

**POSITION STATEMENT ON THE USE OF
DENTAL AMALGAM
2020**

Malaysian Dental Council

Foreword

By the President of the Malaysian Dental Council



Dental amalgam is a clinically well-proven and successful filling material. Over the years, experimentation and research has improved its strength, durability, handling qualities and safety. Thus far, no alternative has been found that can totally replace the clinical attributes of amalgam or its cost-effectiveness.

The Minamata Convention on Mercury, adopted in October 2013, has the objective to protect human health and the environment from anthropogenic emissions and releases of mercury. The Convention requires parties to phase down amalgam use with the intention that coordinated implementation of the provisions of the Convention will lead to an overall reduction in mercury levels in the environment over time

The Malaysian Dental Council supports the Minamata Convention on Mercury. However, until such time the research can deliver an alternative material that matches or exceeds all the characteristics of dental amalgam, we support the continued availability of dental amalgam as a restorative option when alternatives are less than optimal for clinical, economic or practical reasons. To successfully phase-down dental amalgam, there must be a greater emphasis on prevention, increased research on amalgam alternatives, and best management practices for amalgam waste.

I am confident that dental practitioners in Malaysia will continue to use and manage dental amalgam and its waste products safely and responsibly. All practitioners must adhere closely to the best practices outlined in this document to control or minimize mercury exposure to well within safe limits, thus protecting themselves, their staff and patients, and the environment.

Datuk Dr Noor Hisham bin Abdullah

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	Page
<i>Foreword by the President of the Malaysian Dental Council</i>	i
<i>Position Statement by the Malaysian Dental Council</i>	1
1 Introduction	2-4
2 Current research on health effects of amalgam	4
2.1 Neuro-toxic and/or neuro-psychological effects	4-5
2.2 Kidney disease	6
2.3 Pregnancy and breastfeeding	6-7
2.4 'In utero' levels of elemental mercury	7
2.5 Sensitivity to mercury exposure	7-8
2.6 Autoimmunity	8
2.7 Environmental issues related to mercury	8-10
3 Phase down and out of Amalgam Around the World	10
3.1 Australia	11-13
3.2 Japan	14
3.3 Hong Kong	14

		Page
3.4	China	15
3.5	United Kingdom (UK) and European Union (EU)	15-16
3.6	Canada	17
3.7	Singapore	17-18
3.8	Malaysia	18
4	Discussion	18-19
5	Recommendations	19-20
5.1	Strengthen oral health promotion and caries prevention to general public	20-21
5.2	Alternative Restorative Materials	22-23
6	Conclusion	23

Appendices

	Page
App 1 <i>Annex A Part II</i>	24
App 2 <i>Amalgam Best Practice</i>	25
<i>Training</i>	25-27
<i>Amalgam Management Procedures</i>	27-32
<i>Amalgam Waste Management Procedures</i>	32-33
App 3 <i>Best Amalgam Practices for Amalgam Waste</i>	34-35
<i>Members of Review Working Group</i>	36
<i>Acknowledgements</i>	36

POSITION STATEMENT ON THE USE OF DENTAL AMALGAM 2020

The Malaysian Dental Council (MDC) recognizes dental amalgam as cost effective and viable choice for patients if used properly. However, the Position Statement takes into cognizance the stands of the MINAMATA CONVENTION ON MERCURY and FDI towards gradual phasing down of dental amalgam due to its impact on environment. This position supports the use of alternative restorative materials as a substitute to dental amalgam based on the best interest of the patient and clinical judgment, while considering the integrity of environment. The MDC will continue its vigilance on current worldwide literature on the use of alternative restorative materials and dental amalgam.

This third edition of the **Position Statement on the Use of Dental Amalgam** was adopted by the Malaysian Dental Council (MDC) on 13 January 2020. The Position clarifies the stand of the MDC on the use of alternative restorative materials to dental amalgam and recommends best practice in the management of restorative materials.

1. INTRODUCTION

The first edition of the Position Statement on the Use of Dental Amalgam was accepted by the MDC on 6 June 2002.¹ The purpose was to clarify the stand of the MDC on the continued use of dental amalgam in the country and also inform the profession and the public on current facts relating to mercury and dental amalgam. The second edition of the Position Statement on the Use of Dental Amalgam was adopted by the MDC on 3rd June 2013.² The Statement clarifies the stand of the MDC on the continued use of dental amalgam as a dental restorative material and the recommended methods of storage and disposal of waste amalgam.

The Minamata Convention on Mercury, adopted in October 2013, has the objective to protect human health and the environment from anthropogenic emissions and releases of mercury. The Convention requires parties to phase down amalgam use, taking at least two of the nine steps outlined in the Convention's Annex A, Part II. It is intended that coordinated implementation of the provisions of the Convention will lead to an overall reduction in mercury levels in the environment over time.³

¹ Position Statement on Use of Dental Amalgam. Malaysian Dental Council, 2002.

² Position Statement on Use of Dental Amalgam. Malaysian Dental Council, 2013.

