORAL HEALTHCARE TEAM APPROACH TO HELP MAINTAIN LONG-TERM ORAL HEALTH WITH PRIMARILY PREVENTION FOCUSED, PATIENT-CENTRED CARE PLANS COMBINED WITH THE DUTIFUL MANAGEMENT OF PATIENTS’ EXPECTATIONS.”

SEVİL GURGAN, TURKEY

MI ACTIVE CARE

Where to start treating an Active Care patient using the MI approach?

- Consider age
- Identify risk category: Consult checklist (MI Identify)
- Apply preventive care strategies (MI Prevent)
- Restore (MI Restore)
- Recall patients according individual need (MI Recall)

AGE OF PATIENT (FOR 14 YEARS AND ABOVE)

Different age groups may exhibit different habit patterns with foods and beverages. In early teens (children 14-15 years of age), habits relating to daily snacking and drinking sugar-containing soda on a regular basis start to develop (Reddy et al. 2016). Dental flossing is infrequent. Therefore, the risk of developing interproximal carious lesions is high. Hence special emphasis should be placed on observation and prevention of the disease in these areas.

Adults, especially with a numerous restorations, also need dental support

TABLE 3 CARIES RISK ASSESSMENT FOR 14 YEARS AND ABOVE

| A) CLINICAL FINDINGS: IF 1 YES, THEN PATIENT IS IN HIGH RISK | |
|---|--------|
| White spot lesion(s) | YES/NO |
| Developmental Enamel defect(s) | YES/NO |
| Visible cavity or filling (⇒ 1 decayed/missing/ filled surface) | YES/NO |
| Approximal carious lesions (bitewings) | YES/NO |
| Active root carious lesions | YES/NO |
| B) PATIENT FACTORS (INCREASING CARIES RISK) IF 3 YES, THEN PATIENT IS IN HIGH RISK | |
| Oral factors | |
| Visible/ old/ acidic plaque | YES/NO |
| No fluoride exposure (toothpaste / mouthwash) | YES/NO |
| Defective restorations | YES/NO |
| Low salivary flow | YES/NO |
| High S. Mutans and/or Lactobacillus count | YES/NO |
| Orthodontic appliances | YES/NO |
| General factors: | |
| > 3 snacks between meals | YES/NO |
| Anorexia or bulimia | YES/NO |
| Systemic diseases affecting oral environment | YES/NO |
| Low socioeconomic status | YES/NO |
| C) PROTECTIVE FACTORS (REDUCING CARIES RISK) | |
| Twice a day tooth brushing (fluoride) | YES/NO |
| CPP-ACP exposure | YES/NO |
| Xylitol exposure | YES/NO |
| Chlorhexidine exposure | YES/NO |
| Healthy balanced diet | YES/NO |
| Regular preventive oral care | YES/NO |
| Fissure protection/ fluoride varnish | YES/NO |

MI ACTIVE CARE

to avoid secondary carious lesions or periodontal disease. Patients with gingival recession are more susceptible to root carious lesions. Another caries risk factor is reduced salivary flow, which can even affect patients with good general health due to stress and social habits. Medication, chronic systemic diseases and even age can affect the quality and quantity of saliva, which consequently has impact on demineralization process (Llena-Puy 2006).

Studies have also shown that systemic diseases are significantly linked with poor oral health. For a long time it was assumed that bacteria was the factor that linked periodontal disease to other disease in the body; however, more recent research demonstrates that inflammation may be responsible for the association. Therefore, treating inflammation may not only help manage periodontal diseases but may also help with the management of other chronic inflammatory conditions resulting due to systemic diseases such as diabetes, heart disease, respiratory disease, Alzheimer disease, osteoporosis and cancer (Taylor et al. 2000, Taylor & Borgnakke 2008, Doens et al. 2014, Barton 2017).

Another factor that need to be taken

into account is tooth wear, which may increase with age due to erosion, attrition and abrasion. In order to prevent or reduce non-carious destruction it is important to recognize the problem, grade its severity, diagnose the likely cause or causes and monitor progress of preventive measures (Colon & Lussi 2014).

MI IDENTIFY

A caries risk-assessment form for children >14 and adults involve a combination of three main categories: clinical findings, pathological factors and protective factors. Caries risk assessment form for >14/adults is shown in Table 3.

MI PREVENT

The aim of MI Prevent is to reduce risk factors that are identified from the risk assessment charts (Table 3), which are aligned with the patient's specific risk profile and related treatment strategies. An individualized care plan can be created using the charts (Table 2), which will highlight the unique interventions required and make it easier to track the progress at recall appointments. The interproximal and occlusal areas may show higher caries risk. The use of demineralization

strategies, decreases the risk of caries progression, helps to control and reverse the incipient lesions (Featherstone & Doméjan 2012). Sealing the incipient carious lesions is a valid option as well (Wright et al. 2016b).

MI RESTORE

Restorative procedures should be undertaken only in cases when enamel and dentin are biologically unrepairable (Mount & Ngo 2000, Sheiham 2002). Our goal is to keeping cavities small as possible and to preserve as much as possible of hard dental tissues.

ACTION PLAN FOR ACTIVE CARE

PATIENT GROUP

1. Oral Hygiene Modification: All patients should be advised on how to improve oral hygiene with emphasizing need for interproximal cleaning (floss, single tufted and interdental brushes). Ideally tooth brushing with fluoridated toothpaste twice a day is recommended.

2. Diet Advice: Patients, especially those at high risk, have to be instructed to reduce carbohydrate in diet. Snacking more than 3-4 times a day with sugar/starch sweets or sodas (Cola soda etc.) need

TABLE 4 MI ACTIVE CARE

| | MI prevent tips | MI Identify tips* |
|--|--|---|
| Low caries risk group | Use fluoridated toothpaste (pea sized) twice a day Inter-dental cleaning | Look out for initial and interproximal carious lesions and take bite-wing x-rays (first visit and high risk pts) |
| High caries risk group | Use fluoridated toothpaste (pea sized) twice a day Interdental cleaning Fluoride mouthrinse Chlorhexidine mouthwash (1 week/month) Recaldent twice a day Xylitol (6-10gm/day) | Look out for Interproximal surfaces Take bite-wing x-rays if necessary |
| Perio and prosthodontic patient care | Use fluoridated toothpaste (pea sized) twice a day Interdental cleaning Fluoride mouthrinse Use of Chlorhexidine (1week/ month) | Check for root caries Perio probing- once (low risk) or twice (high risk) a year |
| Non- carious lesion | Use fluoridated toothpaste (pea sized) twice a day Fluoride mouthrinse Recaldent twice a day Advise use of soft tooth brush and gentle brushing | Recognize the tooth wear and identify the aetiological factors. Recommendation: take pictures of lesion and evaluate progress and decide the treatment plan. |
| Restrict carbohydrates and low pH food intake at and between meals for all ages. | | |

Note: For High-risk patients, re-evaluate risk factors on recalls and adapt recommendations when needed

to be avoided. It is recommended to rather have these items with main meals, due to increased salivary flow, which will neutralize the acids more effectively.

