

## PEDIATRIC DENTISTS' CHOICES OF RESTORATIVE MATERIALS FOR PRIMARY MOLARS

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### ABSTRACT

*The aim of the study was to examine selection of various restorative materials in children; and the basis for the selection in a group of pediatric dentists in Riyadh, Saudi Arabia. A self-administered questionnaire was utilized to obtain demographic information and present the respondents with six hypothetical clinical scenarios for selection of the restorative materials in primary teeth. A total of forty four pediatric dentists (52% males and 48% females) completed the questionnaire. Two-third of the respondents were seeing children between age 6 to 14 years. A great majority (89%) reported that a successful alternative of amalgam is available. More than two-third (68%) were using tooth-colored restorative materials more frequently than amalgam. Almost half (45%) of the respondents reported that the most influencing factor in the choice of restorative material for vital primary teeth is cavity design. The choice of restorative materials was discussed more with parents (84%) than children (43%). For Class I and II cavity preparations in primary molars; amalgam was used by 43% and 50% of the respondents respectively. For restoring two proximal lesions in primary molars; 66% preferred Stainless Steel Crown (SSC) followed by amalgam (29%). It can be concluded that amalgam is still popular for deep Class I and II cavities; whereas SSC is the most common choice for restoring primary teeth with multiple surfaces carious lesions.*

**Key words:** Children, Restorative Material, Pediatric Dentists, Primary Teeth

### INTRODUCTION

Many changes have occurred in the development and availability of dental restorative materials for pediatric patients over the last 60 years.<sup>1</sup> Amalgam has been used for over 120 years and is still being used extensively in restorative dentistry.<sup>2</sup> It is still taught as the material of choice for Class I and II restorations in many dental schools in the USA and Canada; also it remains the best direct restorative option for larger restorations<sup>3</sup> or when used to restore interproximal carious lesions.<sup>4,5</sup>

Composite resins are the most desirable esthetic materials with excellent physical and mechanical properties.<sup>6</sup> Compomers are a polyacid modified composite resins and considered to be composite resins with modest incorporation of glass ionomer cement (GIC). These materials are easy to handle, stronger and more esthetic than GICs.<sup>4</sup> GICs however have a high fluoride release, good physical properties and biocompatibility; with lesser esthetic properties than composites.<sup>4</sup> Resin

modified glass ionomers and compomers restorations have shown similar longevity compared with amalgam, whereas conventional glass ionomer restorations showed significantly shorter longevity.<sup>7</sup> Recently, dentists have been moving away from amalgams towards esthetic restorations. Guelmann and Mjör<sup>1</sup> reported that the pediatric dentists in Florida (USA) mostly used resin-based materials for primary teeth Class I and II restorations, while SSCs were the predominant choice when three or more surfaces were involved. However, amalgam was the most common material used for Class II restorations by Californian pediatric dentists.<sup>8</sup> In Japan, Fukuyama et al<sup>9</sup> reported that the use of composites has increased primarily due to patients' esthetic desires. More parents and children now prefer tooth colored restorations as compared to amalgam restorations.<sup>10</sup>

Pediatric dentists' at the University of Minnesota, USA found that parental concerns about restorative materials in decreasing order were: esthetics, cost, toxicity and durability. Similarly, parents' greatest concerns about SSCs were esthetics and cost.<sup>11</sup> Several studies have compared durability and lifespan of SSCs and Class II amalgams restorations demonstrating the superiority of SSCs for both the parameters.<sup>12,13</sup> Seale<sup>14</sup> has recommended that the SSC is the most successful restoration in children with high caries rate. Several studies have found SSCs as superior restorations for

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badly broken down primary molars.<sup>13,15</sup> Pre-veneered SSCs were developed to serve as a convenient durable, reliable, and an esthetic solution to the challenge of restoring severely carious primary incisors.<sup>16</sup> These crowns are commonly used to restore primary anterior teeth by pediatric dentists at Detroit, USA.<sup>17</sup> Parental satisfaction is greater with pre-veneered SSCs for primary anterior teeth.<sup>18</sup>

Dentist needs to make wise decisions about the type of restorative material they choose to restore primary teeth. The decisions are becoming more challenging due to advancement and availability of newer materials<sup>19</sup>. The purpose of the present study was to examine the selection of restorative materials in primary teeth by a group of specialist pediatric dentists in Riyadh city, Saudi Arabia.