³ Minamata Convention on Mercury. Text and annexes. United Nations Environment Programme, October 2013.

In 2009, the World Health Organization (WHO) and United Nations Environment Programme (UNEP) held a meeting in Geneva on the “Future Use of Materials for Dental Restoration” and recognised the value of a global “phase down” of dental mercury use worldwide⁴. Subsequently in 2018, a workshop entitled Promoting Dental Amalgam Phase Down Measures under the Minamata Convention and Other Initiatives for “Especially Women, Children and Through Them, Future Generations” took place in Bangkok, Thailand reported and published a series of proven and effective phase-down steps on the use of amalgam.⁵

Thus, by phasing down the use of dental amalgam as a restorative material and switching to quality mercury-free alternative materials; the environmental impacts of dental amalgam can be sustainably avoided.

World Dental Federation (FDI) through their policy statement supports a gradual phase down in the use of dental amalgam through an increased emphasis on prevention and research. These measures should be accompanied by appropriate teaching of other restorative materials and techniques in universities accompanied by continuing education courses.⁶

⁴ Promoting the Phase Down of Dental Amalgam in Developing Countries. United Nations Environment Programme, World Health Organization 2014.

⁵ Global Workshop on ‘Promoting Dental Amalgam Phase Down Measures Under the Minamata Convention and Other Initiatives’. United Nations Environment Programme, World Health Organization 2018.

⁶ Dental Amalgam Phase Down. Published on FDI World Dental Federation (<https://www.fdiworlddental.org>). September 2018, Buenos Aires Argentine

With the increased concern on the impact of mercury to the environment and taking into consideration recommendations made by various global organizations, it is pertinent that the Position Statement of Dental Amalgam 2013 be reviewed. This document will provide the current review on the health effects of amalgam and propose recommendations towards phasing down of amalgam.

2. CURRENT RESEARCH ON HEALTH EFFECTS OF MERCURY RELEASED FROM AMALGAM

Amalgam has been used for decades in dental restorations. However, its safety remains a matter of concern towards human health and environment.

2.1 Neuro-toxic and/or neuro-psychological effects

The Casa Pia study⁷ reported no statistically significant difference between the amalgam and resin-based composite groups for measures of memory, attention, visual function, or nerve conduction velocities over 7 years of follow-up. Another five-year follow-up study showed no association between exposures to mercury from dental amalgams with adverse psychosocial outcomes following initial placement of amalgams.⁸

⁷ DeRouen TA et al. Neurobehavioral Effects of Dental Amalgam in Children - A Randomised Clinical Trial. JAMA 2006; 295: 1784-92.

⁸ Bellinger DC et al. Dental Amalgam and psychosocial status: the New England Children's Amalgam Trial. J Dent Res. 2008 May; 87(5): 470-4

Other studies concluded that exposure to mercury from dental amalgam does not adversely affect the neurological status of children.^{9,10,11} There is no clear evidence for an increased risk for Alzheimer's disease, Parkinson's disease or amyotrophic lateral sclerosis associated with amalgam fillings.¹²

A systematic review conducted in 2010¹³ reported no clear evidence on the risk of Alzheimer's risk with inorganic mercury. Out of forty, only one study among young adults (mean age 22.4-23.3 years) showed positive correlation between number of amalgam fillings and mercury excretion in urine and hair, as well as with forgetfulness and symptoms.¹⁴

⁹ Lauterbach et al. Neurological outcomes in children with and without amalgam related mercury exposure: seven years of longitudinal observations in a randomized trial. *J Am Dent Assoc.* 2008 Feb; 139(2): 138-45.

¹⁰ Mackert JR Jr. Randomized controlled trial demonstrates that exposure to mercury from dental amalgam does not adversely affect neurological development in children. *J Evid Based Dent Pract.* 2010 March; 10(1): 25-9.2010)

¹¹ Ye X, Qian H, Xu P, Zhu L, Longnecker MP, Fu H fillings. Nephrotoxicity, neurotoxicity, and mercury exposure among children with and without dental amalgam. *Int J Hyg Environment Health.* 2009 Jul; 212(4): 378-86.et al. 2009

¹² Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Opinion on the safety of dental amalgam and alternative dental restoration materials for patients and users (2015).

¹³ Mutter J, Curth A, Naumann J, Deth R, Walach H. Does Inorganic Mercury Play a Role in Alzheimer's Disease? A Systematic Review and an Integrated Molecular Mechanism. *Journal of Alzheimer's Disease* 22 (2010) 357–374

¹⁴ Sibirerud RL The relationship between mercury from dental amalgam and mental health. *Am J Psychother.* 1989. Pg 43, 575-587

2.2 Kidney disease

A systematic review and meta-analysis study evaluated the potential health effects over mercury vapour release from dental amalgam showed no significant increased risk for symptoms of the neurological and renal function among people who were exposed to dental amalgam.¹⁵ A review concluded that there was no convincing association between dental amalgam and clinically decreased kidney function in patients either in short or long term exposure.¹⁶

