



Dental amalgam phase down training programme for dentists

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Study is based on evaluating a training intervention

Not the
participants

~~CAT~~

Pre- training
evaluation



Post –
training
evaluation

Pre-training

- **Questionnaire - 15 – 20 minutes**

Introduction

Corporeal literacy

Developed

1. Refresh
2. Additional knowledge and skills



Abbreviations - 1

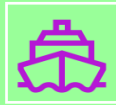
DA	– Dental amalgam
DAAR s	– Dental amalgam alternative restoratives
DAPD	– Dental amalgam phase down
MCM	– Minamata convention on mercury
MID	– Minimally invasive dentistry
CPD	– Continuous professional development

Abbreviations - 2

WHO	– World health organization
FDI	- World dental federation
UNEP	– United Nation’s environmental programme
IDM	- International dental manufacturers
LMI	– Low and middle income countries
COP	– conference of parties

Outline of this lecture: Module I – MCM & DAPD

Discussion about Kenya and Dental amalgam phase down



Introduction of the training programme



Genesis of the Minamata convention on mercury?



Signatories and parties: global status DAPD



Current DAPD status in Kenya

Structure of the training programme



Module I: Lecture I – **Introduction to MCM and DAPD**



Module II: Lecture II and III – **Dental amalgam alternative restorative dental materials**



Module III: Lecture IV – **Practical demonstration of selected DAARs**



Module IV: Lecture V – **Dental Caries prevention and use of DAARS**



Total of 4 lecture sessions & **on-line skills training on 4 DAARs**

General introduction of the DAPD training programme

- The training programme has been designed based on a continuous professional development (CPD) approach.
- The aim is to provide;
 1. Knowledge on the scope of the on-going global dental amalgam phase down
 2. Range of novel dental materials and manipulation techniques that constitute DAARs
 3. Skills for dental practice in the dental amalgam phase down (DAPD) process
- Significant national DAPD stakeholder.
- Responsibility to shape government's position on DAPD.



What does dental amalgam phase down entail?

Prevent caries, reduce number of restorations Mikulás K et al 2018



**DENTAL AMALGAM
PHASE DOWN**



**DENTAL AMALGAM
PHASE OUT**

Where can the text on DAPD be accessed?



DAPD: Article 4
and Annex II of
the MCM text

Article 4 – Mercury
added products Pg.
11

& in

Annex A part II:
the ix measures of
dental amalgam
phase down. Pg 48

[google.com/search?q=Unep.+minamataconvention+o+n+mercury+texts+and+annexes+UNEP+2013a&oq](https://www.google.com/search?q=Unep.+minamataconvention+o+n+mercury+texts+and+annexes+UNEP+2013a&oq)

Why is Dental amalgam being phased down?

Mercury constituent and lack of best waste management practice that makes DA contribute to the worlds' anthropogenic Hg release to air, soil and water

Though safe, durable, and cost-effective, technique forgiving filling material, the end of its' use has dawned globally.

MODULE I

Lecture I

Genesis and negotiation of Minamata convention on mercury 2013, global and Kenya's position

The Minamata convention on mercury



A global Legally binding instrument on mercury

Anthropogenic emissions and releases of mercury and Hg containing products to air, soil and water

Objective: To protect human health and the environment from the effects of mercury (Hg).

Genesis of the MCM

Largest source of Hg by humans is via Artisanal and small-scale gold mining sector 1,000 tonnes annually

Dental amalgam
240-340 tonnes
annually

Hg is a known neurotoxin,
bioaccumulates in ecosystems
DA IS NOT Hg 😊
BUT Hg containing

Decision by the Governing council of UNEP to bring Hg science to policy in February 2009.

MCM on Hg 2013

Damluji SF and Tikriti S et al
<http://www.env.go.jp/en/chemi/hs/minamata2002/ch2.html>

Completed in 31 months and 7 days for signing!

Kenya was among the first batch of 128 countries to become signatory on 10th October 2013.

