Teaching Tool for Teledentistry Modeled with Pediatric Dentistry Residents

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ABSTRACT

Purpose: To present a patient interaction teaching tool for synchronous teledentistry visits following concepts in critical thinking and report on the viability, assessment and implementation of the tool in an academic pediatric dentistry clinic.

Methods: A teaching tool was derived from interviews with pediatric dental residents and clinicians. The tool contained six main sections and 26 steps. The main sections included: greeting, medical, dental and behavioral histories; airway assessment; treatment recommendations; behavioral modalities of treatment; and follow-up. A faculty member assigned each interviewer dichotomous values of yes and no for implementation of each step of the teaching tool.

Results: Six pediatric dentistry residents participated in a tool use demonstration with 21 patients. The purpose of each interview was to gain information for procedural treatment at the first onsite visit. All pediatric dental residents completed over 90 percent of the steps in each section. The interview duration ranged from eight to 29 minutes (median: equals 18 minutes). Eighteen of the 21 patients were scheduled for follow-up visits.

Conclusions: The emulation model for provisional treatment planning is viable for teledentistry. Pilot results showed students consistently completed over 90 percent of skillset steps and that this teaching tool serves as a framework for teledentistry appointments. (J Dent Child 2022;89(3):162-7)

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Teledentistry is increasingly recognized as a promising approach to improve access to dental care, and its use has been accelerated exponentially by the COVID-19 pandemic. Several of the most common uses for teledentistry include screening and consultation, diagnosis and treatment planning, and postoperative follow-up.[1-7] Similar to telemedicine, teledentistry modalities include both synchronous and asynchronous models of care. Synchronous refers to real-time interaction between a person (patient, caregiver or provider) and provider using audiovisual technology, whereas asynchronous refers to the transmission of health information to a provider who subsequently uses the information to evaluate a patient or provide a service at a later time.[8]

Despite the growing use of both modalities and numerous articles describing how teledentistry has been or could be used, very few studies have examined the degree to which teledentistry improves access to dental care. The few studies on teledentistry and access to care have been based on a synchronous teledentistry model implemented at the Pediatric Dental Clinic at Eastman Institute for Oral Health, Rochester, New York, which used teledentistry to streamline the referral process for

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patients referred to an academic pediatric dentistry clinic, saving patients an in-person visit in most cases.[4] Children seen via this model were found to have a high rate of treatment completion,[1] and the treatment modality recommended was completed 88 percent of the time in that same modality (e.g., nitrous oxide, sedation, general anesthesia).[5]

In 2021, the Commission on Dental Accreditation (CODA) included a standard on teledentistry in pediatric dentistry residency curricula.[9] Standard 4-20 requires that programs provide didactic instruction on the "use of technology in didactic, clinical, and research endeavors, as well as in practice management and telehealth systems."[9] However, given the novel nature of this way of delivering care, there is likely to be a great deal of variation in how this topic is being taught. A review of the medical literature to determine how the concept of providing care through telemedicine is taught discusses the differences in how care is provided between traditional face-to-face appointments and telemedicine appointments.[10] One study theorizes that, after medical students' pre- and post-experiences in telemedicine, it is more difficult to teach the concept of telemedicine because the novice student has not mastered the face-to-face appointment.[10] It is important to get buy-in from students and guide student learning through discussing appointments and setting a framework for the appointments prior to the actual appointment time.[11] The challenge to use teledentistry in a dental school setting is that there is no good literature on workflow designs and training.[12]

Teledentistry regulations require that services provided via teledentistry should be consistent with the standard of care. However, the process of care (e.g., rapport building, information gathering, patient assessment, etc.) that the dental care team would feel very comfortable with in an in-person interaction may not come naturally and may present challenges in a virtual environment. For this reason, it is useful to have a teaching tool to reduce the learning curve when transferring skills from in-person to virtual delivery and that helps explain the elements of an appointment and the differences and similarities between the traditional face-to-face appointment and the teledentistry appointment. As a new clinical skill is taught, it is important to have a framework for the novice practitioner on how to apply the skill in a clinical setting. This framework helps elevate the level of critical thinking in a new learner and provides a teaching tool or skillset for the new learner to follow. Although at first glance this may be seen as checking a box, it becomes a way to guide learning and provides a reference for assessing this clinical skill. Previous peer-reviewed critical thinking skillsets in the dental literature following these concepts include treatment planning, literature search and critique, caries risk assessment, geriatric risk assessment, evidence-based dentistry, interprofessional practice, technology decision-making, ethics and social work.[13-19]