2.3 Pregnancy and breast-feeding

In 2018, the United Kingdom (UK) law states that dental amalgam should not be used in the treatment of deciduous teeth, in children under 15 years- old and in pregnant or breastfeeding women, **except when deemed strictly necessary by a dentist based on the specific medical needs of the patient.**¹⁷

However, there was a strong positive correlation between maternal amalgam fillings and the cord blood total Hg level was found. No significant reduction in risk of infant health among the antenatal mother with the dental amalgam exposure.¹⁴

¹⁵ Che Salleh N, Tu YK, Douglas GVA, Jaafar M. Health Effects and Dental Amalgam: A Systematic Review and Meta-Analysis. 2nd Meeting of the International Association for Dental Research - Asia Pacific Region 21-23 August 2013, Bangkok, Thailand. Unpublished.

¹⁶ Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR). Opinion on the safety of dental amalgam and alternative dental restoration materials for patients and users (2015).

¹⁷ <https://bda.org/news-centre/dental-amalgam-new-regulations-from-1-july-2018>

In addition, other studies found no strong relationship between amalgam fillings and mercury concentration in breast milk.^{18,19}

2.4 'In utero' levels of elemental mercury

There are relatively less researches or data on the level of elemental mercury in utero. However, it is reported that the number of amalgam fillings and surfaces influenced the Hg concentration in amniotic fluid but not at a significant level. There was also no significant difference among patient with Hg concentration <0.08ng/ml and those with a concentration ≥0.08ng/ ml with regard to obstetric history and perinatal concentration.²⁰

2.5 Sensitivity to mercury exposure

Even though this happens rarely, dental amalgam can cause delayed hypersensitivity reactions in some individuals. Sign and symptoms include skin rashes in the oral, head and neck area, swollen lips and itchiness. However, the corrosion of amalgam restoration or perhaps the biofilm present on such restorations

¹⁸ Hans Drexler, Karl-Heinz Schaller. The Mercury Concentration in Breast Milk Resulting from Amalgam Fillings and Dietary Habits. *Environmental Research*, Section A 77, 124—129 (1998)

¹⁹ Stoz et al. Effects of new dental amalgam fillings in pregnancy on Hg concentration in mother and child. With consideration for possible interactions between amalgam and precious metals (1995).

²⁰ Pier Franca Luglie, Guglielmo Campus, Giannina Chessa, Giovanni Spano, Giampiero Capobianco, Giovanni Maria Fadda and Salvatore Dessole. Effect of amalgam fillings on the mercury concentration in human amniotic fluid. *Arch Gynecol Obstet* 2005.

may contribute to the development of hypersensitivity reaction rather than the material itself.²¹

2.6 Autoimmunity

In a meta-analysis, the association between amalgam and multiple sclerosis was assessed and showed a non-statistically significant increase between the presence of amalgam restorations and the autoimmune disease. The study does not provide evidence for or against an association.¹⁶ However, in a report by Autoimmunity Reviews, it was stated that in studies of individuals with self-reported illness, perceived to be owing to dental amalgams, found no differences in markers of autoimmunity when compared to controls.²² Furthermore, no differences in immune markers have been observed between groups with dental amalgams and group without.

2.7 Environmental issues related to mercury

The exposure of the general population to mercury is mainly due to fish consumption (organic mercury, methyl mercury (MeHg)) and dental amalgam (elemental mercury, inorganic mercury).⁸ The Scientific Committee on Emerging and Newly Identified Health Risks (SCENHIR) performed the exposure assessment based on urinary excretion of Hg in individuals with

²¹ Rathore M, Singh A, Vandana A. The dental amalgam toxicity fear: a myth or actuality. *Toxicology International* 2012.

²² Crowe W, Philip JA, Watson GE, Magee PJ, Strain JJ, Armstrong DJ, Ball E, McSorley EM. Mercury as an environmental stimulus in the development of autoimmunity- a systematic review. *Autoimmunity Reviews* 2016.

and without amalgam fillings. A recent results obtained by using mercury isotopes to differentiate between exposure to fish-derived or amalgam derived-mercury in the urine shows large part of the urinary inorganic mercury was found to be derived from fish consumption and only fish consumer-individuals with more than 10 amalgam restorations shows a large percentage of mercury derives from amalgam. However, at low levels of amalgam exposure, an imprecise result of urinary mercury excretion indicated. A risk assessment by Scientific Committee on Health and Environmental Risks (SCHER) concluded that the emission fraction of Hg represents a very minor contribution to total human exposure from soil and through inhalation.

A study examined biomarkers of MeHg intake in women and infants from seafood-consuming populations globally found that high-end biomarkers presented in the samples, suggest that MeHg intake exceeds the level recommended by WHO and Food and Agriculture Organization (FAO). It indicated that the body burdens of MeHg in the range associated in epidemiological studies with observable neurological damage.