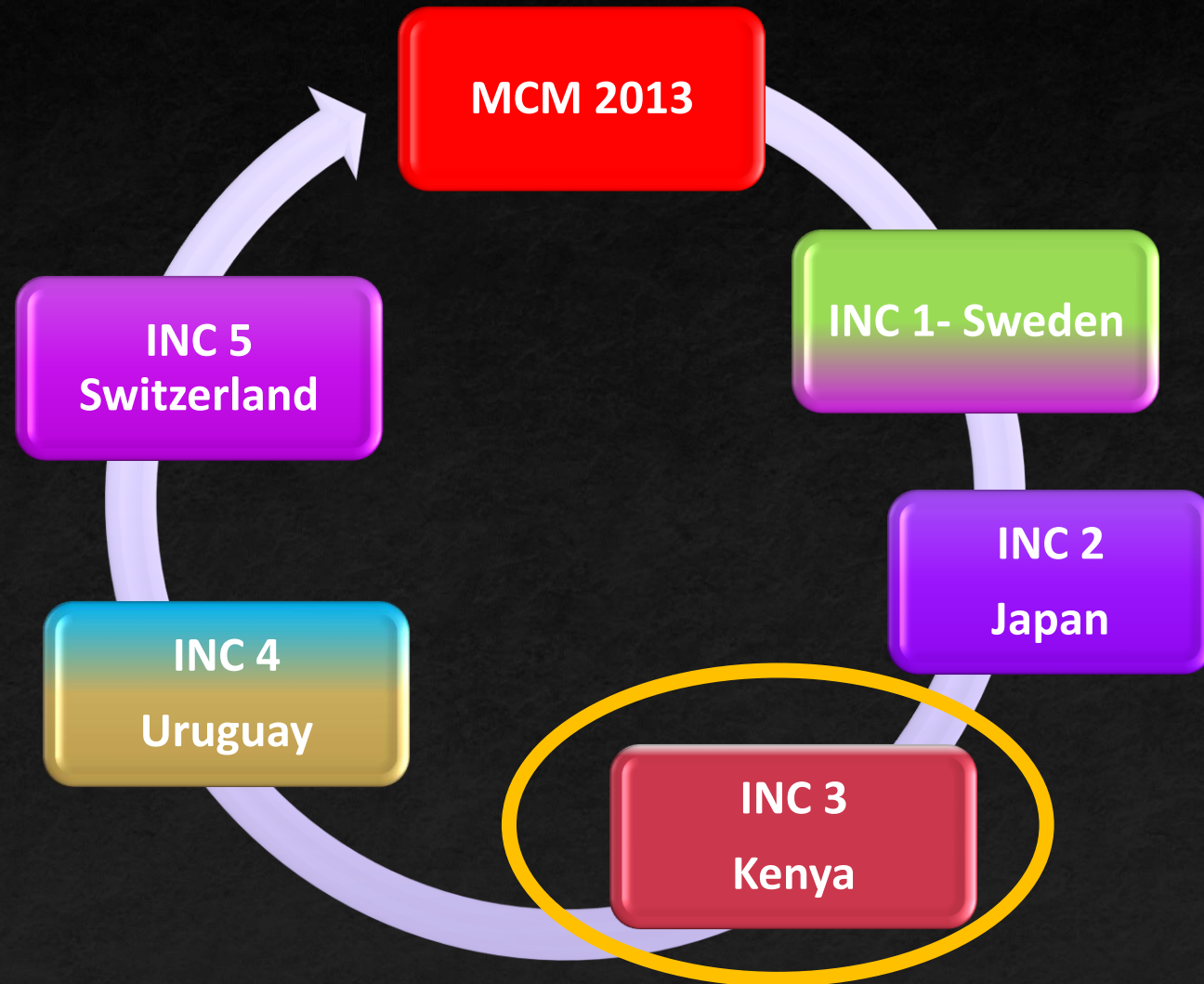
Governments, Non-governmental organisations, WHO, FDI, IDM, led by UNEP.

MCM came into force on 16th August 2017

CITY	DATE
1 Stockholm	7-11 June 2010
2. Chiba	24-28 Jan' 2011
3. Nairobi	31 st Oct' – 4 th Nov' 2011
4. Punta del Este	27 June - 2 nd July 2012
5. Geneva	13 th – 18 th January 2013.

Via Intergovernmental negotiating committee (INCs)

Voluntary
Process
leading to
MCM



137 Parties to the MCM as at Sept. 2022

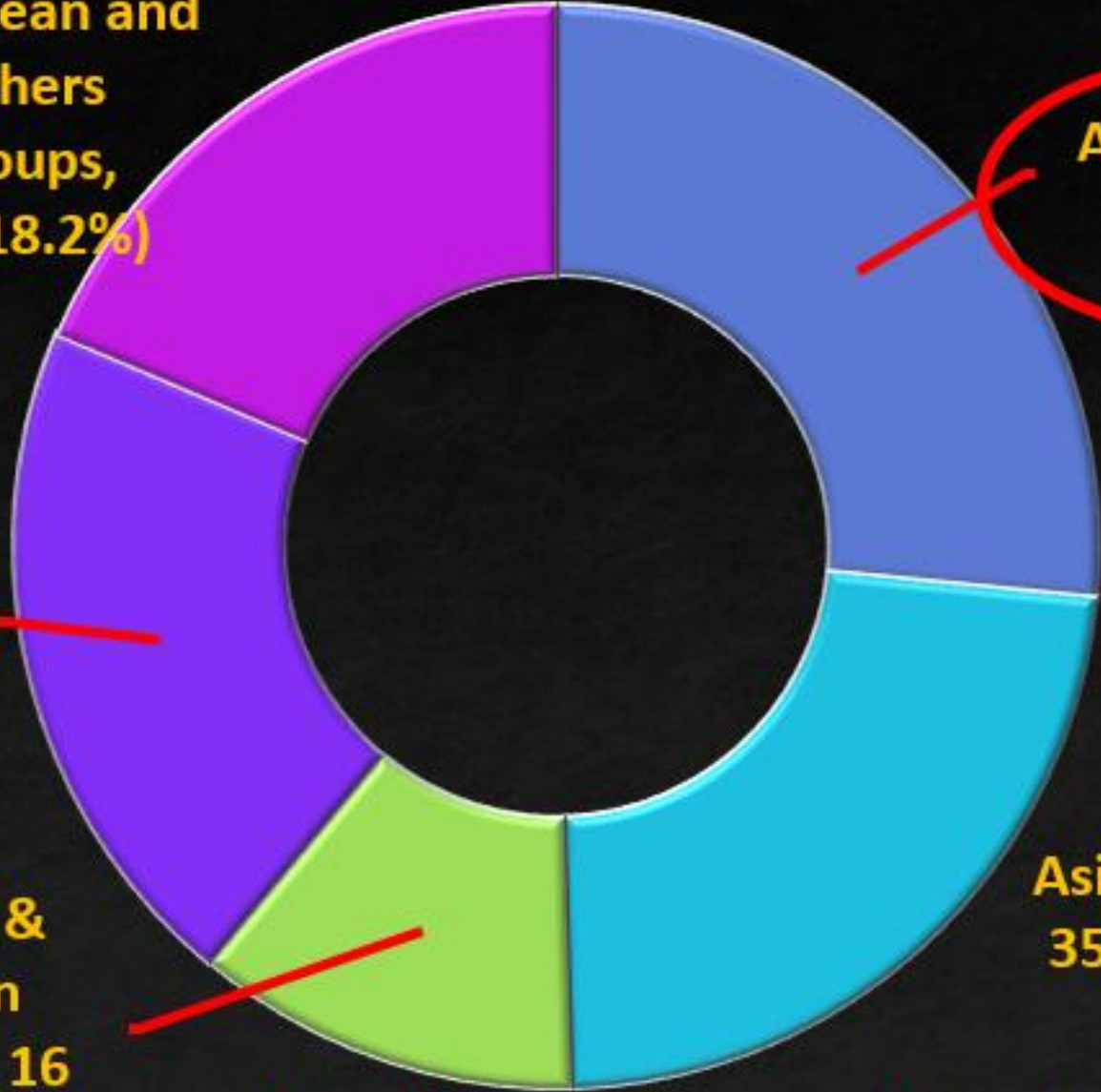
Western European and others groups, 25 (18.2%)

