

# Pediatric Dentists and Residents' Awareness and Willingness to Utilize Alternative Caries Detection Technologies

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## ABSTRACT

**Purpose:** To investigate the attitudes of active pediatric dentists and residents in the United States regarding alternative caries detection technologies (ACDTs) and their usage

**Methods:** A survey questionnaire was emailed via SurveyMonkey® to 7,135 practicing pediatric dentists and residents in the United States, as obtained from the American Academy of Pediatric Dentistry. The data was collected over a 6-week period.

**Results:** Eighty-one percent of pediatric dentists (N=247) were aware of alternative caries detection technologies compared to 72% of residents (N=63). Twenty-seven percent (N=85) of dentists have used the technologies, as compared to 11% (N=10) of residents. 42% (N=54) of dentists with ≥ 21 years of practice have utilized these technologies, as compared to 16% with ≤ 20 years (N=30, P<.001). For the individuals who reported that they did not use the technologies, 92% (N=73) of residents reported being open to using them in the future in comparison to 76% (N=170, P≤.001) of dentists

**Conclusion:** Pediatric dentists who practiced ≥ 21 years are more likely to have used alternative caries detection technologies than those who practiced ≤ 20 years. Residents were more open than dentists to using these technologies in the future, although the willingness to utilize these technologies in both groups was >75%.

## INTRODUCTION

Dental caries are the most common chronic disease in childhood.<sup>1</sup> Detecting dental caries early and preventing caries formation and progression is essential to prevent the progression of caries, reduce the need for surgical treatment, and maintain overall health.<sup>2,3</sup> Traditional methods of detecting dental caries include a clinical examination with instruments including a dental mirror, explorer, and World Health Organization (WHO) probe, in combination for dental radiographs.<sup>3</sup>

In pediatric dentistry, acquiring dental radiographs to aid in clinical exams may be difficult due to a patient's ability to cooperate due to age or special needs.<sup>3</sup> Even when radiographs are acquired, caries may be difficult to detect if they are small or not easily visualized. For example, occlusal caries can be difficult to detect because of the superficial remineralization process with fluoride while the caries continues to progress.<sup>3</sup> Detecting interproximal carious lesions and demineralization can also be challenging as these surfaces cannot be directly visualized.<sup>4</sup> Consequently, bitewing radiographs are commonly used to adjunctive tool detect interproximal caries. However, visual exams and bitewing radiographs have shown to have high sensitivity but low specificity in the ability to detect incipient interproximal carious lesions.<sup>4</sup> While radiographs are relied heavily on for pediatric patients in dentistry, they often are poorly tolerated in very young patients or those with special needs and sensory issues. Many alternative caries detection technologies (ACDTs) have been designed to be minimally invasive and are generally well tolerated by patients.<sup>4</sup> The most common alternative caries detection technologies include quantitative light-induced fluorescence (QLF), fluorescence-enhanced thernagnosis (FET), laser fluorescence (LF), fiberoptic transillumination (FOTI), and electrical conductance (EC).<sup>4</sup>

Alternative caries detection technologies may serve as an adjunctive tool for pediatric dentists in detecting dental caries, especially when radiographs cannot be obtained due poor tolerance for radiographs. Particularly, these methods may help improve detection of incipient caries and utilization of remineralization therapies, including the use of fluoridated toothpastes. Utilization of remineralization therapies and non-surgical treatment of incipient caries is less invasive than traditional surgical treatment of caries, which is required when lesions are large and invade the dentin of the tooth. Consequently, early detection of caries and utilization of non-surgical treatment may help decrease patient anxiety. These alternative methods may also serve as an educational tool to help prevent the development or progression of dental caries.