A large body of research has demonstrated an association of exposure *in utero* with developmental neurotoxicity (e.g. deficits in fine motor skills, language and memory) among populations that consume seafood regularly as MeHg is a neurotoxin particularly harmful to the developing fetal brain.²³

This study suggest that because of seafood's important nutritional benefits, all such messages should aim to encourage a shift away from large apex predator species and towards those with lower MeHg and higher polyunsaturated fatty acid content, rather than to reduce seafood intake and recommend the authorities to set broad priorities for preventive policy and research.

3.0 PHASE DOWN AND PHASE OUT OF AMALGAM AROUND THE WORLD

Many countries have either phased out or phased down the use of dental amalgam. However, encouraging the use of mercury free dental restorative materials for some low and middle income countries will remain a challenge. The UN Environment Programme's upcoming Global Mercury Assessment 2018 is set to reveal that global mercury emissions into the atmosphere rose by around 20% between 2010 and 2015. According to the assessment, East/Southeast Asia, Sub-Saharan Africa and South America account for the greatest increases in mercury emissions between 2010 and 2015.²⁴

²³ Sheehan MC, Burke TA, Navas-Acien A, Breyse PN, McGready J, Fox MA. Global methyl mercury exposure from seafood consumption and risk of developmental neurotoxicity: a systematic review. *Bull World Health Organ* 2014; 92: 254–269F

²⁴ Countries meet to accelerate implementation of the Minamata Convention on Mercury. FDI World Dental Federation. 5 December 2018.

3.1 Australia

Mercury-containing dental amalgam is used for some dental fillings. Its use in Australia comprises approximately 25.0% of new fillings. Dental practitioners in Australia have now adopted the use of alternative, non-mercury containing products such as resin composite and glass-ionomer in the majority of their dental restoration work, largely due to increasing consumer preference for tooth-coloured alternatives.²⁵ Australia had also taken several measures in amalgam phase down as follows:

Minamata Convention Provision	Current Situation in Australia
(i) Setting national objectives aiming at dental caries prevention and health promotion, thereby minimizing the need for dental restoration.	Federal, State & Territory Governments have preventive programmes.
(ii) Setting national objectives aiming at minimizing its use.	None exist but dental amalgam use is declining as alternative restorative materials improve and patient demand for tooth coloured fillings increases.

²⁵ National Phase down of Mercury Ratification of the Minamata Convention on Mercury. Australian Government Department of the Environment and Energy. 2016

Minamata Convention Provision	Current Situation in Australia
(iii) Promoting the use of cost- effective and clinically effective mercury-free alternatives for dental restoration;	Composite and glass-ionomer use is high and growing in Australia. In some situations, the use of dental amalgam is the clinically superior option, so it is important that the option to use dental amalgam, where appropriate, is preserved.
(iv) Promoting research and development of quality mercury- free materials for dental restoration;	Some research in Australia but most is conducted overseas. According to the industry peak body, current government research grants in relation to this are small.
(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;	Already occurs at all dental schools.
(vi) Discouraging insurance policies and programmes that favour dental amalgam use over mercury-free dental restoration;	The most suitable material as agreed by patient and practitioner is customarily used.

Minamata Convention Provision	Current Situation in Australia
(vii) Encouraging insurance policies and programmes that favour the use of quality alternatives to dental amalgam for dental restoration;	The most suitable material as agreed by patient and practitioner is customarily used.
(viii) Restricting the use of dental amalgam to its encapsulated form;	All dental amalgam in Australia sold by dental supply companies is in encapsulated form. Encapsulated form will be the only form that will comply with the new ISO standard that is currently under development (ISO/CD 13897).
(ix) Promoting the use of best environmental practices in dental facilities to reduce releases of mercury and mercury compounds to water and land.	Promotion via Dentists for Cleaner Water project that was successful in Victoria. The collection of hard amalgam waste occurs in Australia through traps and separators but is not standard practice.

3.2 Japan

Since the 1980s, Japan has moved almost completely away from amalgam to aesthetic and environment reasons. Amalgam has been replaced by composite resin, glass ionomer and gold/silver/palladium alloy. In 2010, only 20kg of mercury were used in dentistry.

3.3 Hong Kong

The Government is preparing a piece of new legislation to implement the Convention in Hong Kong. Dental amalgam is the only mercury-containing product that is subject to a phase-down. The Department of Health (DH), joined by the Dental Council of Hong Kong, the Faculty of Dentistry of the University of Hong Kong, the College of Dental Surgeons of Hong Kong and the Hong Kong Dental Association, issued the "Consensus Statement on the Minamata Convention on Mercury and Phase Down of Dental Amalgam in Hong Kong" today (October 18 2018). The statement was issued to support the requirement of the Minamata Convention on Mercury to phase down the use of dental amalgam for a better environment, and to reaffirm the safety of dental amalgam as a filling material in dental procedures.²⁶

²⁶ Consensus Statement on the Minamata Convention on Mercury and Phase Down of Dental Amalgam in Hong Kong. Department of Health, Dental Council of Hong Kong, Faculty of Dentistry of the University of Hong Kong, College of Dental Surgeons of Hong Kong, and Hong Kong Dental Association. 18 October 2018

3.4 China

China has taken significant steps towards phasing down mercury use domestically. In October 2013, the Chinese government signed with the Minamata Convention as an official member. After two years of relentless negotiations, the Standing Committee of the National People's Congress ratified the convention domestically in April 2016 and submitted the signed convention documents to the United Nations in August 2016 as the 30th Official Member of the Convention.²⁷

3.5 UK and European Union (EU)

Dental Protection is reminding dentists in the UK to maintain good clinical records and obtain full consent if a decision is made to use amalgam as a restorative material, ahead of changes to EU Regulations on its use.