Africa, 37 (27%)

Latin America & Caribbean, 24 (17.5%)

Central & Eastern Europe, 16 (11.7%)

Asia Pacific, 35 (25.5%)

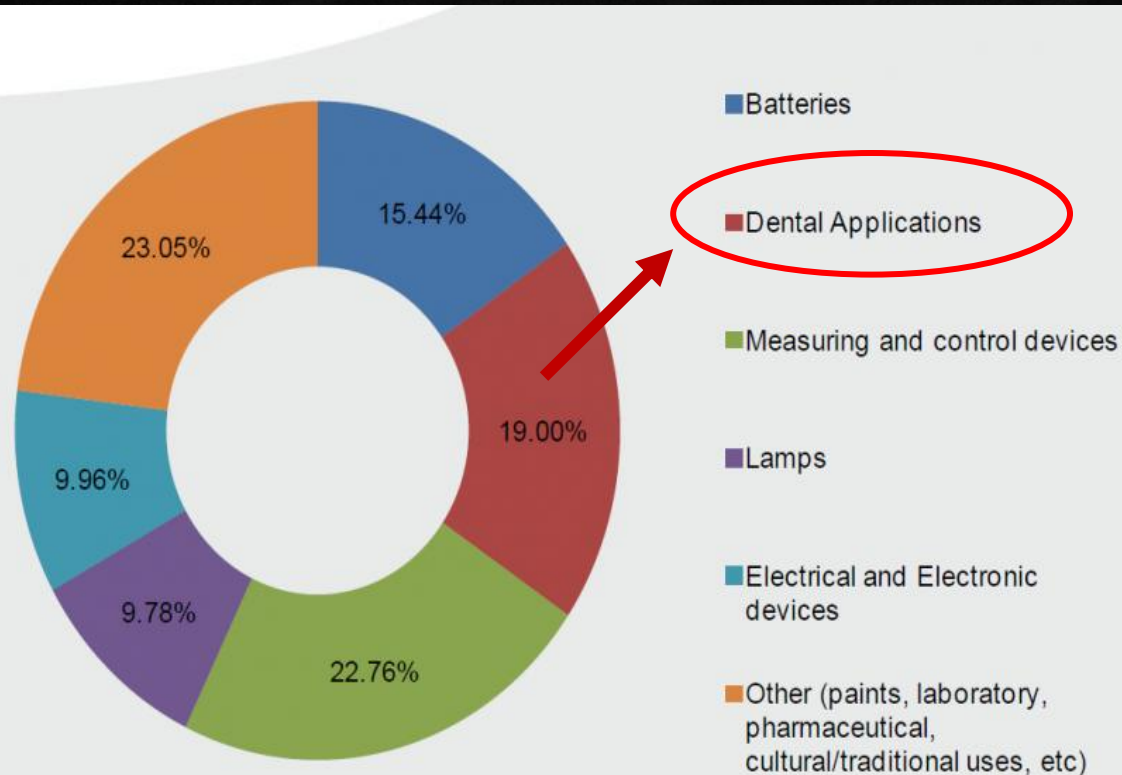


<https://www.mercuryconvention.org/en/parties/overview>



MCM calls for discontinuation of the manufacture of Hg by 2020⁹

Phase out of Hg containing products



- Only dental amalgam is to **be phased down**
- Why? **Quality of DAARs & Prevent deterioration of oral health.**
- An effort to push for a phase out by some African countries in COP 3 **2019** failed for the same reason.
- (Kenya was not included)

The global DAPD: Why phase down and not Phase out?

