Evidence-based Update of Pediatric Dental Restorative Procedures: Dental Materials

Dhar V*/ Hsu KL**/ Coll JA***/ Ginsberg E****/ Ball BM*****/ Chhibber S****** /Johnson M*******/ Kim M********/Modaresi N*********/Tinanoff N**********

Background: *The science of dental materials and restorative care in children and adolescent is constantly evolving, and the ongoing search for ideal restorative materials has led to plethora of research.* ***Aim***: *To provide an evidence base to assist dental practitioners choose appropriate restorative care for children and adolescents.* ***Study design***: *This evidence-based review appraises this literature, primarily between the years 1995-2013, for efficacy of dental amalgam, composites, glass ionomer cements, compomers, preformed metal crowns and anterior esthetic restorations. The assessment of evidence for each dental material was based on a strong evidence, evidence in favor, expert opinion, and evidence against by consensus of the authors.* ***Results***: *There is varying level of evidence for the use of restorative materials like amalgam, composites, glass ionomers, resin-modified glass-ionomers, compomers, stainless steel crowns and anterior crowns for both primary and permanent teeth.* ***Conclusions***: *A substantial amount data is available on restorative materials used in pediatric dentistry; however, there exists substantial evidence from systematic reviews and randomized clinical trials and clinicians need to examine and understand the available literature evidence carefully to aid them in clinical decision making.*

Key words: dental materials, evidence-based dentistry, pediatric dentistry, restorative dentistry, preventive dentistry

From the Division of Pediatric Dentistry
Department of Orthodontics and Pediatric Dentistry
University of Maryland School of Dentistry, Baltimore, USA.

* Dhar V BDS, MDS, PhD, Associate Professor and Program Director.
**Hsu KL, DDS, MS, Assistant Professor.
***Coll JA, DDS, MS, Clinical Professor;
****Ginsberg E, DDS, Assistant Professor;
*****Ball BM, Pediatric Dental Resident.
******Chhibber S, Pediatric Dental Resident.
*******Johnson M, Pediatric Dental Resident.
********Kim M,Pediatric Dental Resident.
*********Modaresi N,Pediatric Dental Resident.
**********Tinanoff N, DDS, MS, Professor and Division Chief.

Send all correspondence to Vineet Dhar

Division of Pediatric Dentistry
Department of Orthodontics and Pediatric Dentistry
University of Maryland School of Dentistryl
Baltimore, Maryland, USA 21201
Phone: +410 706 7970
Fax:+ 410 706 4031
E-mail: vdhar@umaryland.edu

INTRODUCTION

There is an array of dental materials available for restorative treatment in children and adolescents. Considering the ever-evolving nature of the science of dental materials, there is a constant need to reexamine the current literature, and determine the evidence for their use. Restorative care is a part of comprehensive oral health treatment plan that takes many factors into consideration including: caries-risk assessment, durability of dental materials, safety, developmental status of the dentition, anticipated compliance, and patient's ability to cooperate for treatment.[1]

The intention of this article is to provide an evidence base to assist dental practitioners choose appropriate restorative care for children and adolescents.

MATERIALS AND METHOD

A thorough review of the scientific literature in the English language pertaining to restorative dentistry in primary and permanent teeth was completed. Electronic database and hand searches, for the most part between the years 1995-2013, were conducted using the terms: "Restorative treatment decisions, dental amalgam, glass ionomers, resin modified glass ionomers, conventional glass ionomers, atraumatic/alternative restorative technique (ART), interim therapeutic restoration (ITR), dental composites, resin based composite, compomers, stainless steel crowns, primary molar, preformed metal crown, strip crowns, pre-veneered crowns, esthetic restorations, clinical trials, and randomized controlled clinical trials".