The EU Mercury Regulation is intended to protect the environment from the adverse effects of mercury pollution. It reflects the aims of the Minamata Treaty to reduce the use of dental amalgam in the medium to long term, and to eventually phase it out altogether.²⁸

²⁷ Multi-stakeholder workshop on phasing down amalgam in China held in Beijing. World Alliance for Mercury Free Dentistry. 25th October 2016

²⁸ Dental Protection: Good record keeping key in phase down of dental amalgam. <https://www.dentalprotection.org>. June 14 2018.

From 1 July 2018, amalgam is not to be used in primary teeth, children under 15 years and during pregnancy/breastfeeding except if deemed necessary on the ground of 'specific medical needs'. This should be interpreted as including the specific dental needs of the patient.

By 1 July 2019 the UK and other EU member states will be required to have a national plan on the phasing down of the use of dental amalgam.²⁹ Several European countries had already phased-down or completely phased-out the use of dental amalgam prior to the Minamata Convention and EU regulations. Norway initiated a phase-down in the use of dental amalgam more than 15 years ago, with a national clinical guideline recommending that amalgam should not normally be the first choice for dental restorations and promoting preventive treatment and the use of alternative materials.

Since 2011, Norway put a complete ban on dental amalgam. It has also been banned in Sweden since 2009. Other countries including Finland, Denmark and the Netherlands have phased down dental amalgam usage to 1-5% of restorations. In 2012, amalgam was reportedly used in only around 12% of all filling placed in Hungary.

²⁹ <https://bda.org/amalgam>

3.6 Canada

Canada will be implementing at least two measures as required by Article 4, paragraph 3, Annex A, Part II. Canada had set out national objectives for oral health and this serves as a guide to improve oral health care in Canada, thereby minimizing the need for dental restoration. Canada also focuses on the prevention of dental disease and the promotion of good oral health practices among children, their parents/caregivers, and pregnant women. Furthermore, Canada's 2010 Notice Requiring the Preparation and Implementation of Pollution Prevention Plans in Respect of Mercury Releases from Dental Amalgam Waste requires dental facilities to prepare and implement a pollution prevention plan if they have not already implemented best management practices for dental amalgam waste.³⁰

3.7 Singapore

Singapore reported that amalgam was used in about 16% of all dental restorations in 2012. Ministry of Health Singapore, would ensure all new dental chairs are equipped with amalgam separators and that waste amalgams are properly disposed of through recycling by vendors.³¹

³⁰ Canadian Measures to Implement the Minamata Convention on Mercury. Government of Canada.

³¹ Mercury poisoning fears prompt new guidelines for silver dental fillings. Singapore Today. 10 October 2013.

In addition, it will phase out the teaching of the use of dental amalgams for dental restorations in the dental undergrad curriculum. There will also be an increase in training in the use of alternative restorative materials.³¹

3.8 Malaysia

In general, there is a reduction in number of dental amalgam fillings from 2013 to 2017, from 22.8% to 16.0%.³² Short, medium and long term strategies had been identified and Malaysia is on the way of phasing down amalgam by setting national objectives aiming at minimizing its use. Malaysia had already implemented best managements practices for dental amalgam waste.

4.0 Discussion

Mercury is a widely present environmental pollutant that in certain forms poses a threat to ecosystems. Dental amalgam is a clinically well-proven and successful filling material, but the use of dental amalgam is one of several sources of mercury pollution. Thus, there is a need to expedite the reduction in the use of mercury including dental amalgam and safe mercury waste management. Many countries have shown successful phase down or even phase out of dental amalgam.

³² Annual Report HIMS Oral Health Sub-System. Oral Health Programme, Ministry of Health Malaysia, 2013-2017.

A complete phase out of amalgam for children, pregnant women and nursing mothers was deemed realistic or feasible by representatives from both developing and developed nations in 2018.⁵

FDI supports a gradual phase down in the use of dental amalgam and supports the following practices in the phase down of dental amalgam⁶:

- Increase emphasis on disease prevention and health promotion
- Increase research and development of quality mercury-free materials for dental restorations including their potential environmental impact
- Promotion of best environmental management practices for amalgam waste including encapsulated forms
- Reduce and if possible avoid the use of amalgam particularly in vulnerable groups such as young patients and patients with special medical conditions

By 2020, usage of dental amalgam in Malaysia has been targeted to be 15.0% and below. Thus, it is timely for us to take the commendable measures to phase down the use of dental amalgam in daily dental practice.