3. Fluoride: Fluoride application is recommended for patients with high caries risk to enhance the remineralization of the tooth structure.

4. Chlorhexidine: Antimicrobial chlorhexidine mouthrinses, sprays, gels, or chewing gums to prevent caries in adolescents is not recommended (Walsh et al. 2015).

In patients with high risk to develop root carious lesions or with existing root carious lesions, professional application of chlorhexidine with combination of fluoride is advised (Wierichs & Meyer-Lueckel 2015).

5. Amorphous calcium phosphate (CPP-ACP): A product containing CPP-ACP has shown caries reduction potential by remineralizing tooth structure. Application of products containing CPP-ACP using a cotton swab or finger follows the use of fluoridated toothpaste twice a day.

4. Removing all other risk factors which can lead to demineralization of hard dental tissue or affecting periodontal tissue:

- a)** Perform professional tooth cleaning
- c)** Take special care of gingival recession, defective restorations with open margins
- d)** Stimulate salivary flow if necessary

MI RECALL

The recall interval is based on individual risk assessment and it is ranged between 3 and 24 months (NICE, 2004). In the recall appointment practitioner needs to assess efficacy of the treatment therapy. Regular recall appointments will allow clinicians to act promptly if there is no progress through evidence-based MI treatments, as well as remind the patient of the importance of compliance. However small, any progress should be noted and used as further encouragement of the patients. It is essential to motivate and educate patients about the benefits of having better oral health habits as well as healthier eating and other disease preventing lifestyle habits. With this approach, the risk factors can be kept under control and minimized over time.

Please refer to the MI Recall chapter for the questions that we advise can be addressed during subsequent patient recalls.

CLINICAL CASE REVIEWS SHOWING USE OF MI APPROACH ON PATIENTS IN ACTIVE CARE GROUP

LONG-TERM FOLLOW UP OF A HIGH RISK PATIENT

DR MATTEO BASSO, ITALY

INITIAL SITUATION

Patient, male, 18-year-old, good health status, no allergies, no medical treatments, was referred to dental clinic for aesthetic restorative treatments in upper anterior area. Patient reported a facial trauma consequent to a car accident occurred 5 years before, in which he partially lost crowns of teeth #11 and #22. Moreover, as a consequence of this event, endodontic treatments were necessary after trauma on teeth #11 and 21#. A scar from periodontal plastic surgery with connective tissue graft is visible in vestibular area of lower incisors. Patient wore an orthodontic appliance before and after trauma.



At **CLINICAL INSPECTION**, several preexisting restorations are present, in many cases with lack of marginal integrity (Figure 1). Teeth #11 and #21 appeared discromic, as a consequence of endodontic treatment. Many initial carious lesions (Figure 2) are present on many teeth, some of them related to oral hygiene difficulties during orthodontic

treatment.

Patient requested aesthetic conservative treatment in order to recover smile line and proper appearance in social life. Treatment plan has been planned as follows:

1. Professional oral care + home care instructions (brushing, flossing, interdental brushes)

2. Removal of failing restorations with provisional but more aesthetic ones, in order to A) make the patient happy of his smile even after few appointments, B) remove bacteria reservoir in marginal cracks and cavities, C) proceed with safe endodontic retreatment and bleaching on teeth #11 and #21, D) evaluating integrity of remaining teeth after trauma.

3. Managing of oral balance and maintenance of teeth integrity, even in teeth affected by initial caries lesions:

- Plaque and saliva tests
- Sealing of cavities with glass ionomers cements (Figures 3 and 4)

PROCEDURE

After executing points 1 and 2, oral environment has been checked.

- Resting saliva test: 7.6 → OK
- Plaque acidogenic ability:



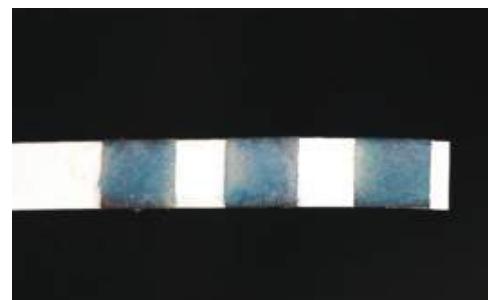
orange red → HIGH RISK

- Plaque disclosing gel test: blue → HIGH RISK
- Buffering capacity: OK
- Streptococci mutans count test: POSITIVE → RISK



PROTOCOL ADOPTED:

- CPP-ACP (Tooth Mousse™) cycles of applications (2 application/day for 1 month every 4 months)
- Fluoride toothpaste 1450 ppm everyday (Sensodyne ProEnamel™)



*The two tone plaque disclosing gel is replaced by the three tone disclosing gel, GC Tri-Plaque ID gel.

MI ACTIVE CARE: CASE STUDY

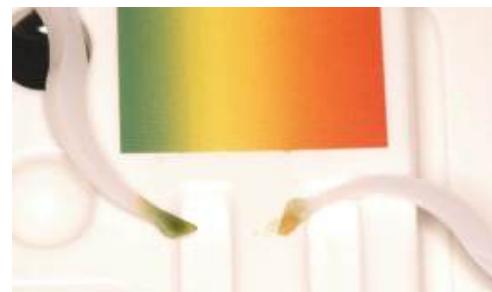
- Tight recall program every 2 months
- Soft-bristles toothbrush (Curaprox Ultrasoft 5460)
- Interdental Brush (Curaprox Prime 06 Green)

2 MONTHS RECALL

- Patients reported no bleeding during brushing, neither pain. Gums appeared ameliorated, and the quality of oral hygiene appeared visibly better. New plaque and saliva test have been performed, reporting better oral environment conditions.