Papers identified were initially classified as meta-analysis/ systematic reviews, or clinical trials on the above topics. Initial criteria used to evaluate clinical trials included children or adults; interventions with control groups; and outcomes of more than one year. For each topic the studies initially were evaluated by two individuals using the published abstracts of the articles. Those studies that met the initial screening received full evaluation and abstraction that included detailed examination of the research methods and potential for study bias (e.g., appropriateness of the control group(s); issues with patient recruitment, randomization, blinding, subject loss, sample size estimates, conflicts of interest and statistics). Studies that did not meet the standards of a randomized clinical trial or were considered to have high bias was eliminated. In those topic areas in which there were rigorous meta-analyses or systematic reviews available, only those clinical trial articles that were not covered by the reviews were subjected to full evaluation and abstraction.

The assessment of evidence for each topic was based on a grading recommendations of strong evidence (based on well executed randomized control trials, meta-analyses, or systematic reviews); evidence in favor (based on weaker evidence from clinical trials); and expert opinion (based on retrospective trials, case reports, in vitro studies and opinions from clinical researchers) [2].

RESULTS AND DISCUSSION

The search strategy yielded five meta-analyses/systemic reviews and eight randomized clinical trials for the topic of " dental amalgam"; three meta-analyses/systemic reviews and ten randomized clinical trials for "composites restorations"; seven meta-analyses/systemic reviews and eight randomized clinical trials for "glass ionomer cements"; fourteen randomized clinical trials for "compomers"; five meta-analyses/systemic reviews and seven randomized clinical trials for "stainless steel crowns"; and one meta-analyses/systemic review and nine retrospective studies for the topic of "anterior esthetic restorations."

A summary of the findings are presented in Table 1 and Table 2.

Dental Amalgam

Dental amalgam has been used as the most common restorative material in posterior teeth for over 150 years and is still widely used throughout the world today [3]. Amalgam contains a mixture of metals such as silver, copper and tin, in addition to approximately 50% mercury [4]. Dental amalgam has declined in use over the past decade [3], perhaps due to the controversy surrounding perceived health effects of mercury vapor, environmental concerns from its mercury content, and increased demand for esthetic alternatives.

With regard to safety of dental amalgam, a comprehensive literature review of dental studies between 2004-2008 found insufficient evidence of associations between mercury release from dental amalgam and the various medical complaints [5]. Two independent randomized controlled trials in children have examined the effects of mercury release from amalgam restorations and found no effect on the central and peripheral nervous systems and kidney function [6,7]. However, on July 28, 2009, the U.S. Federal Drug Association issued a "final rule" that reclassified dental amalgam to a Class II device (having some risk) and designated guidance that included warning labels regarding: (1) possible harm of mercury vapors; (2) disclosure of mercury content; (3) contraindications for persons with known mercury sensitivity. Also in this final rule the FDA noted that there is limited information regarding dental amalgam and the long-term health outcomes in pregnant women, developing fetuses and children under the age of six [4].

With regard to clinical efficacy of dental amalgam, results comparing longevity of amalgam to other restorative materials are inconsistent. The majority of meta-analyses, evidence-based reviews and randomized controlled trials report comparable durability of

Table 1. Evidence of efficacy of various dental materials\techniques in Primary Teeth with regard to cavity preparation classifications.

Strong Evidence -- based on well executed randomized control trials, meta-analyses,or systematic reviews; **Evidence in Favor** -- based on weaker evidence from clinical trials; **Expert Opinion** – based on retrospective trials, case reports, in vitro studies and opinions from clinical researchers; **Evidence Against** – based on randomized control trials, meta-analysis, systematic reviews.

	Class I	Class II	Class III	Class IV	Class V
Amalgam	Strong Evidence	Strong Evidence	No Data	No Data	Expert Opinion For
Composite	Strong Evidence	Expert Opinion For	Expert Opinion For	No Data	Evidence in Favor
Glass Ionomer	Strong Evidence α	Evidence Against β	Evidence in Favor γ	No Data	Expert Opinion For γ
RMGIC	Strong Evidence	Expert Opinion For ε	Expert Opinion For	No Data	Expert Opinion For
Compomers	Evidence in Favor	Evidence in Favor	No Data	No Data	Expert Opinion For
SSC	Evidence in Favor δ	Evidence in Favor δ	No Data	No Data	No Data
Anterior Crowns φ	N/A	N/A	Expert Opinion For	Expert Opinion For	Expert Opinion For

