

## Restorative Treatment on Class I and II Restorations in Primary Molars: A Survey of Brazilian Dental Schools

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*A survey was sent to 70 Brazilian dental schools evaluating techniques and restorative materials being taught for Class I and II preparation in posterior primary teeth by Pediatric Dentistry courses. After a 54% response rate, marked teaching diversity was found among Brazilian dental schools. Amalgam continues to be taught, but a tendency of preference towards more esthetic-like materials was observed.*  
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### INTRODUCTION

The dental amalgam history began in 1826, when Taveau in France, used it as a restorative material.<sup>1</sup> Since then, controversies were generated about its indication due to environmental contamination and apparent health risks caused by mercury vapor. Nowadays, studies have proven that with adequate handling, patients with amalgam restorations do not present reduction in renal function, decrease immune-competence, and higher percentage of fetal defects or general health problems.<sup>2,3</sup> A study performed on some European nations concerning dental amalgam demonstrated that some countries such as Sweden, France and Norway used alternative materials, mainly because of parental concerns about amalgam toxicity.<sup>4</sup>

The amalgam has been used for more than 150 years as a restorative material due to its satisfactory clinical characteristics: Low sensitive technique (moisture contamination),<sup>5</sup> satisfactory longevity on primary teeth<sup>4</sup> and diminished microleakage related to corrosive products in tooth/restoration interface.<sup>6</sup> In addition, amalgam is inexpensive and easy to handle.

Currently, with valorization of esthetic restorations, amalgam has been challenged to new restorative materials, as composite resins and glass ionomer cements that are gradually evolving in the market.

In a survey among 126 pediatric dentists from Florida, the resin-based materials were the most commonly selected for Class I and II restoration in primary molars when compared to amalgam.<sup>7</sup>

Some studies on Class I and Class II composite resin restorations in permanent teeth were accomplished among European,<sup>8</sup> North American<sup>9</sup> and Japanese<sup>10</sup> dental schools. The data showed an intra and inter continental diversity. However, it was possible to observe a significant increase in the use and teaching of composite resins for Class I and II cavities. In another study by Guelmann *et al.*<sup>11</sup> among North American dental schools (United States and Canada) showed that amalgam continues to be the preferred material, while esthetic materials were gaining certain popularity.

The objective of this study was to evaluate what Brazilian dental schools teach regarding restorative procedures for primary molars.

### METHOD AND MATERIALS

This study was based on Guelmann *et al.*<sup>7</sup> A questionnaire with ten questions, some multiple-choice and others in a yes/no format, was sent to 70 Brazilian dental schools. The questions assessed the use of amalgam and esthetic restorative materials in Class I and II restorations in primary teeth, type of cavities preparation recommended for these materials, their clinical indications and contraindications, and use of base/liner according to cavity depth. Letters addressed to Chair Persons of Pediatric Dentistry department programs contained a brief explanation about the study and a pre-stamped envelope for reply.

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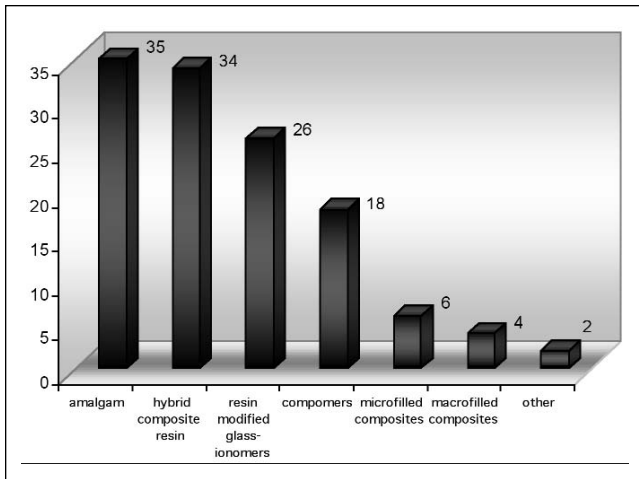
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# Restorative Treatment on Class I and II Restorations in Primary Molars



**Figure 1.** Material selection for posterior restoration in primary molars.

## RESULTS

Thirty-eight (54,3%) questionnaires were received properly answered. Data was analyzed by descriptive statistics based on total number of participant schools.

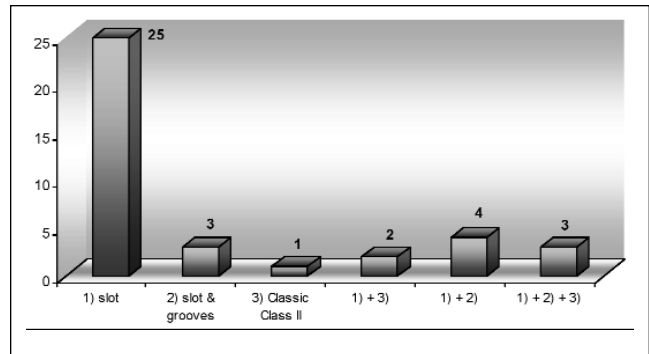
### Material Selection

The schools were questioned about types of materials recommended for primary molars restorations. All schools indicated more than one material. Thirty-five dental schools indicated amalgam, and among esthetic restorative materials, hybrid composite was the most recommended by dental schools (34) (Figure 1). Only 13 dental schools (34%) selected amalgam as the preferred material for Class I and II cavities in primary teeth.