DAAR's are not
practical for all
clinical
indications

Hence, a step-wise voluntary
consultative national approach is
required

Access to appropriate
treatment; XLA'S done where
no other options exist

Challenges in
LMI countries

Resource limitations; electricity and necessary equipment

Availability of suitable affordable DAARs

Appropriate training for dentists

The measures of dental amalgam phase down

(i)	Setting national objectives aiming at dental caries prevention and health promotion thereby minimizing the need for dental restoration;
(ii)	Setting national objectives aiming at minimizing its use;
(iii)	Promoting the use of cost-effective and clinically effective mercury-free alternatives for dental restoration;
(iv)	Promoting research and development of quality mercury-free materials for dental restoration;
(v)	Encouraging representative professional organizations and dental schools to educate and train dental professionals and students on the use of mercury-free dental restoration alternatives and on promoting best management practices;
(vi)	Discouraging insurance policies and programmes that favour dental amalgam use over mercury-free dental restoration;
(vii)	Encouraging insurance policies and programmes that favour the use of quality alternatives to dental amalgam for dental restoration;
(viii)	Restricting the use of dental amalgam to its encapsulated form;
(ix)	Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and mercury compounds to water and land.

Dental amalgam phase-out: Pre the MCM

Lessons
learnt

Countries in Post DA era

Norway - 2011
Sweden - 2012

Norway
Patients groups raising
concerns in the media,

Sweden
stakeholder
participation to set
goals and objectives



DAPD Global Status

Many countries have commenced implementation of DAPD teaching DA has declined in dental schools

DA use <10%

Netherlands (1%),
Finland (3%)

Japan (4%)

Denmark (1.7%)

German and
Switzerland 10%

Developed countries

Finland,
Spain, Mexico, Italy,
Singapore, Austria,
Canada, Japan, and
USA

Developing countries

Bulgaria, Malaysia,
China, Mongolia,
Vietnam, Indonesia,
Thailand and
Philippines, Nigeria

Dental schools

Oceanian teaching;
29% DA vs 39% DRC

Use:

% DA vs 64% DRC

Austria, Germany
Switzerland 89.6% DRC
restorations

Japan, 93% teach DRC
first

Malaysia: 25.9% (0-50%)
DA vs 74.1% (10-100%)
DRC

Increased worldwide
South Africa (Lombard)

DAPD in developing countries Cont...

Country	Status	Reference
Jordan -	Awareness of DAPD low, declining use of DA in private but prevalent in public institutions 43%	Al-Asmar AA et al 2019.
Nigeria	Commencement of phase down, cessation in use in pregnant mothers and children under 16, 2020 DAPD Policy development Human capacity development and training of dentists on the use of mercury alternatives	Arotiba et al 2020 http://sradev.org/wp-content/uploads/2019/05/AmaIgam-phase-2-final-report.pdf
India	DA still in use 57.3% usage Best waste management enacted	Karthik et al 2019.
Iraq	57.8%) of DA	Faraj BM et al 2015.
Pakistan	Use of DA reducing is at 41.6%, most dentists lack knowledge on best waste management practice	Khan S et al 2022.

Kenya Cont...

1. Phase out of use of DA in children at KNH
2. Phase out in use of DA in Mombasa county

MOH
LEADER ✓

	DA use %	DRC use %	Remark
Kiao et al 2021**		51%	Nairobi BFRCs
Osiro et al 2014		25.2 in class I & 18.5 in class II	
East Africa DAPD project 2012	91.2	92.6*	*All Composite applications
Ganatra et al 2009	50		Nairobi
Ndonga et al 2010	75		Nairobi

