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Reaching The Unreachable – Virtual Clinic In Pediatric Dentistry

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Abstract

The advent of telemedicine has revolutionized healthcare delivery, and its integration into pediatric dentistry has the potential to significantly enhance access to care, improve patient outcomes, and reduce healthcare costs. A virtual clinic in pediatric dentistry utilizes digital tools such as video consultations, remote monitoring, and teledentistry platforms to provide comprehensive care to children, particularly in underserved or rural areas where access to specialized dental services may be limited. This abstract explores the benefits, challenges, and applications of virtual pediatric dental care, including preventive care, diagnosis, consultation, and post-treatment follow-ups. Tele-screening and tele-triage can be implemented publically into routine dental practice and also as a triage-based emergency management strategy as it provides an effective compromise between limiting patient admission, ensuring their pain control and symptom relief.

Keywords: Virtual clinics, Health services, Pediatric Dentistry, Tele-dentistry

INTRODUCTION

Regarding the increase in the patient population and global shortage of health professionals, timely access to healthcare, as one of the important challenges of service delivery, can be improved by the significant development of communication technology tools, especially smartphones, due to their ubiquitous nature.[1] Virtual clinics are a form of telemedicine that allow clinicians to provide health services by connecting with patients or other clinical staff through virtual means.[2]

Teledentistry is an innovative service in this digital age followed by the dentists to provide patient access to dental care and services through interactive audio, video or other electronic media for the purpose of diagnosis, consultation, treatment, and/or transfer of dental information to enhance care and education delivery, rather than through direct face-to-face contact with any patient. [3]The term, "Teledentistry" was first described by Cook in 1997, and is defined as, "the practice of utilizing video conferencing technologies to provide advice and diagnosis about the treatment over a distance". [4]

Teleconsultation is established in two ways: a) A real-time consultation involving a video

conference in which the dental professional and the patients can see, hear and communicate with each other over distances . b) A store-forward method that involves the exchange of the clinical information and static images that are collected and stored by the dental professional which are subsequently forwarded for consultation and further treatment planning to a specialist . It can be a near-real-time consultation that provides patient information in low resolution , or a remote monitoring method to monitor patients from distant locations . This provides a comprehensive platform for interdisciplinary communication amongst dental professionals to share, store and plan treatment for patients.[4]

In the speciality of paediatric dentistry, where patients have rapidly evolving dentitions and undergo rapid change, there is a high need for these types of appointments.[5] In this article, we explore the rise of virtual clinics in pediatric dentistry, their benefits, challenges, and the future outlook for this innovative approach to dental care.

COMPONENTS AND SUBSYSTEMS OF TELEDENTISTRY

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- Teleconsultation- Patients or healthcare workers seeks consultation from dental specialists. Study has shown it being a valuable tool even for the consultation of patients who are physically and intellectually challenged.[3]
- Telediagnosis- Telediagnosis makes use of technology to exchange images and clinical data to make diagnosis of oral lesion. Studies have well advocated the use of smartphones for detection in dental caries, as a reliable adjunct for screening of oral potentially malignant lesions and by dental photography reducing the need of close clinical examinations.[3]
- Teletriage- Involves use of smartphone by specialists for the safe, appropriate and timely evaluation of patient symptoms. Study has shown its used for remote assessment of school children and prioritizing those requiring dental care without unnecessary travel.[3]
- Telemonitoring-The use of telemonitoring can replace the frequent physical visits by virtual visits for regular monitoring of treatment outcomes and disease progression.[3]

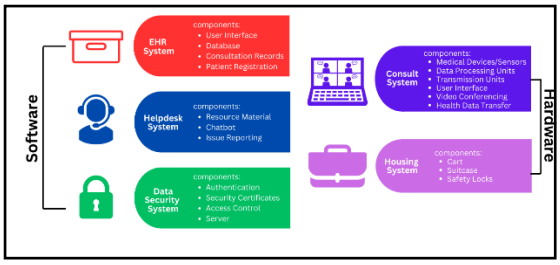

Figure 1: Subsystems of virtual clinic system and their associated key components that form the functioning units [2]

VIRTUAL CLINIC FORMATS

Virtual clinics can take many forms, and the value of different clinic types may depend on the case-mix for each paediatric dentistry service. All virtual clinics can be conducted in a clinical room, in a non-clinical room, or remotely. For any appointment or interaction, appropriate patient documentation will need to be completed, such as clinical notes, letters, requesting follow up appointments, coding, and recording the referral-to-treat outcome. The authors also suggest asking parents to send in patient photographs in advance of a virtual clinic, as this aids the diagnostic value of the appointment.[5]

For the sake of simplicity, the term 'parent' is used to refer to the adult most likely to accompany the patient and have parental responsibility. This is not the case for every patient, and so the term 'parent' should be substituted with the appropriate adult(s) for each child or young person. [5]

1.Telephone

The clinician calls the parent at an agreed appointment time. The child or young person should be encouraged to participate in the call. The benefit of this type of clinic is that it is relatively easy to set up and does not necessarily require any extra technology or governance The main limitation of a telephone appointment is that the clinician cannot observe the patient, or the patient-parent interactions.[5]

2.Video

The clinician and the patient/parent join a video call. Paediatric patients are encouraged to attend and participate in the call, as appropriate to their individual needs. The benefit over telephone appointments is that the patient and the patient–parent interaction may be observed, which often helps to assess the overall context of the child or young person. The main limitation of video is the extra technology and training/instructions needed, which can be challenging for staff and parents![5]