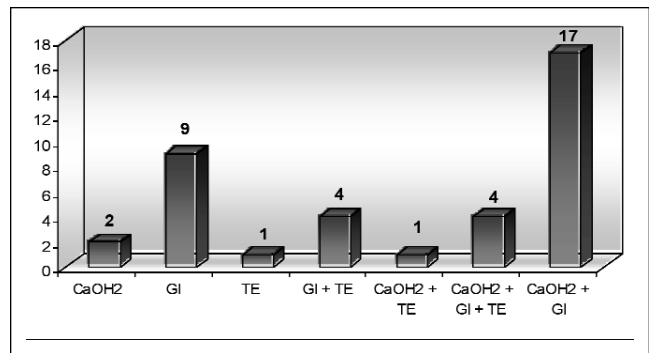
All schools cited, taught alternative materials (composite resin, compomer, and resin-modified glass ionomer), however 28 schools (73.7%) only used them under certain conditions. The mostly marked contraindications for esthetic materials were poor oral hygiene, inability to place rubber dam and proximal subgingival margin (Table 1).

**Table 1.** Contraindications for the use of esthetic restorative materials

<b>Chosen by more than 50% of dental schools</b>	<b>Chosen by less than 25% of dental schools</b>
Poor oral hygiene	Behavior management problem
Inability to place rubber dam	After pulpotomy/pulpectomy
Proximal gingival margin subgingival	Parafunctional activity
	More than 2 surfaces involved
	Large restorations
	Patient's age



**Figure 2.** Type of proximal preparation for resin restoration.



**Figure 3.** Selected base under an amalgam restoration for a primary molar. GI: Glass ionomer; CaOH2: calcium hydroxide; TE: total etch and bonding agents.

### Teaching Dental Materials

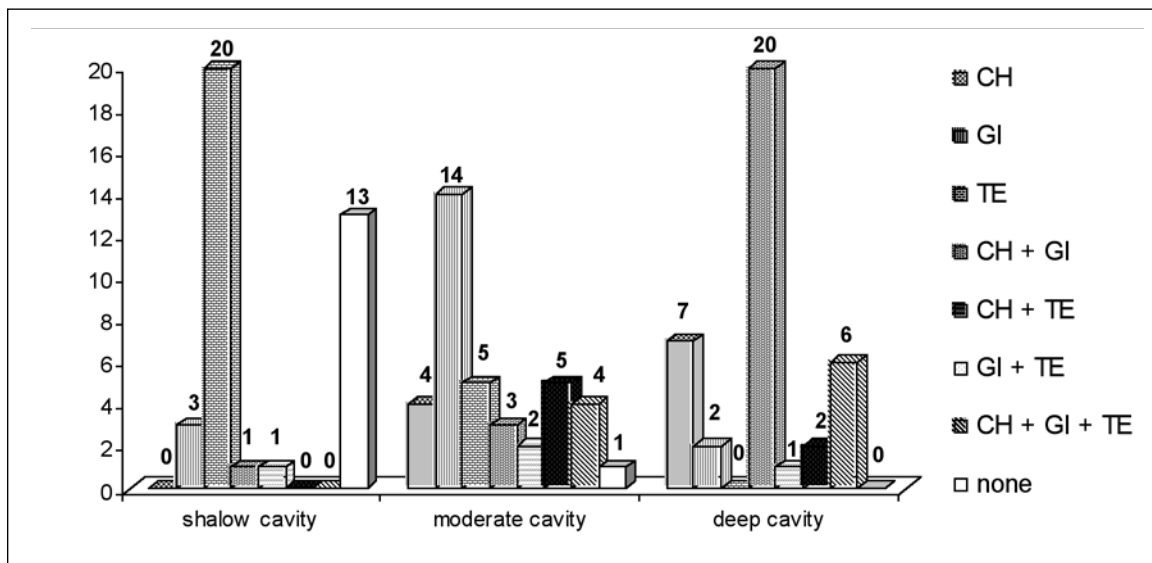
The teaching of dental materials was included in the undergraduate pediatric core course in 24 (63,2%) interviewed schools. Two schools (7.9%) admitted not to teach them; while in 11 schools (28.9%) dental bio-materials and operative dentistry disciplines were responsible for this subject.

### Type of cavity preparation

It was observed that 32 (84.2%) Brazilian dental schools taught Class I and II cavity preparation for amalgam restoration in primary teeth. For resin-based materials, thirty-four dental schools (89.4%) taught the slot-type of preparation and 10 (26.3%) indicated the conservative preparation with retention grooves in the box. Only 6 schools (15.7%) opted for teaching classic Class II preparation for dental amalgam (Figure 2). Some schools chose more than one alternative.