The countrywide DAPD situation remains largely unknown

Kenya's position on MCM as at 2022

Signatory
13th October
2013

Approved by
cabinet, May
2022

Awaits
adoption by
parliament



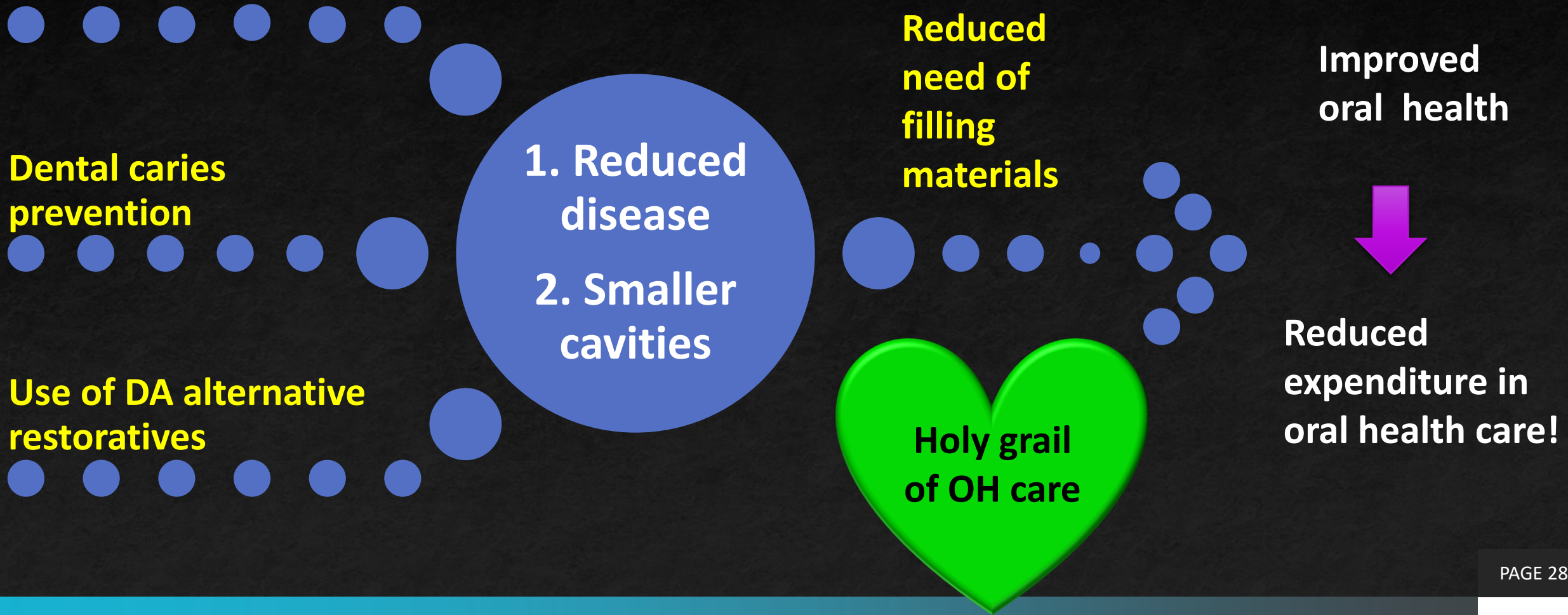
EXECUTIVE OFFICE OF THE PRESIDENT

B. TREATIES AND CONVENTIONS

To further secure Kenya's **overall competitiveness**, **Cabinet considered and approved** the following treaties and conventions:

- I. The Accession to the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property;
- II. The Ratification of the Minamata Convention on Mercury;
- III. Agreement between the Government of Republic of Kenya and the Government of the United States of America on Employment of Dependents of Official Employees;
- IV. The Agreement between the Government of the Republic of Kenya and the Government of the Republic of Turkey on Defence Co-operation;
- V. The Agreement between the Government of the Republic of Kenya and the Government of the Arab Republic of Egypt on Defence Co-operation;
- VI. The Agreement between the Government of the Republic of Kenya and the Government of the Republic of Malawi on Defence Co-operation;

Long-term benefits of DAPD – where realized



Dental amalgam waste management in post DAPD era

Extracted teeth with DA fillings
Removal of old fillings will be there for a long time

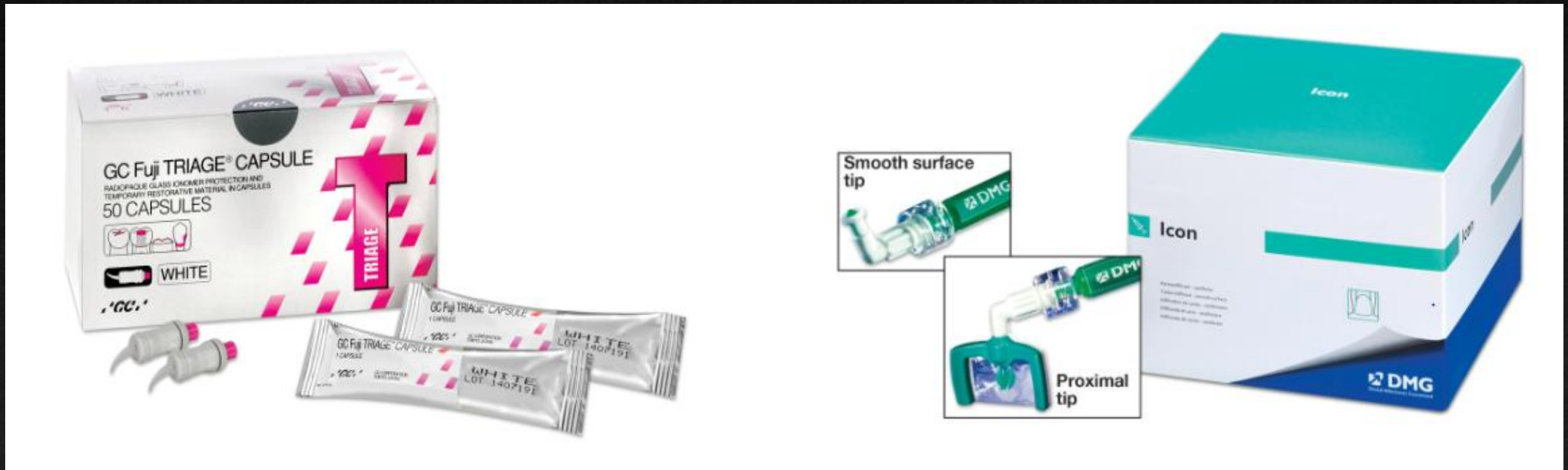


ISO 11143:2008

Amalgam Separators will be needed way past DA phase out?