RMGIC = resin modified glass ionomer cement
SSC = stainless steel crown
α Evidence from ART trials
β Conflicting evidence for multisurface ART restorations
γ Preference when moisture control is an issue
ε Small restorations; life span 1-2 years
δ Large lesions
φ Strip crowns, stainless steel crowns with/without facings

dental amalgam to other restorative materials [8-13], while others show greater longevity for amalgam [14,15]. The comparability appears to be especially true when the restorations are placed in controlled environments such as university settings [8].

Class I amalgam restorations in primary teeth have shown in a systematic review and two randomized controlled trials to have a success rate of 85-96% for up to 7 years, with an average annual failure rate of 3.2% [12,15,16]. Efficacy of Class I amalgam restorations in permanent teeth of children has been shown in two independent randomized controlled studies to range from 89.8 - 98.8% for up to 7 years [12,14].

With regard to Class II restorations in primary molars, a 2007 systematic review concluded that amalgam should be expected to survive a minimum of 3.5 years and potentially in excess of 7 years [17]. For Class II restorations in permanent teeth, 1 meta-analysis and 1 evidence-based review conclude that the mean annual failure rates of amalgam and composite are equal at 2.3% [8,11]. The meta-analysis comparing amalgam and composite Class II restorations in permanent teeth suggests that higher replacement rates of composite in general practice settings can partly be attributed to general practitioners' confusion of marginal staining for marginal caries and their subsequent premature replacements. Otherwise, this meta-analysis concludes that the median success rate of composite and amalgam are statistically equivalent after 10 years, at 92% and 94% respectively [8].

The limitation of many of the clinical trials that compare dental amalgam to other restorative materials is that the study period often is short (24-36 months), at which time interval all materials reportedly perform similarly [18-22]. Some of these studies also may be at risk for bias, due to lack of true randomization, inability of blinding of investigators, and in some cases financial support by the manufacturers of the dental materials being studied.

In summary, there is strong evidence that dental amalgam is efficacious in the restoration of Class I and Class II cavity restorations in primary and permanent teeth.

Composites

Resin-based composite restorations were introduced in dentistry about a half century ago as an esthetic restorative material [23,24] and are increasingly used in place of amalgam for the restoration of carious lesions [25]. Composites consist of a resin matrix and chemically bonded fillers [26]. They are classified according to their filler size, because filler size affects polishability/esthetics, polymerization depth, polymerization shrinkage, and physical properties. Hybrid resins combine a mixture of particle sizes for improved strength while retaining esthetics [27]. The smaller filler particle size allows greater polishability and esthetics, while larger size provides strength. Flowable resins have a lower volumetric filler percentage than hybrid resins [28].

Several factors contribute to the longevity of resin composites, including operator experience, restoration size and tooth position [29]. Resins are more technique sensitive than amalgams and require longer placement time. In cases where isolation or patient cooperation is in question, resin-based composite may not be the restorative material of choice [30].

Bisphenol A (BPA) and its derivatives are components of resin-based dental sealants and composites. Trace amounts of BPA derivatives are released from dental resins through salivary enzymatic hydrolysis, and may be detectable in saliva up to 3 hours after resin placement [31]. Evidence is accumulating that certain BPA derivatives may pose health risks attributable to their estrogenic properties. BPA exposure reduction is achieved by cleaning filling surfaces with pumice, cotton roll and rinsing. Additionally, potential exposure can be reduced by using a rubber dam [31]. Considering the proven benefits of resin based dental materials and the minimal exposure to BPA and its derivatives, it is recommended to continue using these products while taking precautions to minimize exposure [31].

There is strong evidence from a meta-analysis of 59 randomized clinical trials of Class I and II composite and amalgam restorations showing an overall success rate about 90 percent after 10 years for both materials, with rubber dam use significantly increasing

Table 2. Evidence of efficacy of various dental materials\techniques in Permanent Teeth with regard to cavity preparation classifications.

