Effects of Early Preventive Dental Visits on Timing of Subsequent Operative Visits

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Introduction

Early Childhood Caries (ECC) is defined by the American Academy of Pediatric Dentistry as the presence of a carious lesion (cavitated or noncavitated), missing tooth (due to caries), or filled tooth surface in any child younger than six years old. With a global prevalence of 48%, ECC is the most prevalent chronic childhood disease in children younger than six years of age.[1]

Numerous studies have found a negative correlation between the number of early preventive dental visits and the number of operative procedures needed. Children who were subject to prevention-focused dental examinations and cleanings before the age of two had fewer operative dental procedures than those seen for the first time after the age of two.[2] Furthermore, because past caries experience is the most significant risk factor for caries, high-risk children benefited most from early preventive visits.[3] Children who had a tertiary preventive visit before 18 months old, had up to 39% fewer operative procedures and saved up to $138 in dental-related expenditures per year (from ages $3^{1/2}$ - 6) compared to children receiving tertiary preventive services at older ages.[4] The current literature on the topic supports the notion that operative management of caries alone is not enough to address the consequences of ECC and that individualized risk-based preventive interventions as well as modifications of dietary habits and of the oral hygiene routine were indicated. Moreover, dental visits by age 1 can assist the dental provider in caries risk assessment, early caries detection, tooth remineralization interventions, and identification of self-management goals for the patient and caregivers.[5]

Preventive strategies that have been studied and considered included prenatal oral health counseling (promotion of oral health and patient education, preventive visits, and management of caries in mother)[6], use of fluoridated toothpastes[7], and sealant application[8-9]. Additionally, interventions aimed at remineralizing demineralized tooth surfaces and/or managing caries in their early stages included fluoride varnish application, silver diamine fluoride (SDF) treatment, atraumatic restorative technique (ART), and neutral fluoride gel treatment[9-13].

Despite the literature corroborating the importance of preventive interventions in pediatric dentistry, some differences can be found in current evidence-based recommendations. Variations and even disagreements on the recommended age for an initial visit, target population of the recommendations, and type of education or procedures that should be given exist in the reviewed literature. This investigation will add to the current literature and provide useful data to be considered for coordinating and drafting evidence-based guidelines for pediatric dentists worldwide on the recommended timing of first dental visits.

Objectives

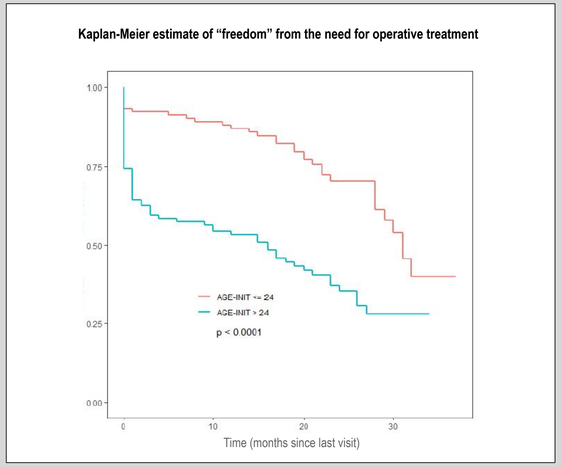
This study aimed to evaluate what effect early preventive visits had on the age at which patients needed their first operative dental treatment due to caries. Preventative visits were encounters constituting a comprehensive oral examination, caries risk assessment, dental prophylaxis, topical fluoride treatment, and/or other preventive interventions. Operative visits were encounters constituting restorative procedures, extractions, and/or SDF application.

Study Design and Methods

This investigation was a retrospective chart review of Montefiore Medical Center, Division of Pediatric Dentistry patients who presented for an initial patient encounter between January 1, 2022 and December 31, 2022. Inclusion criteria were: age of 0 to 72 months at the initial encounter, successful completion a preventative visit, and at least one subsequent visit thereafter. Exclusion criteria were: underlying medical conditions or other special healthcare needs, including but not limited to Autism Spectrum Disorder, developmental delay, cerebral palsy, and Down Syndrome, or records that lacked complete clinical notes. In total, a randomized sample of 202 records were reviewed for the study.