## METHODOLOGY

A sample of pediatric dentists was chosen on the basis of their membership in the Saudi Dental Society and working in Riyadh city, Saudi Arabia. They included pediatric dentists (having a specialist training in pediatric dentistry) working in teaching institutions, government hospitals, private hospitals and private dental clinics.

A self-administered questionnaire was designed for the study. The questionnaire had four sections:

- 1 Demographic information; respondent's gender, age, qualification, years of experience, place of graduation, place of work, number of children seen per week, age range of children treated, and main behavior management approaches used.
- 2 Factors affecting the choice of restorative materials; pattern of amalgam usage, other materials used including SSCs, reason for using tooth colored material for posterior teeth, and the most influential factor in choosing a restorative material.
- 3 Influence of parents and child patients in the restorative material selection.
- 4 The final section had six hypothetical clinical scenarios (brief descriptions with diagrams and material options) presenting lesions of various sizes, location and depth in primary molars. Participants were asked for their choices of materials including fissure sealant with unfilled resin (FS), preventive resin restoration with resin plus unfilled resin (PRR), GICs, composite resins, amalgam, SSCs, and others. These material choices and six hypothetical clinical scenarios were adopted from work of Tran and Messer.<sup>20</sup> It was assumed that all hypothetical situations were in co-operative children with good oral hygiene and using a fluoridated tooth paste.

Prior to undertaking the main study, the ques-

tionnaire was pilot tested in 10 dentists in King Saud University College of Dentistry Clinics. The questionnaire was subsequently modified to make it more comprehensive. All the data were entered and analyzed using SPSS (Version 16.0). Descriptive statistics and tables were generated.

## RESULTS

Forty-four pediatric dentists (52% males and 48% females) completed the questionnaire with a response rate of 80%. The respondents' age ranged from 31-50 years with mean age of 40.5 (SD 7.7) years. Half (50%) of the participants had Certificate and Master of Science degree, while slightly more than one-third (36%) had PhD degree. A majority (77%) of the participants had 11 years or longer experience. More than half (59%) were graduates from Saudi Arabia, 16% from Arab countries, and the rest were from different countries including USA, UK, Canada, France, and Pakistan. Among the participants; 46% work in government hospitals, 25% in private clinics and others in private hospitals and academic institutions. Most of respondents (39%) see 31 or more children per week mainly aged between 6-10 years.

Majority (91%) of the children were treated on a dental chair with or without local anesthesia and rest with local anesthesia and N<sub>2</sub>O (9%) and no one used a general anesthesia approach. A great majority of the participants (89%) found a successful alternative material to amalgam for posterior teeth; and the majority (68%) reported using tooth colored materials more frequently than amalgam (Table 1). None of the pediatric dentists used amalgam as only choice of restorative material for posterior teeth. The two most frequently reasons for selecting a particular tooth-colored material in posterior teeth were fluoride release (34%) and longevity similar to amalgam (32%). The two most influential factors in material choice were cavity extension or depth (45%) and research reports or journal articles (41%).

Majority of the respondents (84%) discussed restorative material selection with parents and the parental preferences were actually considered by 64% of the pediatric dentists. Most respondents (57%) did not discuss the choice of restorative material with children.

### Hypothetical clinical scenarios (Tables 2 & 3)

#### Scenario 1: Preferred material for occlusal lesions (just into enamel) on a primary molar.

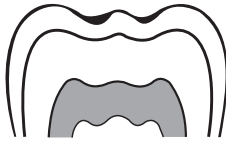
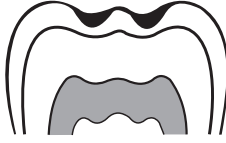


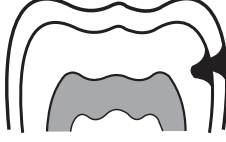

Preventive resin restoration with resin plus unfilled resin (PRR) was the first choice (64%) followed by fissure sealant (FS) using unfilled resin (39%).