## MATERIALS AND METHODS

This study was approved by the Institution Review Board of the Albert Einstein College of Medicine, Protocol #2022-14248. A survey questionnaire consisting of 29 questions was emailed via SurveyMonkey® to 7,135 active pediatric dentists and pediatric dental residents in the United States, as obtained from the American Academy of Pediatric Dentistry. The survey contained questions regarding respondents demographics, as well as awareness, past and current usage, and attitudes towards ACDTs. The response rate was 6% (N=407). The data was collected over a 6-week period. Two follow-up emails were sent to the active members on the mailing lists who did not respond to the survey. The data was compiled and the results were reviewed using standard statistical methodology.

## RESULTS

Seventy-seven percent (N=315) of respondents were pediatric dentists; of those 58% (N=184) had ≤ 20 years of practice, and 41% (N=129) having ≥ 21 years of practice. Twenty-three percent (N=92) of respondents were residents. Eighty-one percent of pediatric dentists (N=247) (Figure 1) were aware of alternative caries detection technologies compared to 72% of residents (N=63) (Figure 2). Twenty-seven percent (N=85) of pediatric dentists have used the technologies, as compared to 11% (N=10) of residents (Figure 3). Forty-two percent (N=54) of dentists with ≥ 21 years of practice have utilized these technologies, as compared to 16% with ≤ 20 years (N=30, P<.001). The likelihood of past and current usage of caries detection technologies increased with experience in five-year intervals of experience (P<.001) (Figure 6). For the individuals who reported that they did not use the technologies, 92% (N=73) of residents reported being open to using them in the future in comparison to 76% (N=170, P≤.001) of dentists (Figure 4). Both dentists and residents reported usage of laser fluorescence technologies (including DIAGNOdent) and transillumination technologies (FOTI & DIFOTI) as the most commonly used technologies (Figures 7 & 8). For pediatric dentists, perceived lack of value and cost were the chief reasons for not utilizing these technologies (Figure 9). For residents, lack of access and lack of awareness of the technologies were the chief reasons for not using these technologies (Figure 10).

Figure 1. Pediatric Dentists' Awareness of ACDTs (N=302)

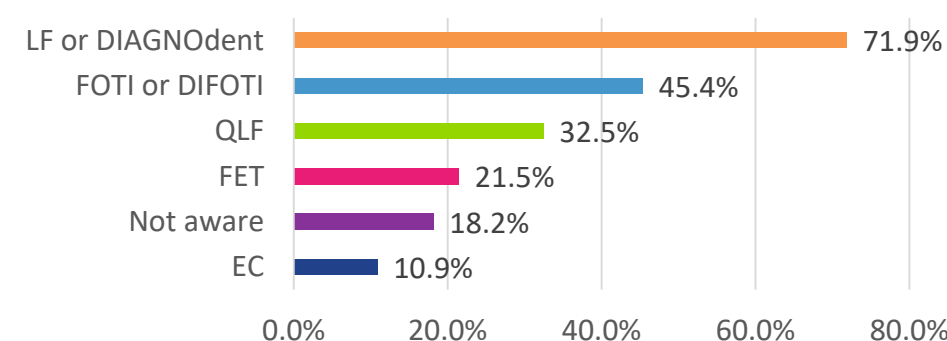


Figure 2. Residents' Awareness of ACDTs (N=88)

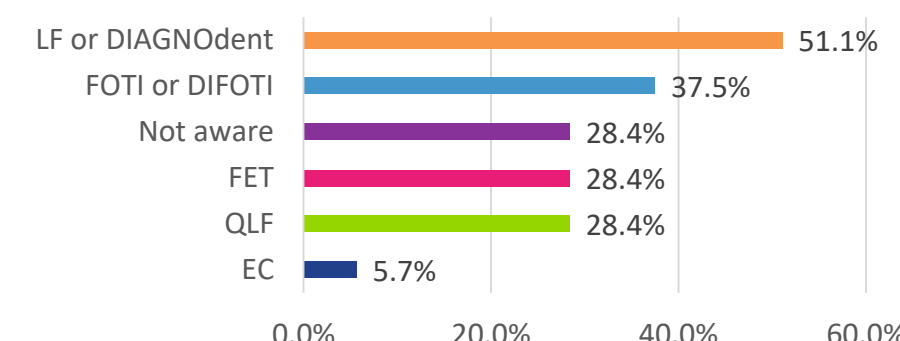


Figure 3. Usage of ACDTs (N=313)