3. Advice and guidance

The consultant reviews the referral and attached records, and makes recommendations about their care. This is communicated to the referring clinician, usually via letter. A benefit to A&G is numbers; more patients can be processed via this format, as patients themselves are not consulted during a set appointment time. Another benefit is the direct communication between referrers and consultants.[5]

APPLICATIONS

1.Oral health education and promotion

Advancements in the information and technology industry can be utilized by paediatric dentists to provide better access to oral health services and improve oral health behaviours . Oral health

education and promotion programmes via mobile technology, internet, mhealth application have been able to draw the attention of the public and reach a large population. In recent years, the number of mobile and internet users have dramatically increased across the globe, which has changed the way, the patient education can be undertaken.[4]

2.Remote diagnosis and monitoring

Children and adolescents are the prime target population for early diagnosis and prevention of oral health diseases . The lack of access to dental health services requires a cost-efficient and sustainable method to increase access of children, especially in distant locations for dental services. Teledentistry via the medium of electronic dental records, information and communication technology, internet and newer digital devices such as digital camera, intra-oral cameras, webcam, computer monitors have expedited the way dental service is being provided.[4]

3.Behaviour guidance

Mobile game applications offer children an interactive way to guide their behaviour and are useful in reducing face-toface contact by reducing the number of dental visits in the pandemic. These applications can incorporate behaviour guidance techniques like tell-show-do, positive pre-visit imagery, distraction, and modelling . Previous studies have shown that video modelling is effective in exerting therapeutic influence in the management of anxiety and at the same time exert an educational influence to improve skills of coping in children in stressful situations .[4]

BENEFITS

1.Increased Access to Care:

In many rural communities, access to pediatric dental specialists is limited, and families often face long travel times to see a provider. Virtual consultations can reduce the need for travel, allowing children to receive timely advice, evaluations, and preventive care from the comfort of their homes.[5]

2.Convenience and Reduced Stress for Children:

Virtual consultations allow children to interact with their dental provider in a more relaxed environment—usually at home—minimizing stress and fear. This can be particularly helpful for routine checkups or when dealing with non-invasive procedures that don't require physical exams.[5]

3.Cost Savings:

Virtual clinics can reduce the cost of care by eliminating travel expenses, reducing the time away from work or school, and lowering the overhead costs associated with operating a physical dental office.[5]

4.Better Follow-Up and Monitoring:

Virtual clinics make it easier for dental professionals to monitor a child's progress, check healing after procedures, and address any issues early without requiring a visit to the office. This continuous care can prevent complications and improve treatment outcomes.[5]

5.Environment:

Reducing patient travel has a positive environmental impact. Excluding those that walk or cycle, every patient journey will have an associated carbon footprint, which is 'saved' for every virtual appointment. The magnitude of the saving will be linked to the distance the patient lives from the dental clinic, as well as their method of transport.[5]

6. Staff

As with patients, staff may be able to work remotely when attending a virtual clinic. Working remotely may have benefits to staff including less time and money spent commuting and increased job satisfaction. Admittedly, there is no evidence available for the staff benefits or disadvantages of remote working in dental settings. There may be more opportunities for staff development in a virtual clinic, as clinicians have the chance to ask questions and further their learning, away from patients and parents.[5]

LIMITATIONS AND CHALLENGES

While virtual clinics offer many advantages, they are not without challenges. These challenges need to be addressed to ensure that this model of care remains effective and equitable.

1. Limitations of Remote Examination:

Pediatric dentists rely on physical exams to diagnose issues like cavities, malocclusion, or gum disease. While digital imaging tools such as intraoral cameras and X-rays can help, a full examination is not possible via virtual consultations.[4]

2. Technology Barriers:

Rural areas, lower-income households, or families with limited internet access may struggle to benefit from telehealth services. Ensuring that virtual dental clinics are accessible to all patients is a key challenge for widespread adoption.[4]

3. Regulatory and Legal Considerations:

Virtual healthcare is subject to various regulations, including those related to licensure, patient privacy, and insurance reimbursement. Dentists must comply with local and state laws regarding telemedicine, which can vary by jurisdiction. [4]

4. Quality of Care Concerns:

In pediatric dentistry, the hands-on nature of dental exams means that there is a risk that virtual consultations may not fully capture the complexity of a child's dental health. While virtual consultations can assist with initial screenings or post-treatment care, they may not be suitable for more advanced procedures that require direct interaction.[4]

5. Integration with Traditional Care:

Virtual pediatric dental care is often seen as complementary to, rather than a replacement for, in-person visits. Ensuring smooth integration between virtual consultations and traditional, in-office care is crucial. This means that virtual consultations should work alongside regular checkups and follow-up visits, with continuity of care and communication between the dental team and patients.[4]

CONCLUSION

Virtual oral examination when conducted in a familiar environment, rather than a clinical environment, results in children being more enthusiastic, co-operative and less anxious. In addition to this, it reduces the absenteeism of the child from the school for appointments other than treatment. For pediatric patients especially in rural areas, it would reduce the cost of treatment and the need to travel to a specialist, because their problems are previously identified and planned via tele-dentistry. The intraoral camera is a practicable and cost-effective alternative to a visual oral examination for caries screening, especially in early childhood caries, in preschool children attending childcare centers.[3]

By connecting patients and providers remotely, virtual care has made its presence in different aspects of healthcare, including healthcare education, as well as positive impressions from end consumers. As technology advances, virtual care becomes more accessible, and utilization will increase; hence, acceptance of virtual care and the technology that supports it can also increase in parallel. The technology supporting virtual care, such as video conferencing tools and virtual reality, will also mature to enhance patient and provider experience in using those tools.[6]

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