5.0 Recommendations

The MDC takes into cognizance the stands of the Minamata

Convention on Mercury and FDI towards gradual phasing down of dental amalgam due to its impact on environment. Hence, recommend the following strategies:

5.1 Strengthen oral health promotion and caries prevention to general public

Oral health status of general public can be improved particularly through increased emphasis in health systems on preventive care, caries risk assessment and surveillance. This could be done by setting national objectives aiming at dental caries prevention and health promotion, thereby minimizing the need for dental restoration and the use of dental amalgam. Following strategies had been identified to reduce caries prevalence^{33,34,35}:

- Widespread use of fluoride through increased coverage of water fluoridation and use of fluoridated dental products such as toothpaste and mouth rinse
- Incorporating Caries Risk Assessment during oral health screening procedure

³³ Petersen PE, Ogawa H. Prevention of dental caries through the use of fluoride the WHO approach. *Community Dental Health*. 2016. 33,66-68.

³⁴ Rechmann P, Kinsel R, Featherstone JDB. Integrating caries management by Risk Assessment (CAMBRA) and Prevention Strategies into the Cotemporary Dental Practice. *Compend Contin Educ Dent*. 2018 Apr;39(4):226-233; quiz 234.

³⁵ Dorri M, Martinez-Zapata MJ, Walsh T, Marinho VCC, Sheiham A, Zaror C. Atraumatic restorative treatment versus conventional restorative treatment for managing dental caries. *Cochrane Database of Systematic Reviews* 2017, Issue 12. Art. No.: CD008072. DOI: 10.1002/14651858.CD008072.pub2.

- Detecting and treating early carious lesion through preventive care such as fissure sealant and preventive resin restoration (PRR)
- Adopting a minimally invasive approach to restorative/surgical care through Atraumatic Restorative Treatment (ART). ART is a procedure that offers a practical option in many cases, especially for children. It uses glass ionomer material and can be placed with only hand instruments. ART is a cost effective option for many primary oral healthcare programs.

5.2 Alternative restorative materials

The use of alternative restorative materials such as composite resin, glass ionomer cements and ceramics are increasing, either due to their aesthetic properties or alleged health concerns related to the use of dental amalgam.³⁶ The alternative restorative materials are generally chemically complex.³⁷

³⁶ European Commission Scientific Committee on Emerging and Newly Identified Health Risks. Opinion on the safety of dental amalgam and alternative dental restoration materials for patients and users. 2015; https://ec.europa.eu/health/sites/health/files/scientific_committees/emerging/docs/scenihr_o_046.pdf. Accessed 19 December 2017.

³⁷ Scottish Dental Clinical Effectiveness Programme (2018). Restricting the Use of Dental Amalgam in Specific Patient Groups- Implementation Advice. NHS Education for Scotland. June 2018.

³⁸ Scottish Dental Clinical Effectiveness Programme. Prevention and Management of Dental Caries in Children. Dental Clinical Guidance. 2nd Edition. 2018; www.sdcep.org.uk/published-guidance/caries-in-children/. Accessed 30 May 2018.

However, there are limited scientific data available concerning exposure of patients and dental personnel to these substances have significant adverse health risk.³⁴ The use of alternative restorative materials have been in clinical practice for over 30 years. It is used to address aesthetic, ease of handling and retention of more tooth substance when treating caries.³⁸

The main limitations for the placement of alternative restorative materials are inadequate moisture control or patient cooperation during the treatment.³⁵ In the absence of these limitations, it should be feasible to use alternative materials including resin composites or high viscosity glass-ionomer restorative materials to effectively restore a large cavity or extensive cavities in primary or permanent teeth³⁵. However, if the patient is unlikely to be able to cope or cooperate with the extent of treatment, or the necessary moisture control for each of the other options is not achievable, then the use of dental amalgam for these restorations might be justifiable.³⁵ The use of alternatives restorative materials are recommended in following conditions:

- lesions that are suitable for other restorative materials, especially in first restorative treatment and young patients;
- patients with special medical conditions, such as severe renal disease or patients with allergic reactions to amalgam or (erosive) lichenoid contact lesions in the oral mucosa;

The choice of material should be based on patient characteristics such as primary or permanent teeth, pregnancy, presence of allergies to mercury or other components of the restorative materials and presence of decreased renal clearance. Therefore, oral health promotion and preventive measures must be strengthened across all target groups to reduce the occurrence of dental caries.

6.0 Conclusion

The MDC supports a gradual phase down in the use of dental amalgam through an increased emphasis on oral health promotion and caries prevention. The MDC also promotes the use of alternative restorative materials and continued research and development regarding this niche area. Concerted effort shall be made to reduce and if possible avoid the use of amalgam unless deemed necessary based on the specific needs of the patient.

Appendix 1

Annex A Part II: Products subject to Article 4, paragraph 3³

Mercury-added products	Provisions
Dental amalgam	<p>Measures to be taken by a Party to phase down the use of dental amalgam shall take into account the Party's domestic circumstances and relevant international guidance and shall include two or more of the measures from the following list:</p> <ul style="list-style-type: none"> (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.

