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Minamata: What the practising dentist needs to know

Part 1: Regulations

The Minamata Convention on mercury is a global treaty, signed by the UK and over one hundred countries on October 2013 with the intention of protecting human health and the environment from the adverse effects of mercury, for example, by limiting the use of mercury from all sources, including LED light bulbs, fluorescent tubes, vaccines, fertilizers, thermometers and, of course, dental amalgam.

The European Union approved the Convention in adopting Regulation (EU) 2017/852 of the European Parliament and of the Council on 17th May 2017. An EU Regulation is enforceable as law in all EU States simultaneously and is binding. Article 10 of the Regulation stipulates the law in relation to dental amalgam and the timelines for the changes laid out in Recitals 21–23 of the Regulation. Article 10 is as follows:

■ **From 1 January 2018**, amalgam separators put into service should provide a retention level of at least 95% of amalgam particles (Article 10, 4 (a)). Amalgam separators shall be maintained in accordance with the manufacturer's instructions to ensure the highest practicable level of retention.

Dental practitioners shall ensure that their amalgam waste, including amalgam residues, particles and fillings, and teeth, or parts thereof, contaminated by dental amalgam, is handled and collected by an authorized waste management provider.

Dental practitioners shall not release directly or indirectly such amalgam waste into the environment under any circumstances (Article 10, 6).

■ **From 1 July 2018**, dental amalgam shall not be used for dental treatment of deciduous teeth, of children under 15 years and of pregnant or breastfeeding women, except when deemed strictly necessary by the dental practitioner based on the specific medical needs of the patient (Article 10, 2).

■ **From 1 January 2019**, dental amalgam shall only be used in pre-dosed encapsulated form. The use of mercury in elemental form by dental practitioners

shall be prohibited.

Operators of dental facilities in which dental amalgam is used or dental amalgam fillings or teeth containing such fillings are removed, shall ensure that their facilities are equipped with amalgam separators for the retention and collection of amalgam particles, including those contained in used water (Article 10, 4).

■ **By 1 July 2019**, each Member State shall set out a national plan concerning the measures it intends to implement to phase down the use of dental amalgam.

Member States shall make their national plans publicly available on the internet and shall transmit them to the Commission within one month of their adoption.

■ **From 1 January 2021**, all amalgam separators in use provide the retention level at least 95% of amalgam particles (Article 10, 4 (b)).

Part 2: Alternatives?

The Minamata Convention on Mercury is a global treaty, signed by the UK and over one hundred countries in October 2013, with the intention of protecting human health and the environment from the adverse effects of mercury, for example, by limiting the use of mercury from all sources including dental amalgam. The European Union approved the Convention in adopting Regulation (EU) 2017/852 of the European Parliament and of the Council on 17th May 2017. The Regulation states that, from 1st July 2018, dental amalgam shall not be used for dental treatment of deciduous teeth, of children under 15 years and of pregnant or breastfeeding women, except when deemed strictly necessary by the dental practitioner based on the specific medical needs of the patient (Article 10, 2).

What are the alternatives? A brief review

Resin composite has been adopted as the alternative to amalgam in many countries across the developed world¹ and, while it has

many advantages, such as the ability to be placed in minimally-invasive cavities because intermediate dentine-bonding agents facilitate an adhesive approach, and the fact that it is tooth-coloured, it takes longer to place. Research carried out in the early days of 'posterior composite' indicated that it took 2.5 times longer to place than an equivalent amalgam restoration,² but it may be considered that recently introduced bulk fill restorative materials will allow faster placement, and it has also been considered that these may be the short- to medium-term alternative to amalgam.³

For nursing/pregnant women, a provisional restoration such as glass ionomer and its derivatives may be utilized and the definitive restoration placed post partum or until breast feeding has ceased, after which the clinician has a choice outwith the Regulations of the Minamata Agreement, as detailed in part 1.

For children under the age of 15 years for whom the Minamata Agreement has indicated that amalgam shall not be used, it may be considered that glass ionomer (GI) materials may perform satisfactorily in permanent teeth in Class I cavities or larger cavities with limited occlusal load.^{4,5} Very recently, a systematic review and meta-analysis⁶ has compared survival of resin composite and GI Class II restorations in primary teeth: the data, which included nine papers in the meta-analysis, concluded that the materials analysed presented similar clinical performance concerning the percentage of failures and anatomical form but, for secondary caries, GI presented superior performance, especially if resin-modified GI was used with rubber dam isolation.

In permanent teeth, for larger cavities, such as Class II or cusp replacements, resin composite may be considered to provide the only other solution and there is an increasing body of evidence from general dental practice across Europe to support its use in all types of cavity.⁷⁻¹¹ There remains the problem that it takes longer to place and has been considered to be technique sensitive, therefore, it will be necessary for third party insurers

to provide the necessary funding arrangements, and training for dentists who are not experienced in the placement of such restorations. Another alternative for primary teeth is the so-called Hall Crown, which has been shown to provide excellent survival rates.¹²

The restriction on the use of dental amalgam in patients, as detailed above, may present a challenge to some dentists: alternatives have been presented above. However, in all other groups, amalgam may continue to be used: it has helped to maintain dental public health in the developed world for over 125 years. One opt-out clause for the under-15 age group and nursing mothers states 'You may consider that the use of amalgam is deemed strictly necessary ... based on the specific medical needs of the patient'. This may be considered to include allergy to non-amalgam restorative materials, and (the author's view) patient management under general anaesthetic in which it is not possible to check the occlusion adequately.

Things will never be the same again. The answers are not simple until the development of an 'amalgam alternative', which will be self-adhesive, have 5 mm depth of cure, low shrinkage stress, good physical properties and good wear

resistance, be quick and easy to place (ie economical), be non-toxic and, in addition, possess adequate aesthetics for back teeth. We're not there yet!

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