- New permanent composite restorations have been placed on teeth 11, 21, 22 (Figure 5).
- Existing GIC restoration has been kept.
- Exposition to CPP-ACP has been maintained every 4 month follow-ups



FOLLOW-UP



FOLLOW-UP 1 YEAR LATER



LONG-TERM TREATMENT OF YOUNG HIGH CARIES RISK PATIENT

PROF DR ELMAR REICH, GERMANY

2006: Patient drinks Cola soda during and in between meals, sweet snacks.

Diagnosis: enamel carious lesions. Caries risk: high. DIAGNOdent measurements 17:13; 16:32; 15:11; 27:14; 37:23; 36:50; 46:34; 47:21

Treatment: prevention in practice: PMTC, Fluorides, GC Tooth Mousse at recall;

fissure sealants: 16, 17, 36, 46,

2010 Diagnosis: interdental caries.

Caries risk: high.(Cola soda and sweets) Fractured composite 11, 21; deep approximal carious lesions 17 mesial.

2013 Diagnosis: progression of caries

36. Caries risk: high (Cola soda and sweets, seldom floss).

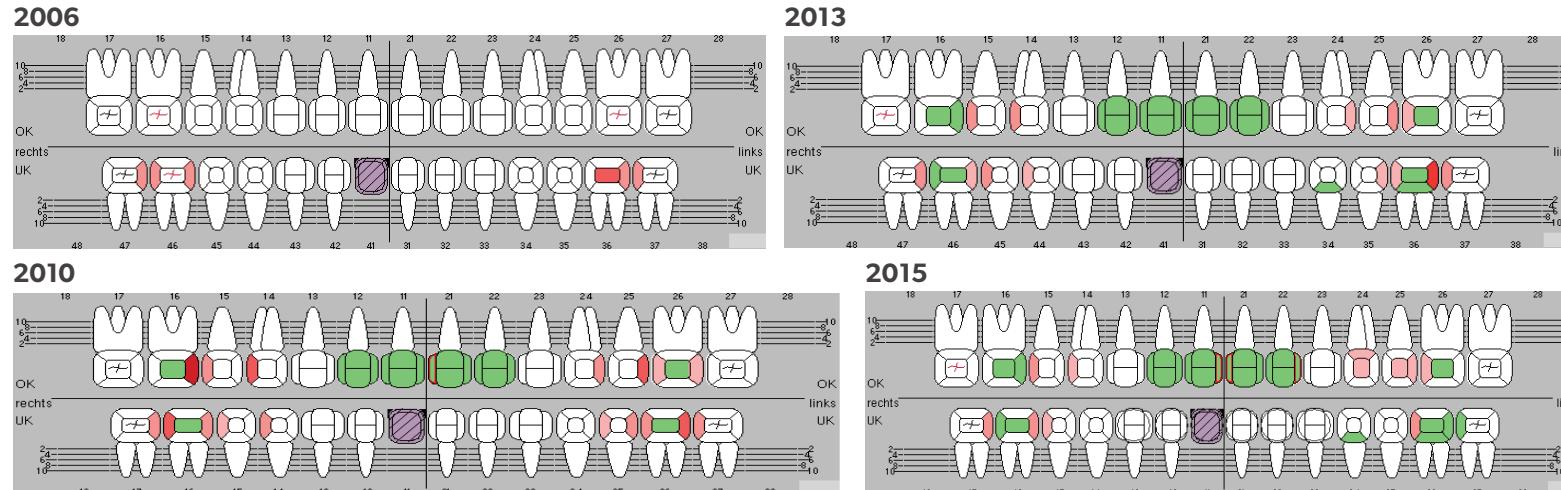
Treatment: prevention in practice:

PMTC, fluoride, GC Tooth Mousse at recall, restoration 36.

2015 Diagnosis: inactive approximal

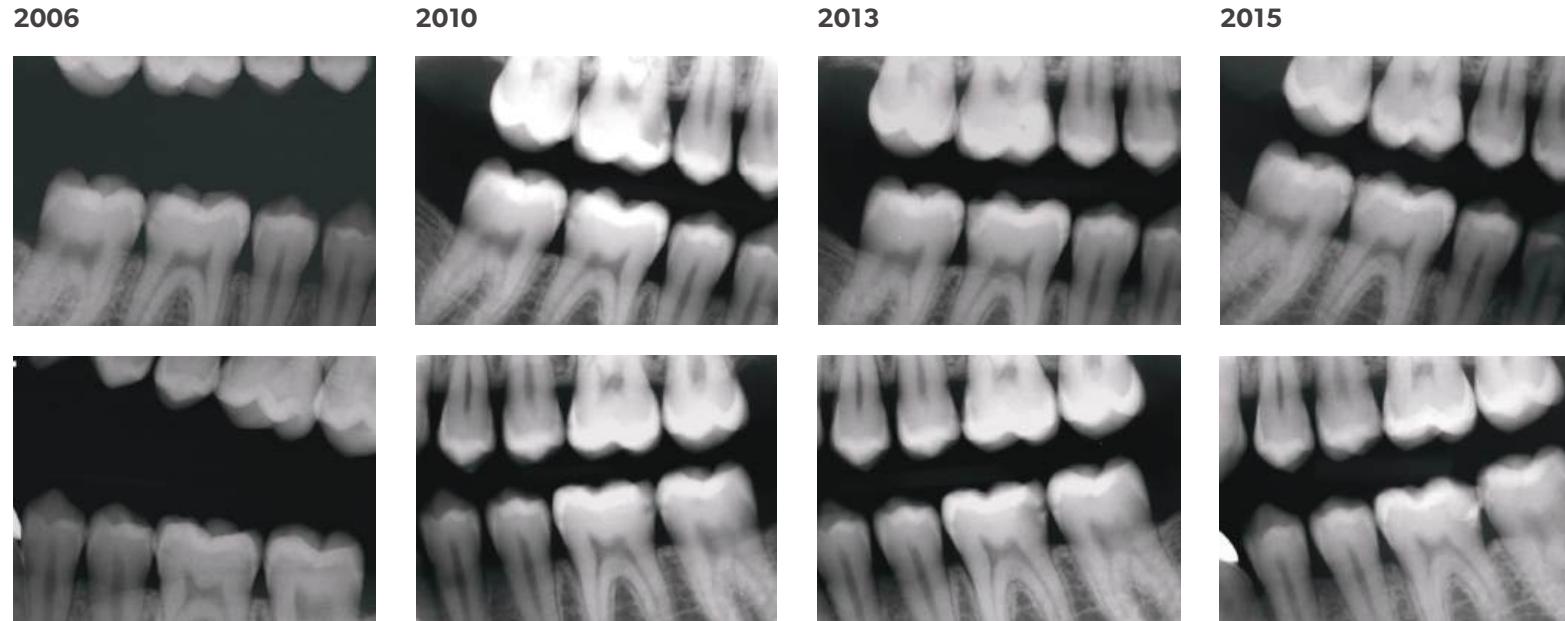
caries lesions. Caries risk: low. healthy diet, drinks water - no more coke. Uses floss regularly.