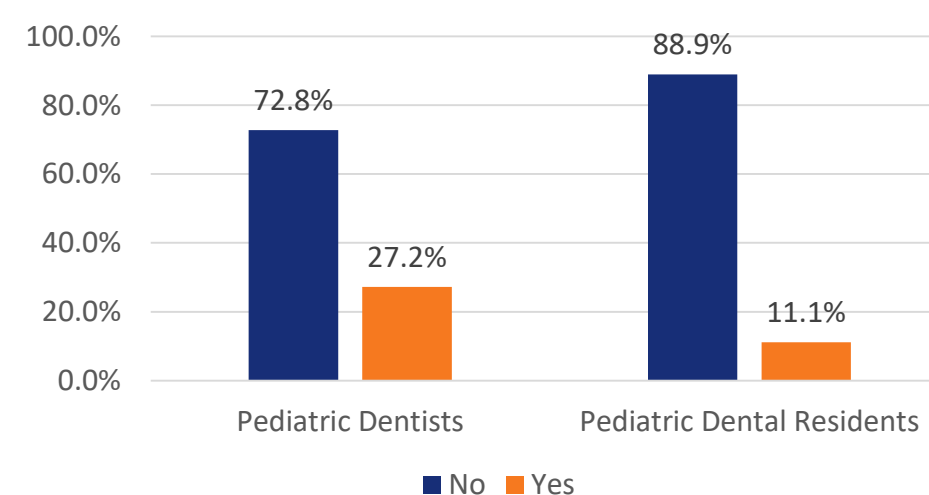


Figure 4. Non-ACDT Users Willingness to Utilize Technologies (N=304)

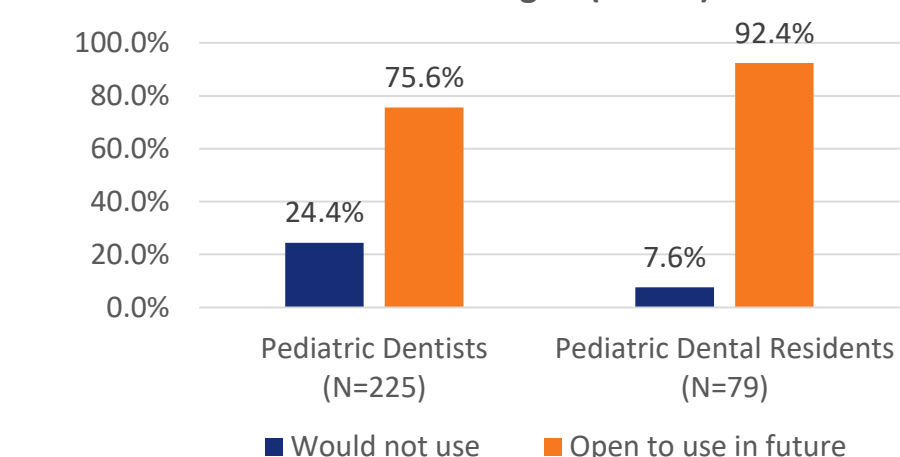


Figure 5. Past and Current Usage of ACDTs Amongst Pediatric Dentists (N=312)

