**Critically Appraised Topic (CAT)**

|  |
| --- |
| **Project Team:** |
| **1A-4** |
| **Project Team Participants:** |
| **D4: Stefan Idso**  **D3: Aesha Bhatt**  **D2: Jordan Dietrich**  **D1: Muhammad Salahuddin** |
| **Clinical Question:** |
| What conditions are optimal for a stainless steel crown to be successful when contemplating SSC versus extraction and placement of space maintainer? |
| **PICO Format:** |
| **P:** |
| **Pediatric Patients with compromised teeth** |
| **I:** |
| **Stainless Steel Crown** |
| **C:** |
| **Extraction and space maintainer** |
| **O:** |
| **Removal of disease with adequate space maintenance** |
| **PICO Formatted Question:** |
| In pediatric patients with severely compromised teeth, do SCC crowns have comparable success rates to extraction with adequate space maintenance? |
| **Clinical Bottom Line:** |
| **The evidence found should provide guidance on the treatment plan.** |
| **Date(s) of Search:** |
| **Sept 14 2020** |
| **Database(s) Used:** |
| **Pubmed** |
| **Search Strategy/Keywords:** |
| **Space maintenance, stainless steel, child,** |
| **MESH terms used:** |
| **((((space maintenance) AND (child)) AND (stainless steel)) AND (crown)) AND (appliance)** |
| **Article(s) Cited:** |
| 1. Dental Space Maintainers for the Management of Premature Loss of Deciduous Molars: A Review of the Clinical Effectiveness, Cost-effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2016 Oct 20. 2. Brill WA. The distal shoe space maintainer chairside fabrication and clinical performance. Pediatr Dent. 2002 Nov-Dec;24(6):561-5. PMID: 12528949. 3. American Academy of Pediatric Dentistry. Guidelines for pediatric restorative dentistry 1991. In: American Academy of Pediatric Dentistry Reference Manual 1991-1992. Chicago, Ill.: American Academy of Pediatric Dentistry; 1991:57-9. Revision: American Academy of Pediatric Dentistry. Guideline on restorative dentistry. Pediatr Dent 2016;38(special issue): 250-62. |
| **Study Design(s):** |
| 1. Systematic review of Case Control studies 2. **Systematic review of Cohort Study** 3. Clinical practice guidelines, Meta-Analysis |
| **Reason for Article Selection:** |
| 1. Addresses PICO – specifically the effectiveness of Space maintainers 2. **Addresses PICO – specifically extraction and space maintainers** 3. **Addresses PICO – specificall stainless steel crowns** |
| **Article(s) Synopsis:** |
| **Article 1:**  **Study Purpose:** To examine the clinical effectiveness, cost-effectiveness, and guideline recommendations surrounding the types and use of SMs.  **Methods:** A limited literature search was conducted using various databases such as Pubmed, Cochrane, CRD database, etc. The search was limited to the human population and limited to English language articles between the years 2006-2016. Their PICO question was stated as: Pediatric patients with primary or mixed dentition, with premature loss of deciduous molars do dental space maintainers versus no dental space maintainers/different space maintainers provide higher clinical effectiveness, cost-effectiveness and guidelines.  **Results:**  Eight publications met the inclusion criteria and were included in this report out of the 250 total citations viewed. Some studies examined the presence of caries and gingival health. These were evaluated either as an index score or as the presence of gingival inflammation. One study examined tooth eruption difficulty from presence/absence of a SM. The remaining studies examined cephalometric measurements from radiographs (arch dimensions and space loss).  **Summary of the findings showed no data available for the cost-effectiveness of and evidence based guidelines for space maintainers.**  **In regards to difficulty in eruption, one study found that space maintainers (**Schwarz appliance, lingual holding arch, or combination) were associated with greater odds of eruption difficulty after adjusting for confounding.  Little to no caries present when using a SM.  In regards to gingival health: No statistical differences in the proportion of patients with poor gingival health receiving one of four types of SMs (these include: band and loop, band and custom loop, Ribbond, and Super splint)  **Conclusions:** Overall, several methodological limitations and uncertain generalizability of the studies preclude robust conclusions about the use of SMs. Inconclusive.  **Limitations:** Populations were not clearly described and sample sizes were small. No RCTs, systematic reviews, economic evaluations, or evidence-based guidelines were retrieved.  **Article 2:**  **Study Purpose:** The purpose of this case report is to describe the chairside fabrication of the distal shoe appliance with a SCC as the retainer and describe the clinical management of the appliance from insertion to removal, including problems requiring intervention and the effect they have on clinical efficacy.  **Methods:** An obersevational study of 127 children who had 1 or more distal shoe appliances, with a stainless steel crown as the retainer, inserted to protect the eruption position of the first permanent molar. Children were recalled for observation every other month and any adjustments, corrections, or repairs were noted. When an appliance broke, a stainless steel band was fitted over the crown, and the appliance was remade within 2 days as a distal shoe attached to a band and inserted without any loss of space. If this distal shoe appliance with orthodontic band (DSB) was used then the treatment sequence using the stainless steel crown/distal shoe was considered a failure.  **Results:**  At the conclusion of the observation they sought out 2 end points end points: either the eruption of the first permanent molar or conversion of the DS to a distal shoe appliance with an ortho band as an abutment after the appliance separated from the crown.  190 DS were placed in 127 patients. These results in 86 successful DS appliances, 82 still under observation at the end of the study, 22 DS converted to DSB.  **Conclusions:** Due to the dynamic nature of a pediatric dentition the end point to the therapy was considered the marker for success therefore, the chairside-fabricated distal shoe appliance with a stainless steel crown as the retainer can be considered a suc- cessful appliance, even though it needs supervision and periodic service.  **Limitations: sample size, varying clinician experience**  **Article 3:**  **Study Purpose:** In order to help practitioners make decisions regarding restorative dentistry (when it is necessary to treat and what the appropriate materials and techniques are for restorative dentistry in children).  **Methods:** A review of articles regarding restorative in primary and permanent dentition was done using online database as well as hand searches (2009-2019). Mesh terms used to complete these searches included: dental caries, ART, ITR, SCCs, Hall Technique, etcwith the parameters on clinical trials and randomized controlled trials. thorough review of the scientific literature in the English language pertaining to restorative dentistry in primary and permanent teeth was completed to revise the previous guide- line. Electronic database and hand searches, for the most part between the years 2000-2019, were conducted using the terms: dental caries, intra-coronal restorations, restorative treatment decisions, caries diagnosis, caries excavation, dental amalgam, glass ionomers, resin modified glass ionomers, conventional glass ionomers, atraumatic/alternative restorative technique (**ART**), interim therapeutic restoration (**ITR**), resin infiltra- tions, resin based composite, dental composites, compomers, full coverage dental restorations, stainless steel crowns (**SSC**), Hall technique, primary molars, preformed metal crowns, strip crowns, pre-veneered crowns, zirconia crowns, esthetic restorations; parameters: clinical trials, randomized controlled clinical trials (**RCTs**).  **Results: Based on RCT, systematic review, case reports, expert opinion**  **“**Preformed metal crowns have been indicated for the restoration of primary and permanent teeth with extensive caries, cervical decalcification, and developmental defects… 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, and for definitive restorative treatment for high caries-risk children.”  “Five studies which retrospectively compared Class II amalgam to preformed metal crowns showed an average five year failure rate of 26 percent for amalgam and 7 percent for preformed metal crowns.”  “… a systematic review did not show strong evidence that preformed metal crowns were superior over other restorations for pulpotomized teeth.”  “The indications [for SCCs] include teeth with severe genetic/developmental defects, grossly carious teeth, and traumatized teeth, along with tooth developmental stage or financial considerations that require semi-permanent restoration instead of a permanent cast restoration.”  **Conclusions:** SSCs continue to offer the advantage of full coverage to combat recurrent caries and provide strength as well as long- term durability with minimal maintenance, which are desirable outcomes for caries management for high-risk children.  There is evidence from retrospective studies showing greater longevity of preformed metal crown restorations compared to amalgam or resin-based restorations for the treatment of caries lesions in primary teeth. Therefore, use of SSCs is supported on high-risk children with large or multi-surface cavitated or non-cavitated lesions on primary molars, especially when children require advanced behavioral guidance techniques126 including general anesthesia for the provision of restorative dental care.  There is evidence from case reports and one RCT 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.  **Limitations: Focus was on retention of teeth therefore discluded recommendations for extraction and space maintainers.** |
| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm)  See <http://www.cebm.net/index.aspx?o=1025>  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)  **1b** – Individual RCT  **2a** – Systematic Review of Cohort Studies  **2b** – Individual Cohort Study  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research  **4a** – Systematic Review of Case Control Studies  **4b** – Individual Case Control Study  **5** – Case Series, Case Reports  **6** – Expert Opinion without explicit critical appraisal, Narrative Review  **7** – Animal Research  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**  See article **J Evid Base Dent Pract 2007;147-150**  **A** – Consistent, good quality patient oriented evidence  **B** – Inconsistent or limited quality patient oriented evidence  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| **Definitive treatment should be made based on an assessment of the following: behavior/compliance, extent/location of decay, restorability, mobility, esthetic concerns, stage of development/eruption, radiolucencies, root resorptions. Positive outcomes are possible for both SCCs and space maintainers, however, in order to achieve ideal outcomes it is essential to weigh all essential factors.** |