CHARTING WITH ENAMEL CARIOUS LESIONS (PINK) AND DENTIN APPROXIMAL CARIOUS LESIONS (RED)



MI ACTIVE CARE: CASE STUDY

CONSECUTIVE BITEWING RADIOPHGRAPHS

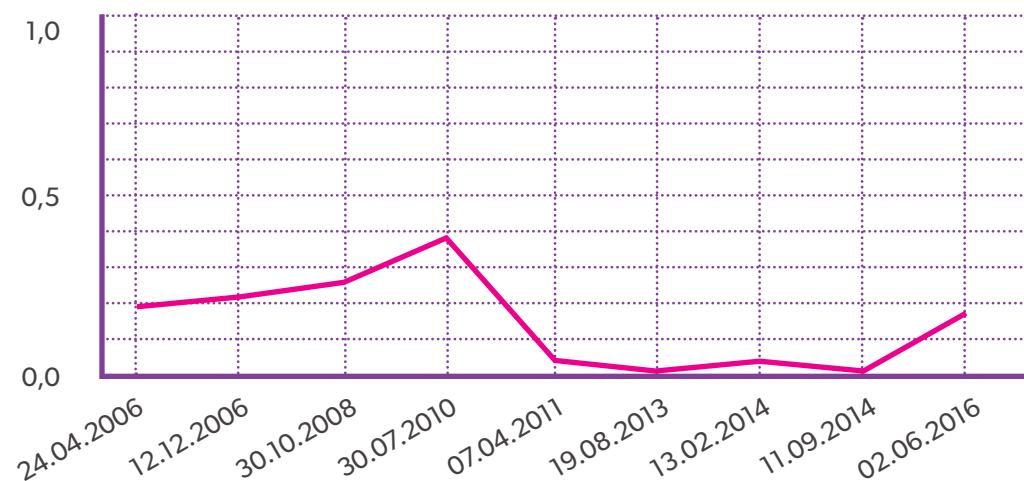


PAPILLARY BLEEDING INDEX

Personal oral hygiene:

- Manual toothbrush, fluoride dentifrice twice daily
- Dental floss a couple of times during the week since 2011, not daily.

Due to his high caries risk this patient has some interdental surfaces with increasing caries (37dis; 46dis). Other enamel caries lesions could be stopped (14, 15, 24, 25).



MI ACTIVE CARE: CASE STUDY

2006 TOOTH 16



2010 TOOTH 16



2015



2006 TOOTH 26



2010 TOOTH 46



2013



Clinical situation in the beginning (2006) and during treatment. the caries risk was high until 2013 and then finally dropped to low thereafter.

MINIMALLY INVASIVE TREATMENT OF EROSION

PROF DR ELMAR REICH, GERMANY

Young female patient (26 years) with history of fruit and salad eating. Because of the hypersensitivity and unpleasant aesthetics composite restorations were placed. GC Tooth Mousse application on sensitive front teeth with enamel lesions. The big lesions were later restored with GC Gradia composites.

EROSION: DIAGNOSIS

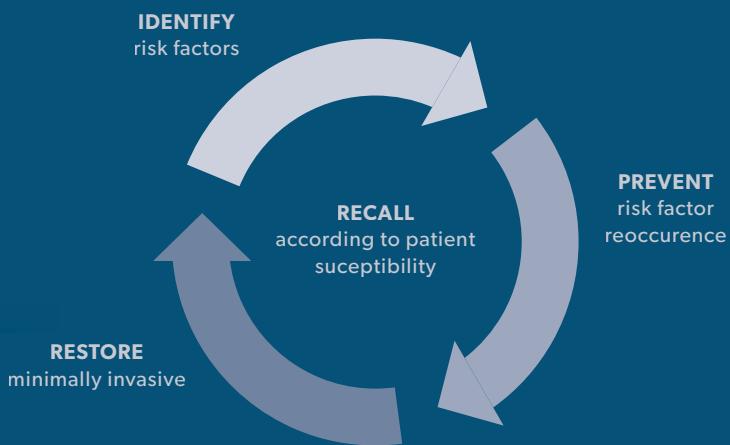
In enamel often not visible
In dentine clearly visible colour differences



RESTORATIONS



MI CARE PLUS



“THE AVERAGE AGE OF PATIENTS WORLDWIDE IS INCREASING, WHICH MEANS THE PRESERVATION OF TEETH IS ALSO INCREASING. WE WILL HAVE LESS EDENTULOUS PATIENTS AND MORE TEETH TO PRESERVE, ESPECIALLY IN AGES WITH HIGHER RISK FACTORS WHICH INCLUDE HYPOSALIVATION, DISABILITY, CHRONIC MEDICATION AND CHRONIC DISEASES.”

MATTEO BASSO, ITALY

MI CARE PLUS

Where to start when treating a Care Plus patient using the MI approach?

- Consider age and specific needs
- Identify risk category: Consult checklist (MI Identify)
- Apply preventive care strategies (MI Prevent)
- Restore (MI Restore)
- Recall patients according individual need (MI Recall)

AGE OF PATIENT AND SPECIFIC NEEDS

A. Ageing population

One of the main concerns globally today is the trend of the growing aging population. According to the World Health Organization, from 2000 until 2050, the world's population aged 60 and over will more than triple from 600 million to 2 billion. Most of this increase is occurring in less developed countries - where the number of older people will rise from 400 million in 2000 to 1.7 billion by 2050. Simply put, there are more people in the world who are living longer and retaining more of their dentition, therefore needing unique oral health care. The choice of treatments and care

recommendations should be adapted accordingly. This trend has a big impact on public health and highlights the need for a preventive care model and holistic approach to lifelong vitality. Dentistry has an important role to play in this context, by offering specialized treatments for periodontal health and implant and denture wearers on a long term basis, while adapting strategies to treat individuals who may also have degenerative conditions such as dementia and Parkinson's disease. The quality of life of individuals with health concerns and compromised dexterity or vision can be improved with supportive care. The MI Care Plus patient category was outlined by the MI Advisory Board to provide tailored recommendations, care and advice to people with special needs. This includes anyone with chronic health concerns, impaired mental health, compromised dexterity or vision, dry mouth (due to chemotherapy or radiotherapy) and other conditions affecting the soft and hard oral tissues. A supportive MID care plan will provide a good foundation to improve their oral health and quality of life.