The medical literature recommends to plan ahead for a telemedicine visit and have structure for the patient interview.[11] At the conclusion of the appointment, the medical provider is then asked to self-reflect on how they provide treatment to the patient.[10,11] The medical format is also recommended for the novice practitioner to follow for organized information gathering. No current information exists on how these teaching tools for information gathering in a medical appointment should or are developed.

The purposes of this paper are to: (1) present a skillset or teaching tool for patient interactions via teledentistry in a synchronous visit and (2) demonstrate how implementation and evaluation of the teledentistry teaching tool can serve as a learning guide and performance assessment instrument with pediatric dentistry residents and students.

METHODS

This study was granted exempt status by the Institutional Review Board of the University of Iowa, Iowa City, Iowa, USA (#202011073). The authors used a previously developed approach to create critical thinking skillsets or what is called 'the teaching tool',[20-23] which includes several steps. First, derive the thought process of the expert succinctly enough to guide the novice or advanced beginner. The thought process becomes the teaching tool for a new model of patient care. This model can then provide information for learning and assessing if a student is able to apply the new method of patient care. There are no reported teaching tools for teledentistry that the authors are aware of and there is a great deal of heterogeneity in how teledentistry is used; hence, the question may arise as to who the expert is. This project begins with development of a teaching tool or skillset for a synchronous teledentistry program for pediatric dental referrals adapted from a well-established model of synchronous teledentistry visits.[4]

A thought process for the teaching tool was turned into a rubric to help compare traditional versus face-to-face in-person visits (Table). This rubric was created by writing the steps for each traditional appointment with expert practitioners. This concept is similar to earlier teaching tools that were developed to help students with patient management in clinical situations.[24] Dental residents and faculty who were instrumental in the implementation of teledentistry provided guidance on how the appointments were structured and how they differed from traditional appointments.

The teaching tool provides context for each step of an appointment and what information was needed from clinical questions asked or how to assess clinically a patient in the teledentistry environment. Six broad categories of a dental appointment were identified, including greeting, medical/dental/behavioral histories, airway assessment, treatment recommendations, behavioral

