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Today's Era of Digitalization - Current Trends and Practise

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KEYWORDS	ABSTRACT
Teledentistry	Combining telecommunications and dentistry, teledentistry entails the transmission of clinical data
Internet	and photographs over vast distances for dental consultation and treatment planning. Teledentistry has
Telediagnosis	the potential to increase accessibility, enhance oral healthcare delivery, and cut costs. Additionally, it
Digitalization	might end the discrepancies in oral healthcare between rural and urban areas. In addition to
Cost offective	reviewing the current information that is available in the literature, this article also discusses the
Cost effective	history, justification, scope, foundation, and needs for teledentistry. This article also discusses the
	future of this alternative and cutting-edge approach to providing dental care, as well as the ethical
	and legal concerns associated with the practise of teledentistry.
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INTRODUCTION

Telemedicine is the practise of providing medical care over long distances using information-based technology and communications systems.¹ When participants are separated by distance, it employs electronic information to communicate technology to give and assist healthcare.² Telemedicine is a component in a larger chain of care. This chain could be improved, which would raise the standard and effectiveness of healthcare.³ Academic medical community hospitals, managed-care centres, organisations, rural hospitals, and other settings all employ telemedicine today. It is also used internationally to connect healthcare practitioners in developing nations with hospitals in developed nations. Remote access to medical treatment now has a previously unheard-of chance thanks to developments in digital communication, telecommunication, and the Internet.⁴

In recent years, there have been numerous technological advancements in the dental industry. Digital diagnostic imaging services, computers,

telecommunications technology, gadgets, and software for analysis and follow-up have all advanced.⁵ The science of dentistry has come a long way since its inception thanks to the use of modern information technologies.⁶ New information technology has enhanced dental patient management quality while also enabling partial or full patient management thousands of kilometres distant from medical facilities or skilled dentists. A branch of telemedicine that deals with dentistry is called as "Teledentistry," and it manages the complete process of networking, sharing digital information, remote consultations, workup, and analysis.7

HISTORY AND BACKGROUND

The initial idea for teledentistry was part of the dental informatics blueprint that was created at a conference in Baltimore, Maryland, in 1989, with funding from the Westinghouse Electronics Systems Group. Discussions centred on how to effectively use dental informatics in dentistry

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practise to influence how oral healthcare is delivered.⁸ The U.S. Army's Total Dental Access Project, a military initiative launched in 1994 with the goal of enhancing patient care, dental education, and the effectiveness of communication between dentists and dental laboratories, can be credited with the birth of teledentistry as a subspecialty of telemedicine. This military initiative proved that teledentistry lowers overall patient care expenses while extending dental care to remote and rural areas and providing comprehensive data needed for more in-depth analysis.7 New potential for teledentistry have emerged as technology has developed. The dynamics of dental care delivery are starting to alter as a result of currently accessible technologies. Teledentistry will present fresh possibilities for enhancing patient care and reshaping existing business structures.9

TELECONSULTATION METHODS

Real-time consultation and the store-and-forward method are two different methods that teleconsultation via teledentistry can be conducted. Real-Time Consultations are conducted by videoconference so that patients and dental professionals in various places can see, hear, and speak to one another. 10,6 The store-and-forward method entails the exchange of clinical data and static photographs that the dental professional has gathered and saved before sending them for consultation and treatment planning.¹¹ The "consultation" is conducted without the patient present.¹² Dentists can exchange information about their patients, including radiographs, graphical depictions of periodontal and hard tissues, therapies used, lab test results, comments, images, and other data that can be sent between different providers. For patients, especially those who require professional advice, this data exchange might be of the utmost value.7 There is also a third technique, called "Remote Monitoring Method," in which patients are seen remotely from either a hospital or their home.¹³ The term "Near-Real-Time" consultation has also been used in the literature to describe a shaky, low resolution, low frame rate result.9

SCOPE OF TELEDENTISTRY

Teledentistry has the power to increase access to oral healthcare, enhance how it is delivered, and cut costs.¹² Additionally, it might end the discrepancies in oral healthcare between rural and urban areas.¹⁰ The fastest and least expensive solution to close the health gap between rural and urban areas may be through teledentistry. Teledentistry can aid in bringing specialised healthcare to the most distant regions of the globe, especially in light of the enormous advancements made in the realm of information and communication technology.¹⁴ When a speciality dentist wasn't available, Lienert N. et al. discovered that telemedical services in a Swiss telemedical centre were beneficial for cases involving dental trauma and offered important support.¹⁵ Australian rural residents could receive cost-efficient, remote specialist dental consultations thanks to teledentistry, as seen by Snow MD et al.¹⁶ Teledentistry will be crucial for both our urban and suburban populations as well as rural areas if the predictions about the shortages of dentists in the upcoming ten years come true.¹⁷ The integration of dentistry into the greater healthcare delivery system will be improved by interprofessional dialogue.⁶ Dentists will be able to share the patient's contextual knowledge more easily by using teledentistry for specialist consultations, diagnosis, treatment planning and coordination, and continuity of care.¹⁸ With the utilisation of actual photos of dental problems rather than tooth charts and written descriptions, second opinions, pre-authorization, and other insurance criteria will be met most promptly online.⁶ Additionally, teledentistry will offer a chance to enhance conventional teaching strategies in dental education and present fresh prospects for dentists and dental students.¹⁹