B. Pregnant women

Dental teams have a responsibility to inform and educate women about the possible changes in their oral health during pregnancy (Albino & Tiwari 2016). Preventive care strategies of regular check-ups and advice on how to identify problems before they become worse should be adopted. This patient group is also uniquely placed to receive information about looking after their babies' teeth once born, the importance of fluoride and preventing early childhood caries, making it an important investment to spend time talking to expectant mothers.

C. Special needs individuals

Patients with special needs are those who due to physical, medical, developmental or cognitive conditions require special consideration when receiving dental treatment. These can include a range of conditions such as cerebral palsy, autism spectrum disorder, dementia and many others that can make routine dental treatments a challenge. Treating patients in this particular

group requires the dental team to have patience, empathy and an approach of working within the limitations of each situation in order to achieve an optimal outcome. Thanks to MI methods, there is much that can be done for these patients without causing too much distress or discomfort, and can help prevent any future oral health related complications.

MI IDENTIFY

Caries risk assessment form for elderly patients and those with special needs is shown in Table 5. It includes clinical findings, pathological factors and protective factors.

MI PREVENT

The aim is to reduce risk factors that are identified from the risk assessment charts, which are aligned with the patient's specific risk profile and related treatment strategies. An individualized care plan can be created using the charts, which will highlight the unique interventions required and make it easier to track the progress at recall appointments. Every group within the MI Care Plus category has a specific preventive requirement. In cases where patients with special needs have limited efficiency with their oral hygiene, the

TABLE 5 CARIES RISK ASSESSMENT FOR OLDER ADULTS/ PREGNANT WOMEN/ SPECIAL NEED INDIVIDUALS

| A) CLINICAL FINDINGS: IF 1 YES, THEN PATIENT IS IN HIGH RISK | |
|---|--------|
| Visible cavity or filling (→ 1 decayed/missing/ filled surface) | YES/NO |
| Approximal carious lesions (bitewings) | YES/NO |
| Active root surface caries | YES/NO |
| B) PATIENT FACTORS (INCREASING CARIES RISK) IF 3 YES, THEN PATIENT IS IN HIGH RISK | |
| Oral factors | |
| Visible/ old/ acidic plaque | YES/NO |
| No fluoride exposure (toothpaste / mouthwash) | YES/NO |
| Defective restorations | YES/NO |
| Extensive prosthodontic therapy, removable or fixed dentures | YES/NO |
| Low salivary flow | YES/NO |
| High S. Mutans and/or Lactobacillus count | YES/NO |
| Orthodontic appliances | YES/NO |
| General factors: | |
| > 3 snacks between meals | YES/NO |
| Anorexia or bulimia | YES/NO |
| Systemic diseases affecting oral environment | YES/NO |
| Low socioeconomic status | YES/NO |
| C) PROTECTIVE FACTORS (REDUCING CARIES RISK) | |
| Twice a day tooth brushing (fluoride) | YES/NO |
| CPP-ACP exposure | YES/NO |
| Xylitol exposure | YES/NO |
| Chlorhexidine exposure | YES/NO |
| Healthy balanced diet | YES/NO |
| Regular preventive oral care | YES/NO |
| Fissure protection/ fluoride varnish | YES/NO |

dental team should compensate by increasing professional care and educating parents or caregivers. The team should develop an individualized oral hygiene program that takes into account the unique disability of the patient alongside recommending a non-cariogenic diet for the long-term prevention of dental disease. The wellbeing of pregnant women is considered part of MI Care Plus approach. Nausea, vomiting and food cravings are common during pregnancy, which can decrease the pH and buffering capacity of saliva. This can lead to dental wear and increased caries risk. All these factors, together with pregnancy gingivitis, will make it difficult to maintain a healthy oral environment for both the women and the dental team. The care plan needs to be individualized by the dental team. The objective is to reinforce the motivation of the patient or caregiver, keep the risk factors under control and to act promptly if there is any lack of compliance or progression of the carious lesions.

MI RESTORE

Although all restorative procedures should be undertaken only in cases when enamel and dentin are biologically unrepairable, keeping cavities as small as possible, practitioner

needs to keep in mind cases, which demands endodontic treatment, prosthodontics treatment or implants. These patients are usually in high-risk category and it is necessary to reduce bacteria loading by systematic individual therapy based on risk assessment.

ACTION PLAN FOR CARE PLUS PATIENT

- 1. Oral Hygiene Modification:** All patients should be advised on how to improve oral hygiene with emphasizing need for interproximal cleaning (floss, single tufted and interdental brushes). Ideally tooth brushing with fluoridated toothpaste twice a day is recommended.
- 2. Diet Advice:** Patients, especially those at high risk, have to be instructed to reduce carbohydrate in diet. Snacking more than 3-4 times a day with sugar/starch sweets or sodas (Cola soda etc.) need to be avoided. It is recommended to rather have these items with main meals, due to increased salivary flow, which will neutralize the acids more effectively.
- 3. Fluoride:** Fluoride application is recommended for patients with caries high risk to enhance the remineralization of the tooth structure.
- 4. Chlorhexidine:** Use of chlorhexidine is advised for high-risk patients with the intention to shift towards healthier oral flora. To avoid temporary side effects of chlorhexidine like brownish discolouration's of teeth and a bitter taste of the rinse recommendation for use is seven consecutive days per month.
Combination of chlorhexidine and xylitol in chewing gums are recommended for elderly partially and completely edentulous. (Simons et al. 2002).
- 5. Amorphous calcium phosphate (CPP-ACP):** A product containing CPP-ACP has shown caries reduction potential by remineralizing tooth structure. Application of products containing CPP-ACP using a cotton swab or finger follows the use of fluoridated toothpaste twice a day.
- 6. Removing all other risk factors which can lead to demineralization of hard dental tissue or affecting periodontal tissue:**
 - a) Perform professional tooth cleaning
 - c) Take special care of gingival recession, defective restorations with open margins
 - d) Stimulate salivary flow if necessary by advising the patients to use sugar free chewing gum and to relieve the dry mouth symptoms by using GC Dry Mouth Gel or 2 tablespoons of baking soda with water.