### The use of cement bases/liners for primary molars

The total-etch and bonding agents was not recommended as standard procedure under amalgam restoration for primary teeth by 35 schools (92.1%). When the use of a base/liner under an amalgam restoration in primary molar is necessary, the glass ionomer was preferred, and was exclusively opted by 9 schools (23.6%). Most schools indicated more than one material, and glass ionomer and calcium hydroxide were mostly



**Figure 4.** Indication for the use of bases and liners in different depth cavity preparations. GI: Glass ionomer; CaOH<sub>2</sub>: calcium hydroxide; TE: total etch and bonding agents.

selected (17 schools). Calcium hydroxide was exclusively taught in only 2 schools (5.26%) and total etch and bonding agents was exclusively recommended by 1 school, but was also associated with other materials (Figure 3). Some dental schools indicated the option “other” but they did not specify the used material. Therefore, this data was excluded from the sample.

Regardless the type of restorative material, in shallow cavities, the total-etch and bonding agents were generally recommended by dental schools. For moderately deep cavities, glass ionomer was the preferred material. In deep cavities, calcium hydroxide and glass ionomer were the most indicated materials (Figure 4).

## DISCUSSION

Although a great variety of dental materials was indicated for posterior restorations in primary molars, the present data showed that amalgam continues to be taught in most of Brazilian dental schools, however was not considered the preferred material like in North American<sup>7</sup> and Eastern European dental schools.<sup>12</sup>

Among the esthetic materials, hybrid composite was the most recommended one. Composite resins have excellent physical properties, but are technique sensitive materials.<sup>13</sup> The longevity of composite resin restorations in primary molars is shorter than amalgam. Some factors such as absence of rubber dam, lack of patient’s cooperation and involvement of proximal surfaces are reported to cause high incidence of marginal leakage and consequently failure of the restoration.<sup>14</sup> In the present study, in agreement with such considerations, the main contraindications selected for the use of tooth colored filling were poor oral hygiene, the inability to place rubber dam and the presence of proximal subgingival margin (Table 1).

Resin-modified glass ionomers were also recommended as esthetic materials (Figure 1). Although not selected as preferred material, some clinical studies revealed that resin-modified glass ionomers appear to satisfy the longevity needed for primary molars and may also be considered a good substitute for the traditional silver amalgam.<sup>5,15,16</sup>

After the resin-modified glass ionomers, compomers were the next most popular esthetic material (Figure 1). Compomers generally present better physico-chemical properties than conventional glass ionomer, but is still inferior when compared to composite resin.<sup>13</sup> Compomers were introduced in Europe in 1993, and several clinical trials tested this material for Class II restorations in primary molars.<sup>17-20</sup> A common conclusion of these studies was that compomer can substitute amalgam for up to 2 years.

A base or a liner under restoration is indicated to protect the pulp from thermal stimuli, mechanical trauma, galvanic shock, toxic components of some restorative materials and microleakage, reducing post-operative sensitivity.<sup>21</sup> The ideal base should promote dentin sealing, present low conductivity and enough resistance to masticatory forces and restorative material condensation.<sup>22</sup> Glass ionomer cement was the most commonly selected material for this purpose (89.5%), while only 10 dental schools mentioned the use of total etch and bonding agents. This difference may be related to a smaller postoperative sensitivity by glass ionomer cements, when compared to adhesive resin.<sup>23,24</sup> A survey of North American, including Puerto Rico, dental schools showed that glass ionomers are becoming more popular, while calcium hydroxide’s popularity as a base is declining under restorations in permanent posterior teeth.<sup>21</sup> These results were similar to the present data

obtained for primary teeth, where calcium hydroxide was selected only from 63.2% of dental schools, while glass ionomer was preferred by 89.5%.

It can be observed in Figure 4 that total-etch and bonding agents was not considered a standard procedure by most of Brazilian dental schools, but was indicated for shallow cavities in amalgam Class II restorations (52.3%) or could be restored with no base (34.2%). According to Christensen<sup>22</sup> the use of base in shallow cavity could reduce the thickness of restoration, weakening it.

In moderate cavities, glass ionomer cement was indicated by 36.8% of dental schools, as the only material to be used as base. However, 31.6% opted for other material, as bonding agents or calcium hydroxide, besides glass ionomer (Figure 4). Probably, glass ionomer is frequently used, due to its ideal characteristics of a base and the fluoride release adjacent to dental structure.<sup>22</sup>

In deep cavities, the calcium hydroxide was mentioned by 89.5% of dental schools. (Figure 4) It was suggested that this preference is related to the lesser severe pulp inflammatory response of calcium hydroxide when compared to adhesive resin.<sup>25</sup>

## CONCLUSIONS

Marked teaching diversity was found among Brazilian dental schools, but with a tendency of preference towards more esthetic-like materials. This is in agreement with Western European schools, but different from North American and Eastern Europe results.

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