	Class I	Class II	Class III	Class IV	Class V
Amalgam	Strong Evidence	Strong Evidence	No Data	No Data	No Data
Composite	Strong Evidence	Evidence in Favor	Expert Opinion For	No Data	Evidence in Favor
Glass Ionomer	Strong Evidence α	Evidence Against	Evidence in Favor β	No Data	Expert Opinion For β
RMGIC	Strong Evidence	No Data	Expert Opinion For	No Data	Evidence in Favor
Compomers	Evidence in Favor φ	No Data	Expert Opinion For	No Data	Expert Opinion For
SSC	Evidence in Favor γ	Evidence in Favor γ	No Data	No Data	No Data
Anterior Crowns δ	N/A	N/A	No Data	No Data	No Data

RMGIC = resin modified glass ionomer cement
SSC = stainless steel crown
α Evidence from ART trials
β Preference when moisture control is an issue
γ For children and adolescent with gross caries or severely hypoplastic enamel
δ Strip crowns, stainless steel crowns with/without facings
φ Evidence from studies in adults

restoration longevity [26]. Strong evidence from randomized controlled trials comparing composite restorations to amalgam restorations showed that the main reason for restoration failure in both materials was recurrent caries [12,29,32].

In primary teeth, there is strong evidence that composite restorations for Class I restorations are successful [12,16]. There is only one randomized controlled trial showing success in Class II composite restorations in primary teeth that were expected to exfoliate within two years [20]. In permanent molars, composite replacement after 3.4 years was no different than amalgam [12], but after 7-10 years the replacement rate was higher for composite [33]. Secondary caries rate was reported as 3.5 times greater for composite versus amalgam [29].

There is evidence from a meta-analysis showing that etching and bonding of enamel and dentin significantly decreases marginal staining and detectable margins in composite restorations [26]. Regarding different types of composites (packable, hybrid, nano, macro, and micro filled) there is strong evidence showing similar overall clinical performance for these materials [34-37].

In summary, there is strong evidence supporting the use composite resins in primary teeth for Class I restorations. For Class II lesions in primary teeth, there is one randomized controlled trial showing success of composite resin restorations success over a two year period. In permanent molars there is strong evidence from meta-analyses that composite resins can be used successfully for Class I and II restorations. Also, evidence from a meta-analysis shows enamel and dentin bonding agents decrease marginal staining and detectable margins for the different types of composites.

Glass Ionomer Cements

Glass ionomers cements have been used in dentistry as restorative cements, cavity liner/base, and luting cement since the early 1970s [38]. Originally, glass ionomer materials were difficult to handle, exhibited poor wear resistance, and were brittle. Advancements in conventional glass ionomer formulation led to better properties, including the formation of resin-modified glass ionomers. These products showed improvement in handling characteristics, decreased setting time, increased strength, and improved wear resistance [39,40]. All glass ionomers have several properties that make them favorable for the use in children including: chemical bonding to both enamel and dentin; thermal expansion similar to that of tooth structure; biocompatibility; uptake and release of fluoride; and decreased moisture sensitivity when compared to resins.

Fluoride is released from glass ionomer and taken up by the surrounding enamel and dentin, resulting in teeth that are less susceptible to acid challenge [41,42]. One study has shown that fluoride release can occur for at least 1 year [43]. Glass ionomers can act as a reservoir of fluoride, as uptake can occur from dentifrices, mouth rinses, and topical fluoride applications [44,45]. This fluoride protection, useful in patients at high risk for caries, has led to the use of glass ionomers as luting cement for stainless steel crowns, space maintainers, and orthodontic bands [46].