#### Scenario 2: Preferred material for occlusal lesions (half way to dentino-enamel junction) on primary molar.

TABLE 1. PEDIATRIC DENTISTS' RESPONSE TO VARIOUS QUESTIONS ABOUT RESTORATIVE MATERIAL SELECTION

Questions	N (%)
<b>Posterior teeth: Successful alternatives to amalgam</b>	
Yes	39 (89)
No	5 (11)
<b>Posterior teeth: Patterns of usage of dental materials (other than stainless steel crown)</b>	
Amalgam only	0 (0)
More amalgam than tooth-colored material	13 (30)
More tooth-colored materials than amalgam	30 (68)
Tooth colored materials only	1 (2)
<b>Posterior teeth: Main reason for use of tooth-colored materials</b>	
Aesthetic superior to amalgam	11 (25)
Fluoride release	15 (34)
Longevity as good as amalgam	14 (32)
Tooth does not need pulp therapy	4 (9)
<b>Most influential factors in choosing a restorative material:</b>	
Cavity preparation	20 (45)
Previous success with material	6 (14)
Research reports and journal articles	18 (41)
Colleague appraisal	0 (0)

TABLE 2: VARIOUS HYPOTHETICAL CLINICAL SCENARIOS<sup>20</sup>

Scenario	Lesion on mandibular primary second molar		Material choices
(1) 4 - years- old child	Occlusal lesions just into enamel		FS, PRR, GIC, RMGIC, CR, A, SSC, Comp
(2) 5- years-old child	Occlusal lesions half way to dentine enamel junction		FS, PRR, GIC, RMGIC, CR, A, SSC, Comp
(3) 6- years -old child	Occlusal lesion just into dentin		FS, PRR, GIC, RMGIC, CR, A, SSC, Comp
(4) 5- years -old child	Occlusal lesion half way to the pulp		FS, PRR, GIC, RMGIC, CR, A, SSC, Comp
(5) 8- years -old child	Proximal lesion half way to the pulp		FS, PRR, GIC, RMGIC, CR, A, SSC, Comp
(6) 8- years - old child	Two proximal lesions half way to the pulp		FS, PRR, GIC, RMGIC, CR, A, SSC, Comp

Abbreviations: FS= Fissure sealant; PRR= Preventive resin restoration; GIC= Glass ionomer cement; RMGIC= Resin modified glass ionomer cement; CR= Composite resin; A= Amalgam; SSC= Stainless steel crown; Comp= Compomer

TABLE 3: SELECTION OF THE RESTORATIVE MATERIALS FOR THE HYPOTHETICAL CLINICAL SCENARIOS.

Hypothetical clinical scenarios	First choice for material/ procedure (n=44) N (%)	Second choice for material/ procedure (n=44) N (%)
Occlusal lesions (just into enamel)	PRR 28 (64)	FS 17 (39)
Occlusal lesions (half way to DEJ)	PRR 24 (54)	RMGIC 16(36)
Occlusal lesion (just into dentine)	RMGIC 17 (39)	CR 16 (36)
Occlusal lesion (half way to pulp)	Amalgam 19 (43)	RMGIC/CR 17 (39)
Proximal lesion (half way to pulp)	Amalgam 22 (50)	CR 16 (36)
Two proximal lesions (halfway to pulp)	SSC 29 (66)	Amalgam 12 (29)

Abbreviations: PRR= Preventive resin restoration; FS= Fissure sealant; RMGIC= Resin modified glass ionomer cement; CR= Composite resin; SSC= Stainless steel crown

Preventive resin restoration with resin plus unfilled resin (PRR) was the first choice (54%) followed by GICs restorations (36%).

### Scenario 3: Preferred material for occlusal lesion just into dentin on primary molar.

GICs were the first material of choice (39%) while the second was composite resins (36%).