Electronic dental records subject to review included clinical notes, odontogram charting, and American Dental Association CDT codes. Subjects were divided into two groups based on age with Group 1 (G1) encompassing ages 0-24 months and Group 2 (G2) ages 25-72 months. Personal identifiers were excluded from data collection and all subjects were assigned a unique study ID number, thereby minimizing risks associated with the study. The outcome of interest was the age at which subjects were identified to need an initial operative visit, if at all. Additionally, the following data was collected and utilized to characterize the study population: caries risk assessment, procedures completed at initial visit, behavior (Frankl Behavior Scale) at initial visit, oral hygiene at initial visit, procedures completed at subsequent visit, and patient behavior (Frankl Behavior Scale) at subsequent visit.

Figure 1



Results

The total number of subjects in both G1 and G2 were 202 with 101 patients in each group. For all subjects, the mean age at the initial preventative visit was 28 months and the mean age needing the first operative treatment was 43 months (Table 1).

Specific to G1, the mean age at the initial preventative visit was 17 months (Table 2). Of these subjects, 33 (32.7%) needed an operative visit due to caries at a mean age of 33.7 months. Of the patients receiving operative treatment, 23 (69.7%) had SDF treatment as the first operative procedure, while 10 (30.3%) required local anesthesia, extractions, stainless steel crowns, or restorations as the first operative procedure.

For G2, the mean age at the initial preventative visit was 38 months (Table 2). Of these, 63 subjects (62.7%) needed an operative visit due to caries at a mean age of 45.9 months. Of the patients receiving operative treatment, 39 (61.9%) had SDF treatment as their first operative procedure, while 24 (38.1%) required local anesthesia, extractions, stainless steel crowns, or restorations at their first operative procedure.

Statistical Analysis

Characteristic	N = 202[1]	95% CI[2]
Age at initial visit (month)		
N Non-missing	202	
Median (Q1, Q3)	25 (17, 35)	
Mean (SD)	28 (14)	
Operative visit due to caries	96 (48%)	(41%, 55%)
Age at operative visit (month)		
N Non-missing	202	
Median (Q1, Q3)	42 (34, 51)	
Mean (SD)	43 (14)	
Group		
AGE-INIT <= 24	101 (50%)	(43%, 57%)
AGE-INIT > 24	101 (50%)	(43%, 57%)

[1]n (%)
[2]CI = Confidence Interval

Table 1: Patient characteristics
Summarized using mean (SD) or median (IQR) for continuous variables and frequency (%) for discrete variables.

	AGE <= 24 N = 101	AGE > 24 N = 101
Age at initial visit (month)		
N Non-missing	101	101
Median (Q1, Q3)	17 (14, 20)	35 (31, 45)
Mean (SD)	17 (5)	38 (11)

Table 2: Age at initial visit by group

	HR[1]	95% CI[1]	*p*-value
Group			
AGE-INIT <= 24	—	—	
AGE-INIT > 24	2.84	1.86, 4.34	<0.001

[1]HR = Hazard Ratio, CI = Confidence Interval

Table 3: Effect of delayed visit on occurrence of operative treatment due to caries
Association between preventive visit and time-to-operative treatment for caries was carried out using log-rank test and cox proportional hazards model. The effect of delayed visit is presented as hazard ratio (HR) with corresponding 95% confidence interval (CI).

Discussion and Conclusion

Delayed preventive visits had a significant effect on time-to-subsequent operative treatment of caries ($p < 0.0001$). Figure 1. The median time-to-operative treatment for caries was 33 months (95% CI: 31 months, NA) for G1 - those with early preventive visit as compared to 16 months (95% CI: 4 , 23 months) for G2 - those with delayed preventive visit.

In conclusion, patients with delayed preventive visits were 2.84 (95% CI: 1.86, 4.34) times more likely to need operative treatment for caries within a shorter time span as compared to those with early preventive visits ($p < 0.001$). Table 3. Furthermore, patients with delayed preventative visits were more likely to receive operative dental procedures, and those procedure were more likely to consist of local anesthesia, stainless steel crowns, restorations, and extractions than their counterparts who had early preventative visits, who were more likely to receive minimally invasive operative treatment such as treatment with SDF.

Lastly, of the children with high caries risk, those who had delayed preventative visits were twice as likely to need operative treatment with local anesthesia as those with preventive visits before 24 months of age.

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