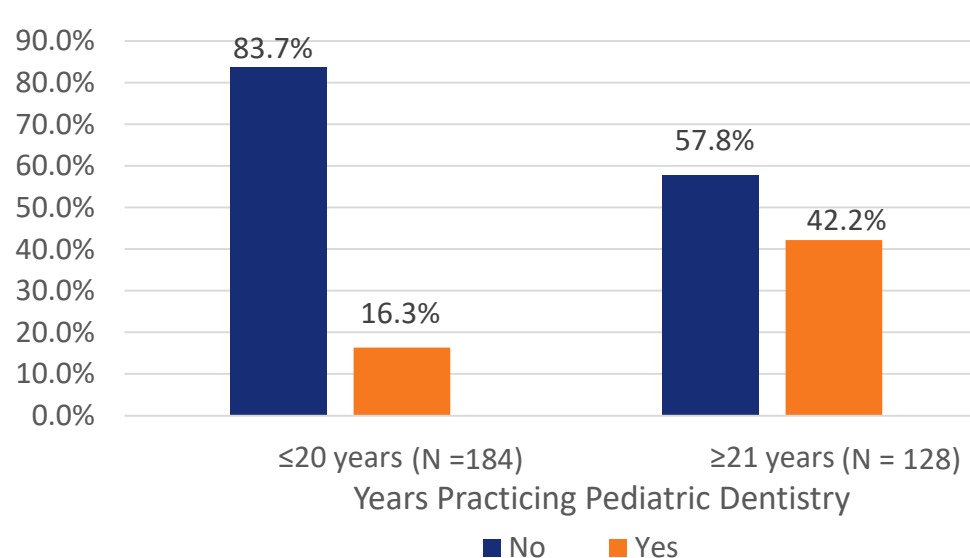


Figure 6. Past and Current Usage of ACDTs Amongst Pediatric Dentists (N=312)

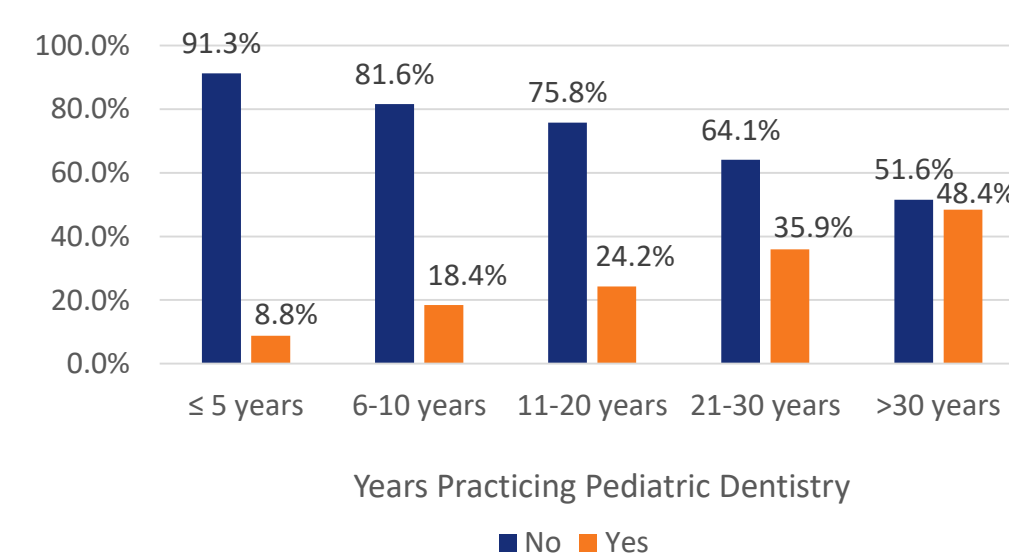


Figure 7. Types of ACDTs Used by Pediatric Dentists (N=85)

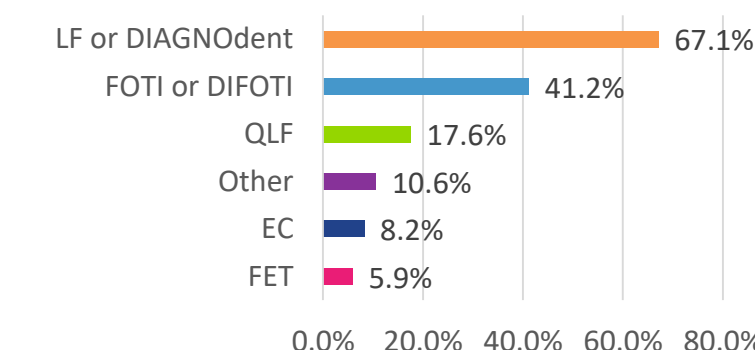


Figure 8. Types of ACDTs Used by Residents (N=12)