Dental caries prevention and use of DAARs in DAPD

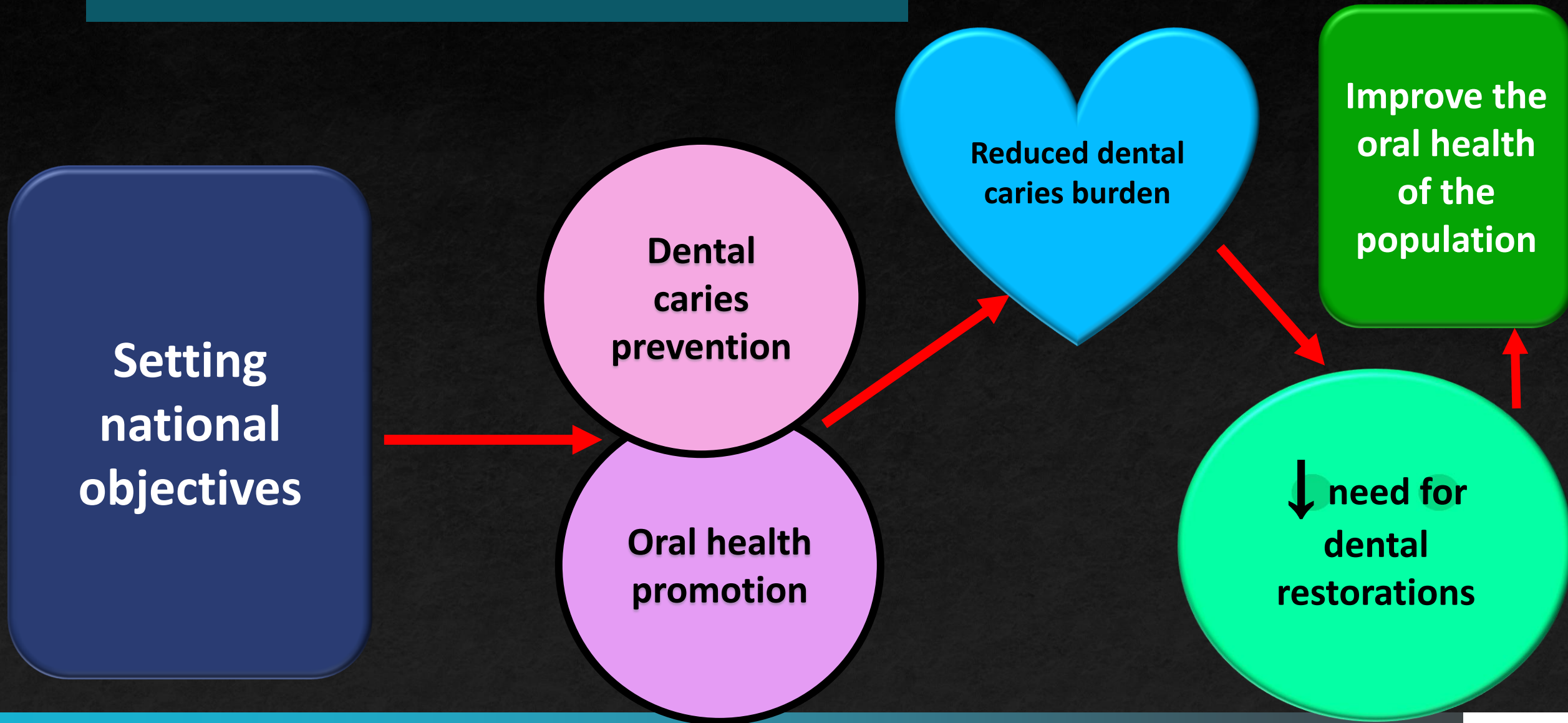
MODULE IV



Learning outcomes are to able to;

- **Anchor dental prevention moment in use of DAARS in DAPD**
- **Routinely include management and follow up early carious lesions.**
- **Indicate DAARs in non-surgical and ultra conservative approaches**
- **Manipulate novel fissure and use DAARs in dental caries prevention.**

Measure no. 1 in DAPD reads;



Dental caries prevention and DAPD in modern dental practice - biocompatible

Approaches

- Prevention
- OHI, Diet Counselling
- Fluoridated tooth pastes
- Fluoridated Fissure sealants
- Conventional Fissure sealants
- Hydroxyapatite tooth pastes
- Casein Phosphopetide/Amorphous Calcium phosphate
- Recall based on patients experience

Tooth brushing and flossing,
↓ cariogenic items,
Water between meals 😊

Empower patients to;
Prevent dental caries thus
Promote oral health

Amorphous Calcium Phosphate (ACP) – Bio-smart material

- ACP converts to hydroxyapatite (HAP) as follows;


pH drop below 5.8


- In less than 2 minutes amorphous crystals that release Ca^{2+} and PO_4^- that supersaturate promote HAP