AMALGAM BEST PRACTICE

Amalgam best practice is a set of actions, methods and procedures to help prevent or reduce to the lowest achievable levels the release of mercury from dental amalgam and its waste. It provides guidance to dentists in adopting an appropriate mercury hygiene programme, ensuring the safety of patients and dental personnel involved in the handling of mercury and dental amalgam and minimizing the release of mercury into the environment.³⁹

1. Training

All dental personnel involved in the handling of amalgam should be aware of the potential hazard of mercury vapour and the need to practice good mercury hygiene. It is stated in Part IV Section 15(2)(c) of the Occupational Safety and Health Act 1994 (OSHA) of Malaysia, that it is the duty of employers to provide personnel with the necessary training.⁴⁰

15. General duties of employers and self-employed persons.

(2) matters to which the duty extends include in particular-

(c) the provision of such information, instruction, training and supervision as is necessary to ensure, so far as is practicable, the safety and health at work of his employees.

³⁹ ADA Council on Scientific Affairs. Dental Mercury Recommendation. JADA, Vol. 134, November 2003 pg 1489-1499

⁴⁰ Occupational Safety and Health Act 1994

All staff who works with dental waste must be adequately trained.

Training procedures and information should -

- be written in a way (including translations) which can be understood by those who need to follow them, including those who may not have a good command of the English Language
- take into account the different levels of training, knowledge and experience of the staff
- be up to date
- be available to all staff including part time, shift, temporary, agency and contract staff.

Training needs vary, depending on the job and on the individual.

All dental staff involved in handling healthcare waste needs training, information and instruction on :

- the risks associated with healthcare waste, and its segregation, handling, storage and collection
- personal hygiene
- any procedures which apply to their particular type of work
- procedures for dealing with spillages and accidents
- emergency procedures
- the appropriate use of protective clothing

Managers must ensure that procedures are adhered to by all staff.

All staff who carry out procedures which generate waste need to understand that they are personally responsible for complying with

agreed local procedures. Training may include the following:

- (a) Management of hazardous materials;
- (b) Response and action to be taken when a spillage occurs - for personnel who handle hazardous material;
- (c) Right-to-know awareness; and
- (d) Proper use and disposal of mercury-containing material

2. Amalgam Management Procedures

Regarding the general duties of employees, it is stated in the OSHA, Part VI Section 24(1)(d) –

24(1) It shall be the duty of every employee while at work-

d) to comply with any instruction or measure on occupational safety and health instituted by his employer or any other person by or under this Act or any regulations made there under.

The management procedures relating to the following should be included:

- (i) Clinical management
 - a. Amalgam restorations in the mouth should not be placed in contact with metal devices, such as braces.
 - b. Dentists should provide their patients with sufficient information to make an informed choice regarding the material used to restore their teeth.
 - c. When removing dental amalgam restorations, dentists should use high vacuum suction.
 - d. Staff should not rinse amalgam-containing traps, filters or

containers in the sink.

- e. Staff should recycle, or manage as scheduled waste the following: amalgam, elemental mercury, broken or unusable amalgam capsules, extracted teeth with amalgam, amalgam-containing waste from traps and filters. Empty dental amalgam capsules containing no visible materials may be disposed of as a non-hazardous waste, except where local regulations require otherwise.

(ii) Working environment

- a. All dental personnel should work in well ventilated spaces. If the spaces are air-conditioned, the air-conditioning filters should be replaced periodically.
- b. Floor coverings should be of a non-absorbent easy-to-clean material. Dental surgeries should not be carpeted. Continuous seamless-sheet flooring continuing up the walls for at least 6cm is preferable.
- c. Worktops should also be non-absorbent, seamless, and easy to clean, suitably lipped to facilitate recovery of any spilled or excess amalgam, and surface which is sloping inwards is also recommended.
- d. The dental surgery should be checked periodically for mercury vapour. Monitors may be of the dosimeter type, or mercury vapour analysers (hand held monitors often used by industrial hygienists), which give rapid readouts.

(iii) Equipment and materials

- a. **Eliminate all use of bulk elemental mercury and use**

only pre-capsulated dental amalgam for amalgam restorations.

- b. Use capsulated alloy of the ideal size to minimize amalgam waste. Keep a variety of amalgam capsule sizes on hand to ensure almost all triturated amalgam is used.
- c. Only capsules that remain sealed during trituration should be used.
- d. An amalgamator with a completely sealed compartment should be used to prevent alloy or mercury spillage during trituration.
- e. All dental units must have traps or filters installed to catch shavings and drilling waste from restoration procedures. The traps/filters should be ISO certified or equivalent and maintained according to the manufacturer's instructions.