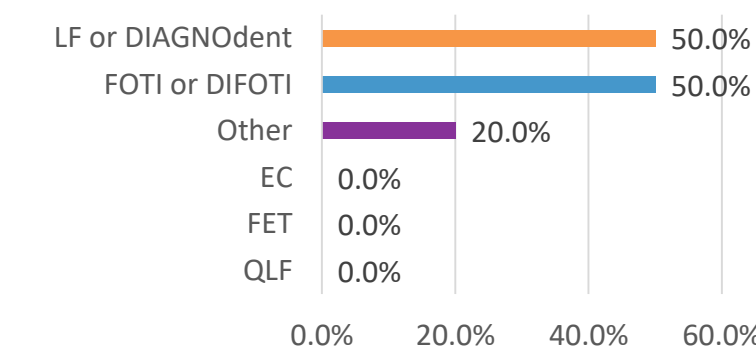


Figure 9. Pediatric Dentists' Reasons for Not Using ACDTs (N=225)

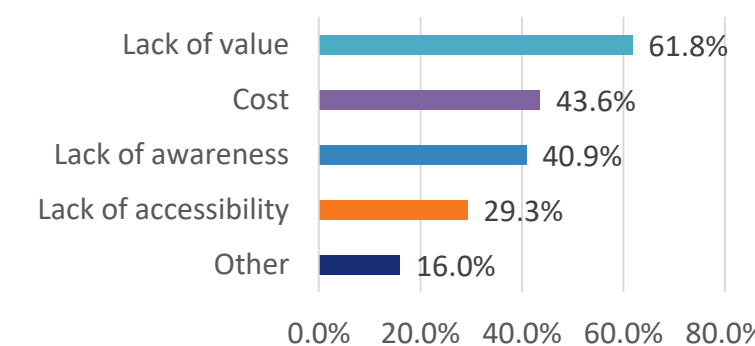
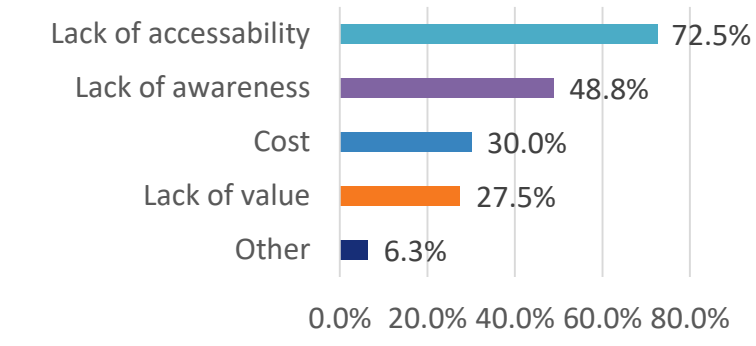


Figure 10. Residents' Reasons for Not Using ACDTs (N=80)



## CONCLUSIONS

Usage of these technologies is relatively low in the field of pediatric dentistry. For practicing pediatric dentists, the chief reasons for not utilizing these technologies is their perceived lack of value and the cost. Although there is a CDT code – D0600, the reimbursement may not be sufficient for regular usage. For residents, barriers to usage include lack of access and awareness of the technologies. Given the low reimbursement, the cost, and the low perceived value of these adjunctive caries detection technologies, unless there is substantial change in these three factors, it is not expected that these modalities will become standard practice in pediatric dentistry. However, there is still interest in these technologies amongst active pediatric dentists and pediatric dental residents.

## BIBLIOGRAPHY

References available upon request