ACP fissure sealant materials – commercially available



Aegis PF sealant



By Harry J. Bosworth Company, USA

Prevest PF sealant available in Kenya



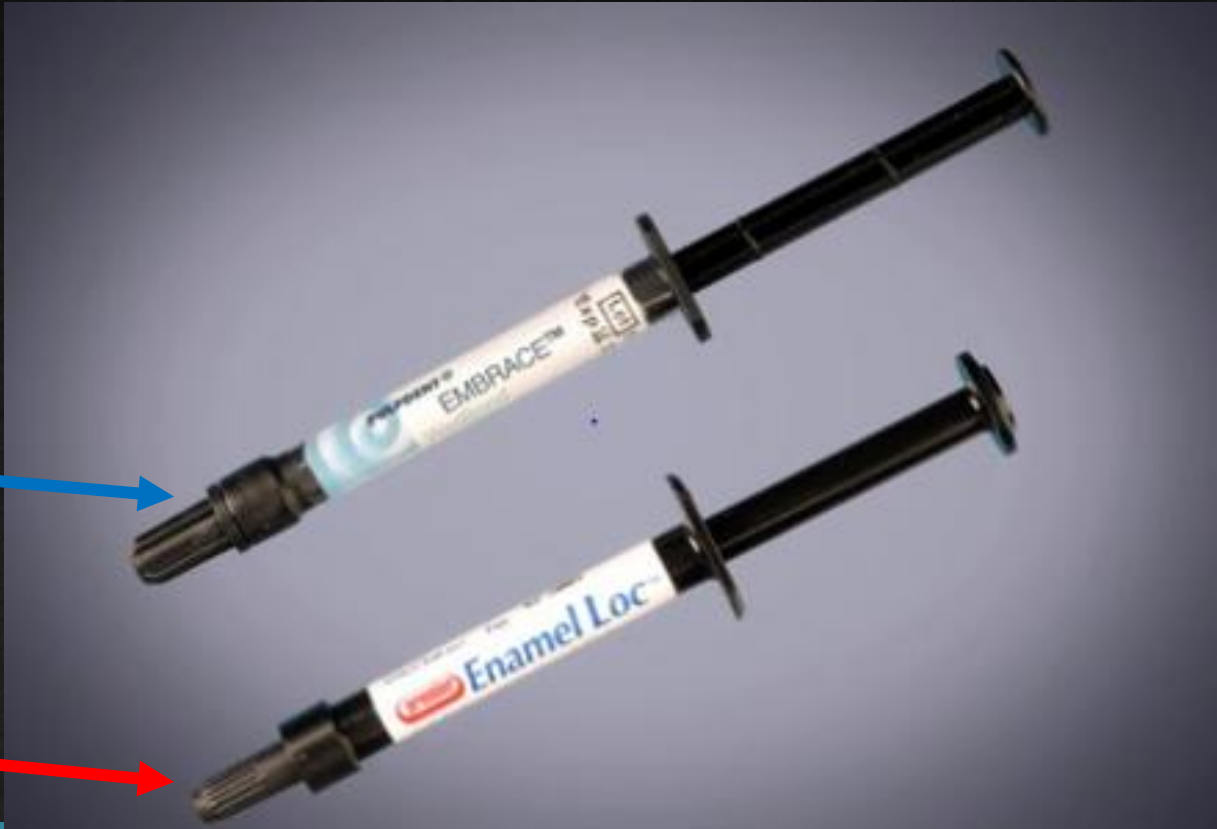
Sidco Industries, India

Other novel Fissure sealant biomaterials

IDEAL IN 1⁰ MOLARS and so is any other GIC



- Wet bond fissure sealants (Hydrophilic monomers)



- Self etching fissure sealants

Minimally invasive approaches



Maintain teeth sound and functional for life.

Preserve healthy teeth and those with potential to mineralise, to maximise healing potential.

Firstly termed by Dawson and Makinson, 1992

Silver Diamine Fluoride

(SDF)

Inhibits biofilm adhesion

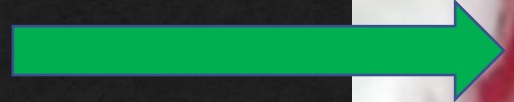
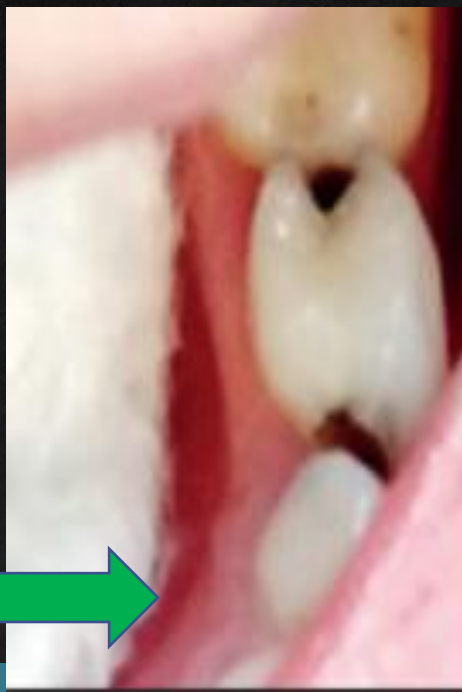
Carious 1^o teeth
2^o caries in geriatrics and
debilitated patients