TABLE 6

MI PREVENT TIPS**MI IDENTIFY TIPS***

| | | |
|--------------------------------------|--|---|
| Low caries risk group | Use fluoridated toothpaste (pea sized) twice a day Interdental cleaning Fluoride mouth-rinse | Lookout for initial and inter-proximal carious lesions and take bite-wing x-rays (first visit and high risk pts) |
| High caries risk group | Recommend electric toothbrush for reduced manual capacities Use fluoridated toothpaste (pea sized) twice a day Inter-dental cleaning Fluoride mouthrinse Chlorhexidine mouthwash (1 week/month) Recaldent twice a day Xylitol (6-10gm/day) | Lookout for Interproximal and cervical surfaces Take bite-wings |
| Pregnant women | Use fluoridated toothpaste (pea sized) twice a day Interdental cleaning Fluoride mouth-rinse Chlorhexidine mouthwash (1 week/month) Recaldent twice a day Xylitol (6-10gm/day) | Lookout for pregnancy gingivitis Lookout for pH of saliva (gastric reflux or vomiting) |
| Perio and prosthodontic patient care | Use fluoridated toothpaste (pea sized) twice a day(3 week) Interdental cleaning Fluoride mouthrinse (3 week) Use of Chlorhexidine (1week/ month) | Check for root caries Perio probing- once (low risk) or twice (high risk) a year |
| Non- carious lesion | Use fluoridated toothpaste (pea sized) twice a day Fluoride mouthrinse Recaldent twice a day Advise use of soft tooth brush and gentle brushing | Recognize the tooth wear and identify the aetiological factors. Recommendation: take pictures of lesion and evaluate progress. |

Restrict carbohydrates and low pH food intake at and in-between meals for all ages

*Low risk patients: risk analysis once a year and High risk patients: risk analysis twice a year

MI RECALL

The recall interval is based on individual risk assessment and it is ranged between 3 and 24 months. Since this is a very high-risk group,

these patients should be recalled 3-4 times a year in order to achieve behavioral modification, control of demineralization process by controlling biofilm and healthy dentition.

Please refer to the MI Recall chapter for the questions that we advise can be addressed during subsequent patient recalls.

CLINICAL CASE REVIEWS SHOWING USE OF MI APPROACH ON PATIENTS IN CARE PLUS GROUP

CARIES MANAGEMENT IN ELDERLY PATIENT

DR MICHEL BLIQUE, LUXEMBOURG

This 87-year-old patient in 2009, is suffering from severe Parkinson's Disease. The patient asked for a second opinion due to the fact his dentist recommended extractions of all teeth and bi-maxillary full dentures. The patient did not want full dentures and was seeking an alternative treatment (Figure 1).

Risk factors were: Poor oral hygiene due to tremors, which impair efficiency, high consumption of candies and snacking, medical treatment reducing saliva flow. Decision was made to implement an MI and prophylactic approach.

MI Prevent: Increase home oral hygiene efficiency (skipping to oscillo-rotative electric brushing) with 2500ppm fluoride toothpaste (Figure 2), regular Professional Mechanical Toothcleaning (PMTC) after control with Tri Plaque ID Gel, plus Fluoride varnish applications.

MI Restore: All cavitated lesion were filled with EQUIA GIC, even on anterior teeth (Figure 3). Sealing of decayed root surfaces with GC Triage GI (Figures 4-5). Former



partial dentures where repaired and adapted to the new situation.

After 2 years, situation was under control. The patient is now in nursing residence, and coming every 6 months at the office for caries risk evaluation, PMTC and control with Tri Plaque ID Gel, plus Fluoride varnish application (Figure 6).

LONG-TERM MANAGEMENT OF ELDERLY PATIENT

PROF DR ELMAR REICH, GERMANY

70-year-old patient presented himself in the practice with an old prosthesis and periodontitis – before and after scaling.



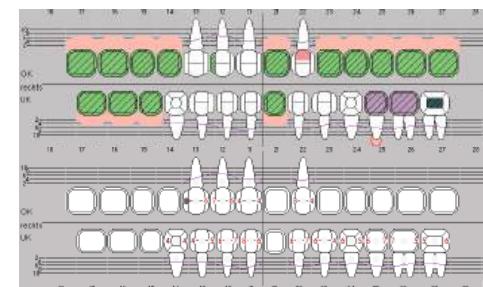
Patient with severe periodontitis insufficient prosthesis and ineffective oral hygiene. After PMTC and scaling appointments the clinical situation improved. The patient opted for fixed bridges on natural teeth and implants.

Situation in 2007 at the beginning of treatment

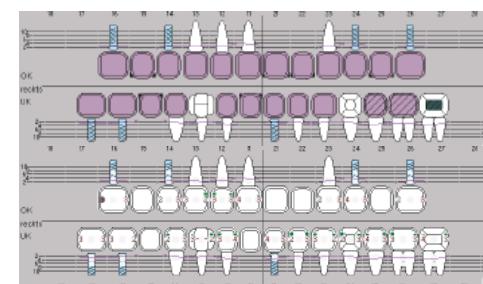


Graphic presentation of situation before and after treatment.