Regarding use of conventional glass ionomers in primary teeth, one randomized clinical trial showed the overall median time from treatment to failure of glass ionomer restored teeth was 1.2 years [15]. Based on findings of a systematic review and meta-analysis, conventional glass ionomers are not recommended for Class II restorations in primary molars [47,48]. Conventional glass ionomer restorations have other drawbacks such as poor anatomical form and marginal integrity [49,50]. Glass ionomer restorations were more successful than composite restorations where moisture control was a problem [48].

Resin modified glass ionomers (RMGIC), with the acid-base polymerization supplemented by a second resin light cure polymerization, has been shown to be efficacious in primary teeth. Based on a meta-analysis, RMGIC is more successful than conventional glass ionomer as a restorative material [48]. A systematic review supports the use of RMGIC in small to moderate sized Class II cavities [47]. Class II RMGIC restorations are able to withstand occlusal forces on primary molars for at least 1 year [48]. Because of fluoride release, RMGIC may be considered for Class I and Class II restorations of primary molars in a high caries risk population [49]. There is also some evidence that conditioning dentine improves the success rate of RMGICs [47]. According to one randomized clinical trial cavosurface beveling leads to high marginal failure in RMGIC restorations and is not recommended [32].

With regard to permanent teeth, a meta-analysis review, reported significantly less carious lesions on single-surface glass ionomer restorations in permanent teeth after 6 years as compared to restorations with amalgam [50]. Data from a meta-analysis shows that RMGIC is more caries preventive than composite resin with or without fluoride [51]. Another meta-analysis showed that cervical restorations (Class V) with glass ionomers may have a good retention rate, but poor esthetics [52]. For Class II restorations in permanent teeth one randomized clinical trial showed unacceptable high failure rates of conventional glass ionomers, irrespective of cavity size. However, a high dropout rate was observed in this study limiting its significance [53]. In general, there is insufficient evidence to support the use of RMGIC as long-term restorations in permanent teeth.

Other applications of glass ionomers where fluoride release has advantages are for interim therapeutic restorations (ITR) and the atraumatic/alternative restorative technique (ART). These procedures have similar techniques but different therapeutic goals. ITR may be used in very young patients [54], uncooperative patients, or patients with special health care needs [55] for whom traditional cavity preparation and/or placement of traditional dental restorations are not feasible or need to be postponed. Additionally, ITR may be used for caries control in children with multiple open carious lesions, prior to definitive restoration of the teeth [56]. In-vitro caries-affected dentin does not jeopardize the bonding of glass ionomer cements to the primary tooth dentin [57].

ART, endorsed by the World Health Organization and the International Association for Dental Research, is a means of restoring and preventing caries in populations that have little access to traditional dental care and functions as definitive treatment. According to a meta-analysis, single surface ART restorations showed high survival rates in both primary and permanent teeth [58]. One randomized clinical trial supported single surface restorations irrespective of the cavity size, and also reported higher success in non-occlusal posterior ART compared to occlusal posterior ART [59]. With regards to multi-surface ART restorations there is conflicting evidence. Based on a meta-analysis, ART restorations presented similar survival rates to conventional approaches using composite or amalgam for Class II restorations in primary teeth [60]. However, another meta-analysis showed that multi-surface ART restorations in primary teeth exhibited high failure rates [58].

In summary, there is evidence in favor of glass ionomer cements for the restoration of Class I restorations in primary teeth. There is strong evidence for the efficacy of resin-modified glass ionomer cements for Class I restorations in primary teeth, and expert opinion for Class II restorations in primary teeth. There is insufficient evidence to support the use of conventional or resin-modified glass ionomer cements as long-term restorative material in permanent teeth. Regarding, atraumatic restorative technique (ART) there is strong evidence supporting high viscosity glass ionomer cements as single surface temporary restoration for both primary and permanent teeth. Additionally, glass ionomer cements may be used for caries control in children with multiple open carious lesions, prior to definitive restoration of the teeth.

Compomers

Polyacid- modified resin-based composites or compomers, were introduced into dentistry in the mid-1990s. They contain 72% (by weight) strontium fluorosilicate glass and the average particle size is 2.5 micrometers [61]. Moisture is attracted into the material by both acid functional monomer and basic ionomer; this moisture can trigger a reaction that releases fluoride and buffers acidic environments [62,63]. Considering the ability to release fluoride, esthetic value and simple handling properties of compomer, it can be useful in pediatric dentistry [61].