Table. Teaching Tool for Teledentistry: A Learning Guide and Assessment

In-person appointment	Information subject	Teledentistry appointment	
Consent obtained by the front desk		**Must read consent statement**	❑ **Completed**
❑ No treatment completed today	Expectations	❑ Evaluation for next dental visit, possible treatment or location of treatment	
Fill out at the appointment, may get information during the appointment ❑ Enter manually	Medical history	Online, completed prior to the appointment ❑ Review in detail ❑ Accept the HH* in Axium	❑ Assessed ❑ Grasped
On health history ❑ Enter manually	Medications	Will not be filled out online ❑ Enter manually	❑ Assessed ❑ Grasped
Filled out at the appointment ❑ Enter manually	Allergies	Online ❑ Review in detail	
❑ Address chief complaint ❑ Previous dental visits/dental history ❑ Discuss OHI* and nutrition ❑ Observe patient behavior ❑ Observe parent/child dyad ❑ Interact with patient separate from parent/caregiver ❑ Conversation with the parent without the child about future treatment *Must maintain HIPPA* due to open bay and waiting room areas* *Direct observation of different dyads*	Dental history/behavioral information	❑ Address chief complaint ❑ Previous dental visits/dental history ❑ Discuss OHI and nutrition ❑ Ask about patient behavior ❑ Observe parent/child dyad ❑ Conversation with the parent with the child about future treatment *Can be done in private* *Some direct and indirect observations of dyads, able to see the social environment*	❑ Assessed ❑ Grasped
❑ Brodsky scale ❑ Malampati score Provider able to determine	Airway assessment	❑ Brodsky scale ❑ Malampati score *Ask patient to stick out tongue,* *Have a parent use a spoon to push down on the tongue* *Get photographs if possible*	❑ Assessed ❑ Grasped
❑ Radiographs if possible ❑ Review clinical findings ❑ Definitive treatment plan signed for the next appointment ❑ Establish behavior guidelines for parent and child	Treatment recommendations	❑ Review radiographs if possible ❑ Review clinical findings ❑ Provisional treatment plan dependent on in-person appointment ❑ Establish behavior guidelines for parent and child	❑ Assessed ❑ Grasped
Treatment modalities			
❑ Tell-Show-Do next appointment ❑ Review parent presence/absence ❑ Review patient behavior guidance: nitrous, stabilization, movie, parent roles	In office	❑ Next visit is provisional ❑ Will confirm findings and get needed images ❑ Review parent presence/absence ❑ Review patient behavior guidance: nitrous, stabilization, movie, parent roles	❑ Assessed ❑ Grasped
❑ Complete a review of systems set day of treatment ❑ Confirm NPO* guidelines ❑ Complete sedation paperwork with signatures	Sedation	❑ Will complete a review of systems day of treatment ❑ Confirm NPO guidelines ❑ May need to cancel if unable to get a good airway assessment ❑ Complete sedation paperwork	❑ Assessed ❑ Grasped
❑ Paperwork completed on-site	General anesthesia	❑ Paperwork will be emailed and requires return signatures ❑ Complete other portions of the paperwork	❑ Assessed ❑ Grasped
❑ Front desk to make the next appointment	Follow-up	❑ Provider to make the next appointment	❑ Assessed ❑ Grasped
❑ May be able to complete a next step (impressions, consultations, spacers, minimal intervention dentistry)	Completion	❑ Must be observant of the time, must be documented	❑ Assessed ❑ Grasped

* *HH=Health history; OHI=Oral hygiene instrucitons; HIPPA=Health Insurance Portability and Accountability Act; NPO=nil per os (empty stomach).*

modalities of treatment and follow-up. Twenty-six individual steps were examined for all teledentistry dental appointments.

This teaching tool was then used to assess new student/practitioner performance with the use of teledentistry. Previous skillsets have used the following model for student performance: did the student/practitioner apply each step and did the student/resident grasp the concepts in each step? The grasped concept is used to determine if the student is confident in their knowledge of the subject matter, and if they understood how to move to the next step and how to ask follow-up questions. This teaching tool makes the assumption that the student has mastered the in-person initial patient assessment before beginning to conduct patient assessments via teledentistry.

All residents were introduced to teledentistry visits by systematically including each step in the teaching tool for teledentistry during their orientation of teledentistry. During their synchronous teledentistry visits, residents conducted patient consultations and limited oral exams for patients referred to the pediatric dentistry clinic. Residents followed the steps in the teledentistry teaching tool presented in the Table. To help standardize teledentistry appointments, a single pediatric dental faculty member was involved in providing guidance for appointments and assessing the performance of all the residents in patient communication. The examiner did not have a primary role in grading the residents. Patients were aware of the standardization process and the silent observer who was present on the synchronous video calls was not instrumental in providing clinical care. A second clinical faculty member reviewed the radiographs and notes of all visits to determine if appropriate treatment plans were made based on the information provided in the limited oral examination process. The clinical faculty also reviewed the essential elements of the patient visit identified previously.

As with other critical thinking exercises using teaching tools, resident performance was based on demonstrating a systematic process that resulted in all treatment options being offered to a patient as well as discussing next steps and outcomes with treatment options. A final step of this teaching tool is how residents reviewed follow-up care and next steps. This allowed residents to reflect on patient interactions after appointments and identify how the teaching tool could be used for future patients. The teaching tool served as the assessment instrument to confirm that all elements of a traditional face-to-face appointment were met for synchronous teledentistry appointments.

RESULTS

Twenty-one teledentistry interviews were completed by six different pediatric dentistry residents. Twenty patients were scheduled for treatment following the teledentistry visit and one visit was for a second opinion only. The following treatment modalities were recommended: four for traditional treatment in the office, seven for treatment with nitrous oxide and nine for treatment with advanced behavior guidance techniques, including either oral conscious sedation or general anesthesia.