EVIDENCE OF TELEDENTISTRY IN CURRENT PRACTISE

Oral Medicine and Radiology

Using a prototype teledentistry system, Bradley M. et al. successfully demonstrated the application of teledentistry in oral medicine in a community dental service in Belfast, Northern Ireland.²⁰ According to Torres-Pereira C et al., email transmission of digital images for distant diagnosis

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of oral lesions is a reliable substitute.²¹ The Northern Arizona University Dental Hygiene Department developed a teledentistry-assisted, affiliated practise dental hygiene model that allowed dental hygienists to provide oral healthcare to underserved populations by digitally connecting up with a remote oral health team, according to Summerfelt FF.²²

Oral and Maxillofacial Surgery

According to research by Duka M. et al., telemedicine-assisted diagnostic evaluation of the clinical diagnosis of third molars with impacts or semi-impacts was equivalent to clinical diagnosis evaluation in real time.²³ In order to adequately assess patients for dentoalveolar surgery under general anaesthesia and nasotracheal intubation, telemedicine consultations are as reliable as those carried out using conventional methods, according to Rollert MK et al. Telecommunication is an effective and affordable mechanism to provide preoperative evaluation in circumstances where patient transport is challenging or expensive. According to Aziz SR and Ziccardi VB, smartphones offer quick and clear access to electronically sent digital images and give the oral and maxillofacial surgeon full mobility without being constrained by desktop personal computer limitations. As a result, the speciality consultation can be conducted more quickly and effectively, and the patient's maxillofacial treatment can be enhanced.24

Endodontics

According to Brullmann D et al., dentists who practise remotely may recognise root canal orifices from photographs of endodontically accessible teeth.²⁵ Zivkovic D. et al. showed that teledentistry based on the Internet as a telecommunication medium can be effectively used in the diagnosis of periapical lesions of the front teeth, minimising the costs associated with remote visits and making urgent assistance available.²⁶ Baker WP 3rd et al. demonstrated that there was no statistically significant difference between evaluators' abilities to recognise periapical bone lesions using traditional radiographs on a viewbox and their abilities to do so using the same images transmitted via video teleconferencing on a monitor.²⁷

Orthodontics

When referring underprivileged children to an orthodontist is not practical, Berndt F et al. claim that interceptive orthodontic treatments performed by well trained general dentists under the supervision of orthodontic specialists via teledentistry are a viable alternative.²⁸ According to a study by Stephens CD and Cook J, the majority of UK orthodontic consultants are in favour of adopting teledentistry to increase the accessibility of their counsel to patients and dentists.29 According to a survey conducted by Mandall NA et al., general dentists largely endorsed the use of teledentistry to screen new patient orthodontic referrals.30

Prosthodontics

Ignatius E. et al. looked at the use of videoconferencing for diagnosis and treatment planning for patients needing prosthetic or oral rehabilitation treatment and found that it could expand the availability of dental expert services in sparsely populated areas.³¹

Paediatric Dentistry

Teledentistry for dental caries screening in young children is just as effective as visual/tactile exams, according to research by Kopycka-Kedzierawski DT and Billings RJ.³² Teledentistry, according to Kopycka-Kedzierawski DT et al., may be an effective way to check high-risk preschoolers for early childhood caries. A teledentistry initiative started in Rochester, New York's inner cities and child care facilities was successfully shown.33 According to Amavel R et al., non-invasive pictures used for remote diagnosis of children's dental issues are a reliable source.³⁴ In order to screen for caries, particularly early childhood caries, in preschoolers enrolled in daycare centres, Kopycka-Kedzierawski DT et al. showed that the intraoral camera is a practical and potentially costeffective substitute for a visual oral examination.³⁵

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FUTURE OF TELEDENTISTRY

The field of teledentistry is not a recent one. In actuality, it is a different way to provide the same dental treatments. It is impossible to overstate the value of teledentistry in far-off, isolated regions. Its application is crucial and highly valuable in rural and urban regions without access to specialised consultation. The usefulness and popularity of teledentistry, a new component of overall patient care, are rising quickly.¹¹ Patients of a primary care physician who makes use of the considerable experience made available by teleconsultation will benefit much from it.5 Information sharing will improve patient care, and being able to consult with colleagues more effectively will result in a better knowledge of the goals of treatment and better treatment outcomes.36 Family dentists can act as gatekeepers for specialist services, coordinating the dental care offered by other dental specialties, therefore effective use of teledentistry will lead to the successful development of family dentistry in the future.¹⁹

With all the technological developments taking place in the field of teledentistry, practitioners may eventually link up to virtual dental health clinics and an entirely new era of dentistry can be created. The future might also see distant telemedical control of robotized instruments in situations with long-term unavailability of dental care, e.g., during space flights, on transoceanic ships, and in various rural areas. The results achieved so far are very encouraging, setting the road signs for future investigations. However, a number of things have to be addressed before teledentistry can rise to its peak. Further studies involving greater number of participants will be required to validate the various aspects of teledental applications.

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