Based on a recent randomized clinical trial, the longevity of Cl I compomer restorations in primary teeth was not statistically different compared to amalgam, but compomer were found to need replacement more frequently due to recurrent caries [12]. In Class II compomer restorations in primary teeth the risk of developing secondary caries and failure did not increase over a two-year period in primary molars [21,64]. Compomers also have reported comparable clinical performance to composite with respect to color matching, cavosurface discoloration, anatomical form, and marginal integrity and secondary caries[65,66]. Most randomized clinical trials showed that compomer tends to have better physical properties compared to glass ionomer and resin modified glass ionomer cements in primary teeth, but no significant difference was found in cariostatic effects of compomer compared to these materials [15,64,67].-

In summary, compomers can be an alternative to other restorative materials in the primary teeth in Class I and Class II restorations. There is not enough data comparing compomers to other restorative materials in permanent teeth of children.

Preformed Metal Crowns

Preformed metal crowns (also known as stainless steel crowns) are prefabricated metal crown forms that are adapted to individual teeth and cemented with a biocompatible luting agent. Preformed metal crowns have been indicated for the restoration of primary and permanent teeth with extensive caries, cervical decalcification, and/or developmental defects (e.g., hypoplasia, hypocalcification), when failure of other available restorative materials is likely (e.g., interproximal caries extending beyond line angles, patients with bruxism), following pulpotomy or pulpectomy, for restoring a primary tooth that is to be used as an abutment for a space maintainer, for the intermediate restoration of fractured teeth, for definitive restorative treatment for high caries-risk children, and used more frequently in patients whose treatment is performed under sedation or general anesthesia [1].

There are very few prospective randomized clinical trials comparing outcomes for preformed metal crowns to intracoronal restorations [68,69]. A Cochrane review and two systematic reviews conclude that the majority of clinical evidence for the use of preformed metal crowns has come from nonrandomized and retrospective studies [70,71,72]. However, this evidence suggests that preformed metal crowns showed greater longevity than amalgam restorations [70], despite possible study bias of placing stainless steel crowns on teeth more damaged_by caries [71,73,74]. Five studies, in a literature review, which retrospectively compared Class II amalgam to preformed metal crowns showed an average five year failure rate of 26% for amalgam and 7% for preformed metal crowns [71].

A two-year randomized control trial regarding restoration of primary teeth that had undergone a pulpotomy procedure found a non-significant difference in survival rate for teeth restored with preformed metal crowns (95%) versus resin modified glass ionomer/composite restoration (92.5%) [68]. In another prospective study, significantly less restoration failure and improved calcium hydroxide pulpotomy success was found with preformed metal crowns (79.7%) versus amalgam restorations (60%) after 1 year [75]. However, a systematic review did not show strong evidence that preformed metal crowns were superior over other restorations for pulpotomized teeth [76].

With regards to gingival health adjacent to preformed metal crowns, a one year randomized controlled trial showed no difference in gingival inflammation between preformed metal crowns and composite restorations after pulpotomy [77]. Yet, a two year randomized clinical study showed more gingival bleeding for preformed metal crowns vs. composite/glass ionomer restorations [68]. Inadequately contoured crown and residues of set cement remaining in contact with the gingival sulcus are suggested as reasons for gingivitis associated with preformed metal crowns, and a preventive regime including oral hygiene instruction are recommended be incorporated into the treatment plan [71].

There is one randomized control trial on preformed metal crowns versus cast crowns placed on permanent teeth [78]; and this report found no difference between the two restoration types for quality and longevity after 24 months. The remaining evidence is case reports and expert opinion concerning indications for use of preformed metal crowns on permanent molars. The indications include teeth with severe genetic/developmental defects, grossly carious teeth, traumatized teeth, along with tooth developmental stage or financial considerations that require semi-permanent restoration instead of a permanent cast restoration [71,72,78]. The main reasons for preformed metal crown failure reportedly are crown loss [70,74,79] and perforation [79].

