Utilization, Challenges, and Implications of Digital Dentistry in Pediatric Dentistry Practice

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INTRODUCTION

The shift from traditional to digital impressions is reshaping pediatric dentistry, offering solutions to longstanding challenges like patient discomfort, material fragility, and size limitations. Intraoral scanning systems provide significant advantages, including enhanced data storage, better accessibility, and seamless communication with dental laboratories. These advancements improve patient comfort, reduce chair time, and enable more personalized treatment options.

Pediatric patients often prefer digital impressions due to their comfort and reduced gag reflex compared to traditional methods. However, despite these advantages, barriers such as high implementation costs, limited training opportunities, and concerns about equipment durability hinder widespread adoption. While traditional impressions may occasionally be faster in specific scenarios, the overall patient-centered benefits of digital technology highlight its potential to improve care.

This study evaluates the adoption, benefits, and challenges of digital impressions across various pediatric dental practice settings. By addressing these factors, it aims to provide insights that support the integration of digital impressions into daily practice, ultimately enhancing patient care and practice efficiency.

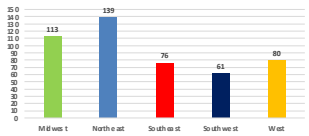
METHODS

The study design is a cross-sectional study which consisted of a 10-item questionnaire sent out via email to members of AAPD (American Academy of Pediatric Dentistry). It was hosted by SurveyMonkey to meet security standards for the transmission of online data. 4 weeks of reminders were sent.

Transport layer security protocol was used to encrypt and transmit data which are frequently backed up in an encrypted storage. Frequencies for each of the 10 questions were collected and summarized. Nonparametric analyses were performed as appropriate.

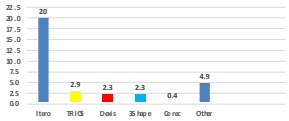
RESULTS

Fig. 1: Frequency by Geographic Location



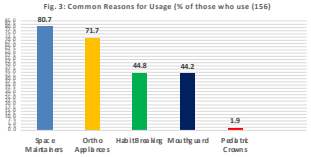
There were regional differences in use of digital dentistry ($X^2 = 41.7$; p<.001)(Figure 1).

Fig. 2: Percent Usage by Manufacturer



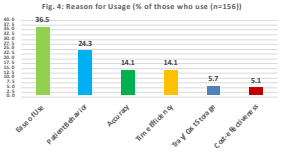
The most common manufacturer was Itero followed by Trios and Dexis (Figure 2).

Fig. 3: Common Reasons for Usage (% of those who use (156)



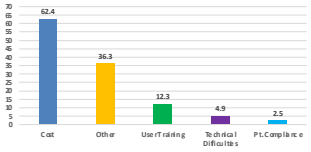
The most common reasons for use included space maintainers and orthodontic appliances(expander) (Figure 3).

Fig. 4: Reason for Usage (% of those who use (n=156))



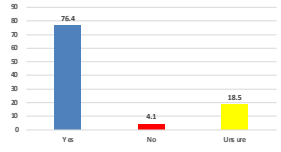
The adoption of digital impressions is driven primarily by ease of use and patient behavior, while cost and storage concerns play a minimal role (Figure 4).

Fig. 5: Barriers to Use (%)



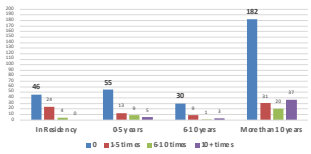
The most common barriers for use of digital impression is cost and other-embedding in the training curriculum (36.3%) including training (Figure 5).

Fig.6: Add Digital Technology to Pediatric Curriculum (%)



76.4% felt that digital technology should be included in a pediatric training curriculum, while 4.1% did not agree, and 18.5% were unsure (Figure 6).

Fig. 7: Frequency of Usage based on experience



(Figure 7)

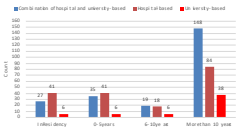
Majority of respondents with **more than 10 years of experience (182 people)** reported **never using** the practice.

Among **newer professionals (residents and 0-5 years)**, a **higher percentage reported some usage**, though the majority still indicated no use.

Training programs and early career exposure appear to increase adoption slightly, but not significantly.

RESULTS

Fig. 8: Type of residency program based on years of experience



(Figure 8)

Combination Programs Dominate: The majority of respondents (229 individuals) are from combined hospital and university-based programs. This suggests that these programs are popular for their ability to offer comprehensive care training and potential career growth opportunities.

Increasing Trend for Recent Graduates from Hospital-Based Programs: Among recent graduates (residents and those with 0-5 years of experience), there is a noticeable increase in participation from hospital-based training programs, with counts of 41 in both groups, compared to lower counts in other residency types.

DISCUSSION & CONCLUSION

8532 emails were sent, 784 were undeliverable, 469 were completed for a response rate of 6.1%

Limitations:

Survey Response Bias: Due to the low response rate, the findings of this study should be interpreted with caution and limit generalizability. The study relied on self-reported data, which may have introduced bias based on individual perceptions and experiences.

Underrepresentation of High-Frequency Users: Majority of respondents (66.9%) never use digital impressions, limiting insights into best practices from experienced users.

Technology Access Variability: there are a lot of digital dentistry resources past 10 - years and we don't know which resources fits better for different settings.

Possible future directions:

Longitudinal Adoption Trends: A follow-up study tracking adoption rates over time could reveal how training, cost reductions, and technological advancements impact the integration of digital dentistry.

Expand Training: Increase digital impression education, especially Continuing Education or in corporate into residency curriculum.

Reduce Costs: Provide financing options or more affordable systems for private practices.

Strengthen Lab Collaboration: Improve digital workflows between pediatric dentists and labs.

Conclusion: Digital impressions improve patient comfort and practice efficiency; however, cost and training remain significant barriers. A noticeable shift toward incorporating digital dentistry in pediatric dental environments is reflected in the increasing number of recent graduates from hospital-based programs adopting this technology. Expanding training opportunities, reducing financial constraints, and strengthening lab collaborations can further enhance its adoption and integration into pediatric dentistry.

Survey Questions & References