All interviews were judged as adequate to proceed to patient care with procedures in the pediatric dentistry clinic or with advanced behavior guidance techniques based on a review with the clinical faculty member. Resident interview durations ranged from eight to 29 minutes (N=17), with a median duration time of 18 minutes.

All residents completed the interview, with over 90 percent of the steps being applied for each patient from the teledentistry teaching tool. Two areas of the teaching tool omitted included 'next appointment made by provider' and explanations of the 'treatment plan being provisional'. In the first example of the next appointment being made, in two cases the appointment books were full and the scheduling clerk needed to call the family to make a future appointment when new clinical schedules were open. The second area that was omitted included explaining that, based on the information provided, the treatment plan being presented was provisional and there may be limitations in treatment upon clinical examination. This was omitted 12 times by residents.

Residents were asked to do self-reflection of the appointments when reviewing them with the faculty member involved. Residents reviewed the appointment and discussed what went well. These thoughts were recorded by the examiner and included themes such as complex medical histories that required in-depth research, difficulties judging emergent versus non-emergent needs and having to explain the possible use of medical stabilization for emergency treatment.

DISCUSSION

The teaching tool is viable for guiding learning and assessing performance for the teledentistry patient encounter in pediatric dentistry. While previous reports from the current authors with other critical thinking skillsets and teaching tool exercises were conducted with predoctoral dental students, dental residents are beyond the novice stage. Unlike predoctoral dental students who sequentially followed respective teaching tools other than teledentistry, residents took latitude with this teledentistry tool to let the interview be guided more by the patient. Residents were effective in circling back to pick up elements of the teaching tool if the patient digressed off topic. It is important to have a succinct way to teach this new modality of patient care as there is a drive to have teledentistry as part of the predoctoral and residency education.

Subjective observations are worth noting. Residents commented on the advantage of seeing the patient in the

home setting. Watching patient and parent interactions had some advantages over observation in a clinic reception area. The use of an online platform provided a private interaction in a home setting free of distractions and strangeness with comfort for parents and the child. Residents also commented on the likely use of teledentistry more for specialists than general dentists due to distances traveled for appointments and the nature of the appointments as well as referrals that included previous charting and radiographs (if obtained from the referring provider). Residents felt that the limitations of this method of care included not having appropriate radiographs during the examination, inability to read subtle body language that is present at an in-person visit and technology issues. These are issues that have been brought up by previous guidelines on telehealth visits.[25]

Pediatric dentistry residents navigated the patient exchange expeditiously. The teaching tool was viewed as comprehensive and succinct enough to be practical. There were no glaring omissions or redundancies reported either by faculty or residents. The authors are not aware of a comparable teaching tool in teledentistry that can serve as a performance/learning outcome for the practitioner. As with previous critical thinking teaching tools, the thought process of the experienced clinician becomes the learning outcome, learning guide and assessment instrument.

A limitation of this study is that it is theoretical in how to structure an appointment rather than the outcomes of patients' acceptance of teledentistry. This study does not report if teledentistry appointments lead to better outcomes (i.e., patients completing recommended care or completion of a recommended modality of care). These are aspects that have been studied in previous research.[5] However, this study was an attempt to develop the structure of the appointment, which is missing from the current dental literature.

The authors submit that a standardized process will bring consistency to an individual patient perspective and will add consistency to gathering patient data. For next steps, once a standardized performance skillset is implemented, more meaningful comparisons can be made for factors such as compliance, wait time, the accuracy of information used for diagnosis and treatment planning and the follow-up rate.

CONCLUSIONS

Based on the results of this study, the following conclusions can be made:

1. Teledentistry is an effective tool in patient care for pediatric dentistry referrals;
2. A comparison teaching tool helped residents encompass all aspects of the traditional pediatric dental appointment in a teledentistry appointment; and
3. This teaching tool can serve as a learning guide for new dentists using teledentistry as well as an assessment that all important steps were captured in all areas for 90 percent of all dental appointments.

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