(iv) Storage

- a. **Store all amalgam waste dry** in a properly labelled, air tight container. Do not store amalgam waste under any liquid such as photographic fixer solution / water with a layer of oil. Dispose of any liquids used to disinfect contact amalgam as hazardous. These cannot be discharged to the sewer system.
- b. The container in which waste amalgam is stored should be labelled with the appropriate symbol and the word "Biohazard" and "Scrap Dental Amalgam", as well as the name of clinic, clinic address, telephone number and

date on which the waste amalgam was first collected in the container.

- c. The container must be tightly sealed when not in use.

(v) Handling

- a. Exercise care in handling amalgam. Avoid skin contact with freshly mixed amalgam. A no-touch technique should be used with amalgam at all times.
- b. Wherever possible, use high volume evacuation during placement, finishing and removal of amalgam fillings.
- c. Any spilled amalgam should be cleaned up immediately. After a spill, the affected area should be well ventilated, preferably by opening windows.
- d. Material from traps or filters and extracted filled teeth should be disposed of as *scheduled waste, and not as clinical waste or general waste. [Clinical waste may be incinerated and mercury from the amalgam will be released into the atmosphere.]
- e. Care should be taken when handling amalgam waste that has contacted human body fluids. Some dentists place the removed traps inside a glove to prevent exposure.

(vi) Cleaning

- a. Instruments contaminated with amalgam should be cleaned to remove the amalgam contaminant before using ultrasonic cleaners, heat disinfection or heat sterilisation.

- b. Check, clean and replace traps or filters periodically to ensure waste amalgam is removed. Clean filters and traps at least once a week or more frequently if needed.
- c. Never use disinfectants or line cleaners containing chlorine (bleach) to flush dental unit wastewater lines.

(vii) Disposal

- a. Where feasible, amalgam scrap and waste amalgam should be recycled or disposed of in accordance with applicable laws as scheduled waste.
- b. Clean used amalgam capsules should be disposed of as normal waste. Amalgam capsules which have residual amalgam or mercury should be disposed of as scheduled waste.

**Scheduled waste means any waste falling within the categories of waste listed in the First Schedule of the Environment Quality (Scheduled Wastes) Regulations 1989, specifically Part II Section 21 'mercury wastes, containing metallic mercury, organic and inorganic mercury compounds'. (Environmental Quality Act 1974 (Act 127)*

Waste classification summary

Hazardous Waste

- Clinical waste
- Dental amalgam
- Amalgam capsules
- Amalgam-filled teeth
- Radiographic fixer and developer solutions
- Lead foil
- Cytotoxic and cytostatic medicines

Offensive Waste Feminine hygiene waste
Trade Waste Business waste

3. Amalgam Waste Management Procedures

For Ministry of Health Dental Clinics

- a) All dental chairs must have amalgam traps or filters installed.
- b) The maintenance of amalgam traps and filters will be carried out by Dental Technologists, and the collection and handling of waste amalgam shall be the responsibility of Dental Nurses and Dental Surgery Assistants.
- c) Waste amalgam shall be collected and properly stored before being sent for disposal. See Appendix 2
- d) Waste Amalgam is to be collected in each state at centralized collection centres, after which it should be sent for disposal only at disposal centres **accredited by the Department of the Environment.****
- e) The State Deputy Director of Health (Dental) has to enter into an agreement with a waste disposal concessionaire for the transport and disposal of the waste amalgam, for their respective states.

For Non-MOH Dental Clinics

- a) All dental chairs shall have amalgam traps or filters installed.

- b) Designated staff shall be responsible for the maintenance of amalgam traps and filters, and the collection and handling of waste amalgam.
- c) Waste amalgam shall be collected and properly stored before being sent for disposal. (See Appendix 2). The Person-in-Charge of each clinic has to enter into an agreement with a waste disposal concessionaire **accredited by the Department of the Environment** for transport and disposal of the waste amalgam.

Appendix 3

Best Amalgam Practices for Amalgam Waste⁴¹

DON'Ts	DOs
Do not use bulk mercury	Use pre-capsulated alloys and stock a variety of capsule sizes
Do not deposit non-contact amalgam waste or used amalgam capsules in biohazard containers, infectious waste containers (yellow bags) or regular garbage	Salvage, store and recycle non-contact amalgam (scrap amalgam)
Do not put contact amalgam waste in biohazard containers, infectious waste containers (yellow bags) or regular garbage	Salvage amalgam pieces from restorations after removal and place them in the amalgam waste container
Do not rinse devices containing amalgam over drains or sinks	Use chair-side traps, vacuum pump filters and amalgam separators to retain amalgam and recycle their contents

⁴¹ Best Amalgam Practices for Waste Amalgam. American Dental Association. October 2007

DON'Ts

Do not dispose of extracted teeth that contain amalgam restorations in biohazard containers, infectious waste containers (yellow bags), sharps containers or regular garbage

Do not flush amalgam waste down the drain or toilet

Do not use bleach or chlorine-containing cleaners to flush waste water lines

DOs

Teeth that contain amalgam restorations should be disposed of as scheduled waste.

Manage amalgam waste through recycling as much as possible

Use line cleaners that minimize dissolution of amalgam

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