In summary, there is evidence from retrospective studies showing greater longevity of preformed metal crown restorations compared to amalgam restorations for the treatment of carious lesions in primary teeth. Also, there is evidence from case reports and one randomized controlled trial supporting the use of preformed metal crowns in permanent teeth as a semi-permanent restoration for the treatment of severe enamel defects or grossly carious teeth.

Anterior Esthetic Restorations for Primary Teeth

Despite the continuing prevalence of dental caries in primary maxillary anterior teeth in children, the esthetic management of these teeth remains problematic [80]. Esthetic restoration of primary anterior teeth can be especially challenging due to: the small size of the teeth; close proximity of the pulp to the tooth surface; relatively thin enamel; lack of surface area for bonding; and issues related to child behavior [80].

There is little scientific support for any of the clinical techniques that clinicians have utilized for many years to restore primary anterior teeth, and most of the evidence is regarded as expert opinion. While a lack of strong clinical data does not preclude the use of these techniques, it points out the strong need for well designed, prospective clinical studies to validate the use of these techniques [81]. Additionally, there is limited information on the potential psychosocial impact of anterior caries or unesthetic restorations in primary teeth [80].

Class III (interproximal) restorations of primary incisors are often prepared with labial or lingual dovetails to incorporate a large surface area for bonding to enhance retention [82]. Resin-based restorations are appropriate for anterior teeth that can be adequately isolated from saliva and blood. Resin-modified glass ionomer cements have been suggested for this category, especially when adequate isolation is not possible [83, 84]. It has been suggested that patients considered at high-risk for future caries may be better served with placement of full tooth coverage restorations [84].

Class V cavity (cervical) preparations for primary incisors is similar to those in permanent teeth. Due to the young age of children treated and associated behavior management difficulty, it is sometimes impossible to isolate teeth for the placement of composite restorations. In these cases, glass ionomer cement or resin-modified glass ionomer cement are suggested [83,84].

Full coronal restoration of carious primary incisors may be indicated when: (1) caries is present on multiple surfaces, (2) the incisal edge is involved, (3) there is extensive cervical decalcification, (4) pulpal therapy is indicated, (5) caries may be minor, but oral hygiene is very poor, or (6) the child's behavior makes moisture control very difficult [82]. Successful full-coronal restorations of extensively decayed primary teeth have been reported; however, due to the lack of available clinical studies, it is difficult to determine whether certain techniques of restoring carious primary anterior teeth are effective [81,85]. A retrospective study showed that 80% of strip crowns were completely retained after three years, and 20% were partially retained, with none being completely lost [86]. Another retrospective study, with 24-74 months follow-up, reported 80% retention of strip crowns [87].

Pre-veneered stainless steel crowns also are among the options of restoring primary anterior teeth with full coronal coverage. Three retrospective studies report excellent clinical retention of these types of crowns, yet with a high incidence of partial or complete loss of the resin facings [80,88,89]. Pre-formed stainless steel crowns and open faced stainless steel crowns are also other options mentioned; however, there appears to be no published data on the use of either crown on primary anterior teeth [81].

In summary, there is expert opinion that suggests: 1) use of resin- based composites as a treatment option for Class III and Class V restorations in the primary and permanent dentition; 2) use of resin-modified glass ionomer cement as a treatment option for Class III and Class V restorations for primary teeth, particularly in circumstances where adequate isolation of the tooth to be restored is difficult; 3) that strip crowns, pre-veneered stainless steel crowns, pre-formed stainless steel crowns and open faced stainless steel crowns are a treatment option for full coronal coverage restorations in primary anterior teeth.

CONCLUSIONS

This paper has attempted to critically evaluate the available evidence for restorative materials in primary and young permanent teeth and presented the strength of evidence supporting their use in different clinical situations.

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