2007



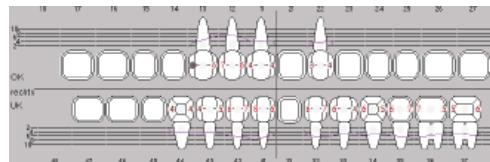
2016



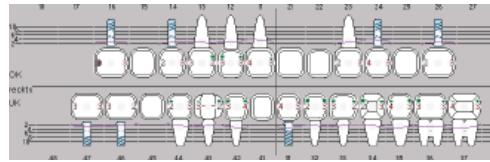
MI CARE PLUS: CASE STUDY

Periodontal charting in

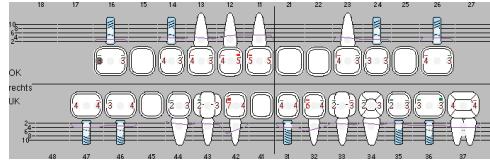
2007



2009

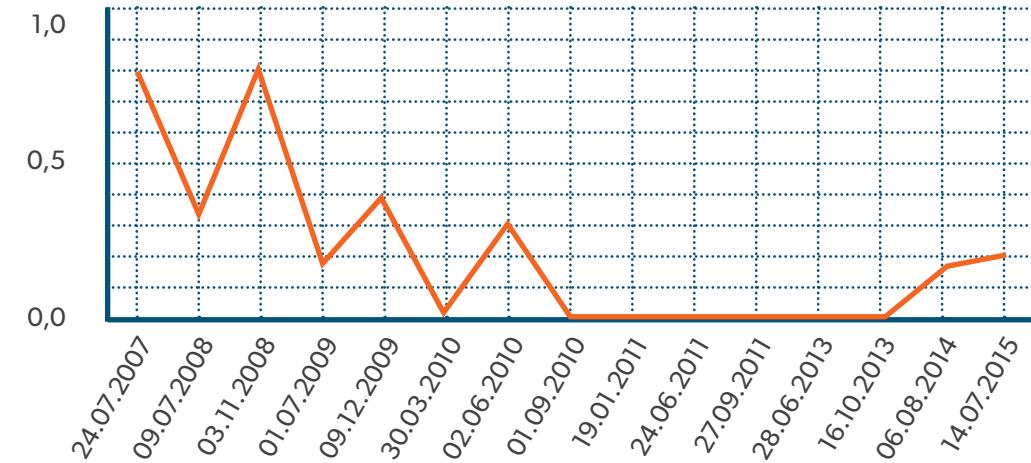


2015



8 years after the initial treatment phase the patient is coming 2 - 3 times a year to recall appointments. His oral hygiene is fair but needs professional support. The periodontal situation around the teeth and implants is stable. He uses 1% CHX-gel with an interdental brush in the posterior interdental areas.

Papillary bleeding index



2016: Left aspect



2007: before treatment



2016: Right aspect



2016: in recall and 8 years after treatment



MI TREATMENT OF PERIODONTAL INFLAMMATION DURING PREGNANCY

DR MATTEO BASSO, ITALY

INITIAL SITUATION

Patient, female, 28-year-old, good health status, no allergies, no medical treatments, has been referred to dental clinic for treatment of periodontal inflammation during pregnancy. Patient reported daily episodes of bleeding gums, pain on brushing, halitosis, dental sensitivity.

At clinical inspection, hard and soft plaque deposits were visible. Bleeding on probing was easily provoked. Gingival inflammation was evident along both dental arches.



Last professional oral hygiene was performed 11 months before visit. Patient avoided every dental checkup visit after knowing to be pregnant.
Saliva Check Test revealed:

- Buffering ability of stimulated saliva: OK
- Resting Saliva pH: 6.8



PROCEDURE

Being in the 5th month of pregnancy, initial scaling with ultrasonic and manual devices was performed. Polishing with fluoridated, low abrasive paste had been also performed.



Patient was instructed for home dental cleaning, and was given new soft-bristles toothbrush (Curaprox UltraSoft 5460) and interdental brushes (Curaprox Prime 07 Red). A check-up visit was scheduled after 14 days.

14-DAY FOLLOW UP

Patient reported no more bleeding during brushing, neither pain. Gums appeared ameliorated, even if quality of oral hygiene was still no good in proximal areas. Few



deposit of calculus were still visible in lower arch, in the incisor area. New, more detailed instructions for cleaning were given.

SENSITIVITY / ENAMEL QUALITY

Beside the periodontal problem, increase of dental sensitivity has been reported by the patient after professional treatment. Even if this clinical situation is quite common after professional oral hygiene or periodontal root planing, the status of enamel on different teeth appeared affected of a initial texture loss (BEWE score = 1 Bartlett et al, Clin Oral Investig. 2008 Mar; 12(Suppl 1): 65–68.)

Application of a high fluoride, CPP-ACP containing professional varnish (GC MI Varnish) has been decided in order to protect surfaces against erosive attacks, bacterial acidic attack, to reinforce enamel texture and also to reduce dental sensitivity.



MI RECALL

MITP is based on the susceptibility of each patient and is customized according to the specific aetiological factors involved in each clinical case. Its success is largely dependent on the tailored preventive procedures and on the follow-up regimen. The main objectives of the MI recall visit are to control the oral balance, to prevent oral disease and possibly to detect and treat it at an early stage.

In order to customize the MI recall frequency, several important points have to be kept in mind:

- The carious process is a slow process: It takes about two years for a carious lesion to progress through the enamel. Patients aged 12 years or older having recall dental examinations at intervals longer than 6 months are not disadvantaged as they do not exhibit more severe dental caries or periodontal disease than those attending at intervals of 6 months (Sheiham et.al 2002).
- Living in a fluoridated area retards lesion progression: Residence in a fluoridated area has a marked retarding effect on both enamel and dentinal lesion progression (Arrow et al. 2007).
- Age can be a predisposing factor: In a low caries prevalence population, both the incidence of new caries lesions and that of lesion progression are lower during young adulthood than during adolescence. The risk of both new approximal enamel lesions and lesion progression is clearly greatest during early adolescence, in the first 2–3 years after eruption (Arrow et al. 2007). For the elderly patient, professional support may be required for prolonged periods of time until efficient control is achieved.
- The health system of each country has to be considered: As an example, in the UK, following NHS regulations in the General Dental Service, dental practitioners are encouraged to perform 6-monthly check-ups and registration with an NHS dentist lapses after a 15-month gap between visits (Davenport et al. 2003).
- The recall frequency has to be adjusted to patient's response to treatment: At each

recall appointment, the interval should be reviewed according to the patient's responses to the oral care provided and the health outcomes.

RISK ASSESSMENT FOR PERIODONTAL DISEASES

Periodontal treatment was the first area in dentistry with longitudinal studies to evaluate the long term effect of different treatment regimes. It became clear early that the outcome and success was less attributed to the method of periodontal treatment (surgical or subgingival scaling) but in the long run more so on the quality and frequency of the recall.

Periodontal risk assessment should be done prior to treatment and in regular intervals (yearly) during the maintenance phase (recall).

MI RECALL TIPS

Keep in mind these questions when you have your patients on recalls.