- SDF 38%,
(14,100 – 50,013ppm F

Slayton RL et 2018,
Soares-Yoshikawa et al 2020
Ahmad MM et al 2022

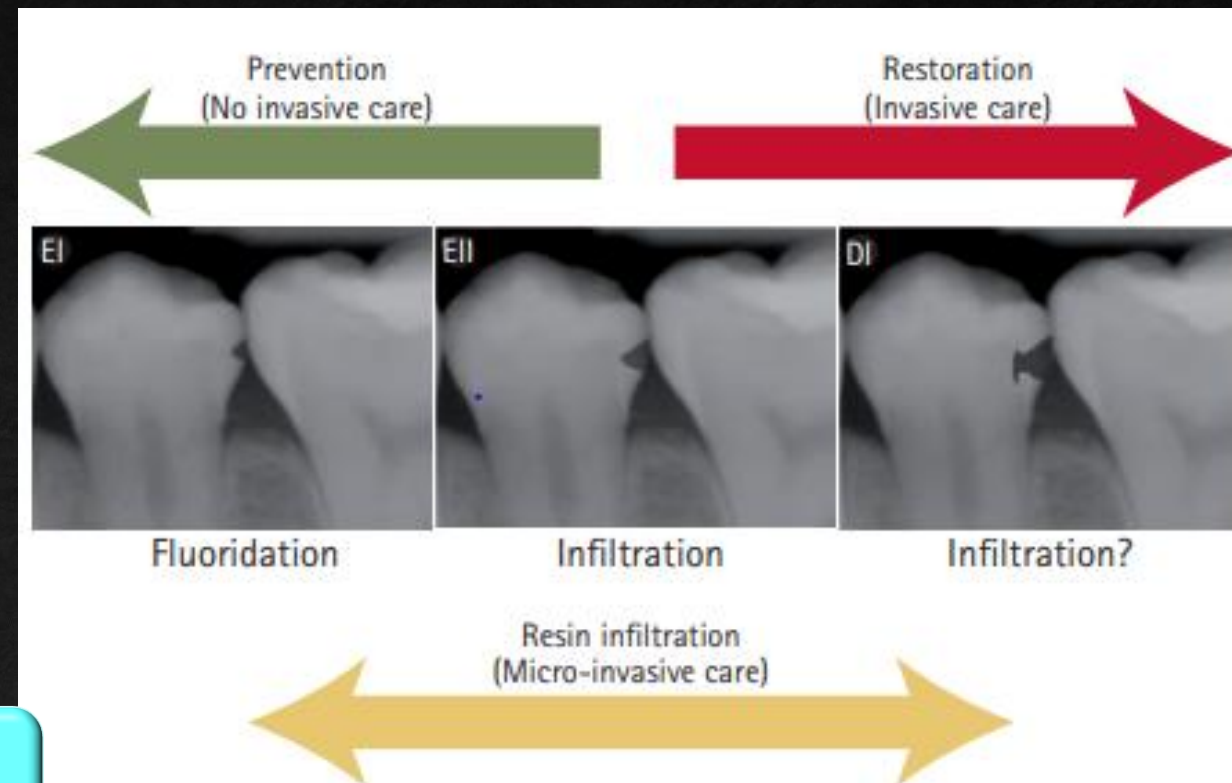
Silver Modified Atraumatic
Restorative Technique (SMART)



Indications OF Resin infiltration (RI) – For smooth surface incipient caries – STABILIZES & ARRESTS



High penetration coefficient RESIN



Limited to the outer third of dentine – non cavitated

J. J. Lasfargues et al 2013 (Sebestraro et al)

RI –in proximal lesions

Early caries 98%
success rate



D1 Works well in non-Cavitated lesions

RI –
Manipulation

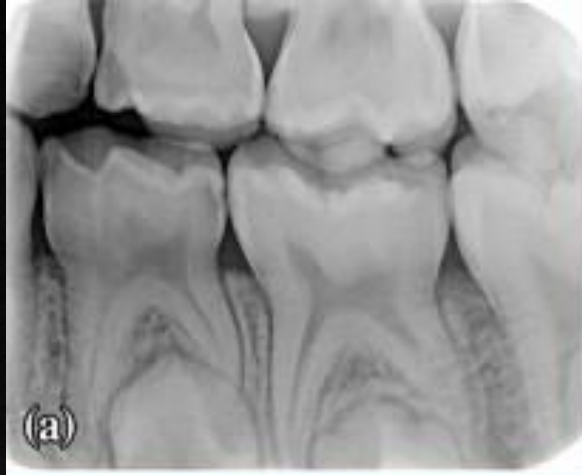
Separator

15% HCL
etch

Ethanol

Resin & LC

https://youtu.be/_wvOA_x6wBNI



OTHER MID APPROACHES THAT UTILISE DAARS

- Use of DAARs in repair of restorations verses total replacement
- “**Caries-removal-only**” technique embraced by many dentists. Saucer shaped class II’s
- **Always Include enamel carious lesions in the treatment plan**

Paradigm shift to **patient-centered**, tooth preserving
preventive care  Current philosophy

DAPD discussion for Kenya

1. What is your perceived status of DAPD process in the country?

2. In your opinion what direction should DAPD it take?

What would be a pre-requisites in your view



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Thank you colleagues
for your time