### Scenario 4: Preferred material for an occlusal lesion (half way to the pulp) on primary molar.

Amalgam restoration was preferred by 43% respondents followed by resin modified GICs/composite resins (39%).

### Scenario 5: Preferred material for a proximal lesion on primary molar.

Although a wide range of materials were selected, amalgam was the first material of choice (50%) while the second was composite resins (36%).

**Scenario 6: Preferred material for two proximal lesions (half way to the pulp) on primary molar** SSCs was the first choice of the pediatric dentists (66%) while amalgam was the second (29%).

There were no differences ( $p>.05$ ) in various responses in relation to gender, age, experience, place of graduation and qualifications of the pediatric dentists.

## DISCUSSION

The present study utilized the method sample distribution and size similar to the study by Tran and Messer in their study.<sup>20</sup> The results demonstrate that participants were well qualified and experienced, thus providing strong confidence to the results of the study. The high average number of children treated by pediatric dentists per week and broad age-range of the children further strengthened the study.

The trend towards finding an alternative to amalgam and increasing use of tooth-colored materials as shown by the present study were in agreement with several other previous studies<sup>1,20,21</sup> and reflect favorable scientific reports about these materials from other organization such as National Health and Medical Research Council.<sup>1,20,21</sup>

Fluoride release was selected as one of the most important factors in selecting tooth-colored material for restoring posterior teeth. This could be attributed to high caries risk that makes the fluoride releasing materials the primary choice for restoring posterior primary teeth. Using glass ionomer and compomer had been investigated in the past through different studies. Ample fluoride release and longevity have been reported for GICs.<sup>21,22</sup> It was comforting to note that the majority of pediatric dentist were considering parental preference for the restorative materials.

In the 1<sup>st</sup> hypothetical scenario; a majority of the respondents selected PRR as a preferred restoration in spite of the fact the carious lesion only involved enamel surface. Previous studies have reported that in preparations which extend very minimally into enamel are restored with sealants that can be flown onto an acid-etched surface. PRR can be used when the preparation extent substantially into enamel or even into dentine.<sup>23</sup>

In the 2<sup>nd</sup> scenario; the first choice was PRR for restoring occlusal lesion that extends half way into dentino-enamel junction of a primary molar. This is a reasonable selection for a carious lesion that is extended half way into dentino-enamel junction.<sup>23</sup>

For the 3<sup>rd</sup> scenario of carious lesion just into dentin; it was interesting to find that the respondents selected GICs as the first material of choice followed by composites. High caries rates in Saudi children could be the contributing factor in this decision.<sup>4</sup> This finding was similar to several other studies in various countries.<sup>1,21,25</sup>

In the 4<sup>th</sup> scenario, where the lesion was half-way towards pulp, a majority selected amalgam as the first choice; followed by GICs/Composites. The selection indicates respondents' continuing trend towards amalgam as a dependable material for deep carious lesions. This

finding however was in contrast to the results of study by Tran and Messer<sup>20</sup> where the first choice was GICs.

The respondent's first choice for restoring proximal lesions in primary molars was amalgam followed by composites. This finding was in agreement with the result of Pair et al (2004) who found that the majority of pediatric dentists in the California used amalgam as the material of choice for restoration the proximal lesions. However, several other studies have reported Compomers and GICs as the first choice of pediatric dentists for restoring primary proximal lesions.<sup>4,20,25</sup>

In the 6<sup>th</sup> scenario of multi-surface carious lesions; SSCs were the clear choice of the respondents. This finding is in agreement with several other studies.<sup>26,27,28</sup> SSCs are considered as the most durable restoration for multi surface primary lesions and have a high success rate than any other type of restoration.<sup>28</sup> The present study has provided useful information on the selection of restorative materials in various clinical situations for restoring primary molars. The author feels that there is a need to provide a uniform guidelines to be used for the selection of restorative materials in primary teeth.

## CONCLUSIONS

- GICs are the pediatric dentists' first choice to restore shallow occlusal carious lesions in primary molars.
- Amalgam is still a choice for restoring deep occlusal and proximal carious lesions.
- SSC is most common choice for restoring primary molars with multi-surfaces carious lesions.

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