- Is the bacterial environment under control?
 - Do the plaque test, bacterial tests or the salivary tests.
- Does the chemical treatment seem to be efficient?
 - Evaluate the efficiency of at-home treatment
 - Look out for the signs of demineralization
- Check if there is remineralization or not?
- Check if the sealants and dental restorations are stable?
- Evaluate if the diet risks are still present?
- Check the evolution of the lesion on the X-rays

RISK ASSESSMENT FOR PERIODONTAL DISEASES

Right from the young patients to older adults, the periodontal status of the patients has to be evaluated to have a proper diagnosis and treatment plan. For patients with high periodontal risks a frequent recall and screening is mandatory.

| | |
|--|--------|
| Gingivitis (bleeding gingivae; plaque; tartar) | YES/NO |
| Periodontal diseases, Bleeding on probing | YES/NO |
| Increased probing pocket depth | YES/NO |
| Bone loss | YES/NO |
| Missing teeth due to periodontal disease | YES/NO |
| Smoking | YES/NO |
| Systemic diseases (HIV, diabetes etc) | YES/NO |
| Stress | YES/NO |

PRODUCT OVERVIEW

1. GC TRI PLAQUE ID GEL

Three-tone plaque disclosing gel that identifies new, mature and acid producing biofilms

- Three easy steps to ensure patient compliance
- Plaque is revealed in three tones:
 1. blue/purple - old plaque (more than 48 hours)
 2. red/pink - newly formed plaque
 3. light blue - high risk plaque
- After diagnosis, simply brush the teeth to clean them



2. GC EQUIA

Self-adhesive Posterior Restorative

- No bonding agent needed, chemical adhesion with tooth structure
- Low moisture sensitivity
- Bulk placement with only 3'30" in total needed from start to finish
- Filler content provides wear resistance and fracture toughness
- Optimal protection of marginal seal for long-lasting restorations
- Tooth coloured restorative material, with real translucency and natural gloss and smoothness



3. GC MI VARNISH

Bioavailable Calcium, Phosphate and Fluoride for an Enhanced Varnish Treatment, containing RECALDENT™ (CPP-ACP)

- MI Varnish delivers a powerful dose of fluoride, with the added booster effect of the calcium and phosphate ions through its patented Recaldent™ technology.
- Minimises tooth sensitivity and strengthens enamel
- Neutral pH of 6,6 enhances enamel acid resistance and inhibits demineralization
- Penetrates dentinal tubules effective to form a good seal
- Simple application requires no preparation or prophylaxis
- Sticks to applicator brushes and flows easily in hard to reach areas
- Does not clump or coagulate when exposed to saliva
- Neutral shade with natural translucency
- Available in 2 delicious flavours - Strawberry and Mint

4. GC FUJI TRIAGE

Radiopaque GIC surface protection

- Very high level of fluoride release
- 6 times higher than any other glass ionomer cement (GIC)
- Can be applied when saliva control is not possible
- To treat newly erupted molars (partially) covered by tissue
- Chemical adhesion to tooth structure
- No etching, no bonding
- Self curing conventional GIC with optional command set with VLC unit



5. GC SALIVA-CHECK BUFFER

An in-office test to evaluate quality of saliva

- Checks the flow rate, viscosity and consistency of non-stimulated saliva. This will provide information about how the patient's lifestyle may be consequently affecting their oral health.
- Checks the pH of the patient's resting saliva. This will determine whether acid levels may be dangerously high, hence possibly causing erosion or caries problems.
- Checks the quantity of stimulated saliva a patient can produce. This enables you to identify any major salivary gland diseases.
- Checks the buffering capacity (quality) of stimulated saliva. This will establish the effectiveness of the saliva in neutralising acids in the mouth.

6. GC TOOTH MOUSSE

Water based, sugar free dental topical crème containing Recaldent™ CPP-ACP (Casein Phosphopeptide - Amorphous Calcium Phosphate) and fluoride.

- Delivers Recaldent™ (ACP-CPP) to restore mineral balance in the oral environment
- Provides extra protection for teeth
- Helps neutralise acid challenges from acidogenic bacteria in plaque and other internal and external acid sources
- Tastes delicious and makes teeth feel smoother and cleaner



7. EQUIA FORTE

Bulk fill glass hybrid restorative

- EQUIA Forte doesn't require any layering, is non sticky and packable, and adapts seamlessly to cavity walls
- With hardly any shrinkage stress, EQUIA Forte can be called a real bulk fill material even for deep cavities
- The use of a rubber dam is optional and the chemical adhesion eliminates complicated bonding procedures
- No need for any complex finishing and polishing since only a single application of EQUIA Forte Coat is required
- Brilliant shine and smooth surfaces with a durable, natural gloss easier than ever before
- Total procedure time of around 3,5 minutes*
- Increased strength of the glass ionomer over time due to the unique maturation effect, attributed to saliva



8. GC SALIVA-CHECK MUTANS

Chairside diagnostic device to detect high level of Streptococcus Mutans

- Chair-side detection kit, no special equipment required, just a timer
- Results in 15 minutes only
- Using 2 Monoclonal antibodies only S.mutans is detected, no other bacteria species
- Enhances patient motivation & education



9. MI PASTE PLUS

Water based, sugar free dental topical crème containing Recaldent™ CPP-ACP (Casein Phosphopeptide - Amorphous Calcium Phosphate) and fluoride.

- 900ppm of a unique, patented form of fluoride in a product designed for high-risk

patients.

- Delivers Recaldent™ (ACP-CPP) to restore mineral balance in the oral environment
- Provides extra protection for teeth
- Helps neutralize acid challenges from acidogenic bacteria in plaque and other internal and external acid sources
- Tastes delicious and makes teeth feel smoother and cleaner

10. GC FLUORIDE TOOTHPASTE

According to the guidelines on the use of fluoride in children by the European Association of Paediatric Dentistry

*national guidelines may vary

Recommended use of fluoride toothpaste in children

| AGE GROUP | FLUORIDE CONCENTRATION | DAILY USE | AMOUNT TO BE USED DAILY |
|--------------------|------------------------|-----------|-------------------------|
| 6 months- <2 years | 500 ppm | twice | pea-size |
| 2-<6 years | 1000 (+) ppm | twice | pea-size |
| 6 years and over | 1450 ppm | twice | pea-size |

IMPLEMENTING MI INTO YOUR PRACTICE

Now that you have read through the entire publication, we hope you feel inspired to take the first steps to transforming your practice into a patient-centred health centre and an MI-focused business. We recommend that you join the MI Dentistry community to broaden your knowledge and skills

STEP 1:

Subscribe at <http://mi.gceurope.com/> to receive updates via email about MI Dentistry news and helpful resources



STEP 2:

Contact your local GC Branch for product information and training workshops



STEP 3:

Attend MI Symposia and hands-on courses at GC Campus in Leuven, Belgium



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