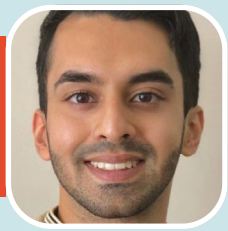
EBD spotlight:

Can teledentistry be used to accurately diagnose dental caries?



Manas Dave[1] reflects on topics discussed in our sister journal *Evidence-Based Dentistry*.

Telediagnosis of dental caries: Possible or impossible? A pilot cross-sectional study was published in the *Journal of Clinical and Experimental Dental Research* in 2022.[1] A commentary on the paper was published in *Evidence-Based Dentistry* in December 2022.[2]

The term telemedicine was first used in the 1970s and was used to describe 'healing at a distance'.[3] The idea of using digital technology to aid in remote patient care (including consultation, diagnosis and treatment) was accelerated during the COVID-19 pandemic.[4] Telemedicine has numerous advantages including improved patient access, early diagnosis and referral and cost-effectiveness. Telemedicine is also used in diagnostic specialties such as radiology and pathology through digital scanning, remote working and integration of artificial intelligence. The latter has allowed training of computer models to screen pathology slides, X-rays or even skin images to stage risk, inform referral pathways and supplement clinical knowledge. Therefore, it is important to determine the ability of telemedicine to integrate into dentistry (teledentistry).

The aim of this study was to evaluate the feasibility of remote diagnosis of dental caries using intraoral photographs taken at home and to evaluate the accuracy of telediagnosis of dental caries compared to routine clinical diagnosis.

Methods

All participants were dental students at the University of Verona, Italy. This cross-sectional study required owners of a smartphone, a parent/relative/friend to take intraoral photographs, mouth opening of 35 mm and access to email. Participants suffering from systemic illness, eating disorders, taking medications or therapies and those on a vegan diet were excluded. The photographs used for remote diagnosis had the following requirements: 8 Mpx smartphone camera with built-in flash, sufficient ambient lighting to capture all tooth surfaces without a flash, the positioning of the participant so both dental arches could be photographed individually with suitable focus, the photographs to be taken by a non-professional photographer and without disruption of the soft tissues. Volunteers were given leaflets with a photography protocol. Each volunteer was asked to take ten photographs as instructed. The photographs were sent to a member of the research team that assigned them an alphanumeric code.

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The same volunteers had a chairside dental examination and same parameters were recorded in both situations. These included the presence/absence of carious lesions, ICAS II scores and age and gender of the patient.

Results

Forty-three patients (22–38 years) with a total of 1,201 teeth were included in this study.

Four hundred and thirty photographs were submitted. The sensitivity was 74.0 (ability to detect caries) and specificity 99.1 (ability to detect healthy teeth) suggesting teledentistry is a highly specific method for identifying healthy tooth surfaces.

There were no differences between photographs taken with or without flash.

The positive predictive value of teledentistry was 91.7 and negative predictive value was 96.4.

Spearman's correlation showed a gradual underestimation of the ICDAS values from scores 2–4 suggesting teledentistry is more effective in detecting initial enamel lesions than advanced lesions.

Conclusions

The authors concluded:

There is a '…good potential of telediagnosis of caries which could be applicable on a large scale in the daily practice of preventive dentistry…'.

Comments

As the participants were dental students, they would have understood the protocol to photograph the arches correctly; however, patients without this knowledge may not be able to capture every tooth and the correct surfaces on the photograph. One clinician reviewed the submitted photographs and one clinician assessed the patients however there was no mention of calibration. Additional clinical information including previous records and radiographs were not mentioned. The main findings showed that teledentistry had high specificity in identifying healthy surfaces but the sensitivity to identify carious surfaces was much lower. More research is needed in this field before it can be considered in clinical practice.

Author information

[1]Dr Manas Dave qualified from the University of Manchester with degrees in pathology and dentistry. He undertook postgraduate training in Newcastle and Middlesbrough before returning to Manchester where he is an NIHR Academic Clinical Fellow in Oral and Maxillofacial Pathology and Honorary Lecturer in Dentistry. Manas has achieved postgraduate qualifications in Medical Education, Dental Public Health and Pathology Informatics. He has published extensively across numerous journals including the *BMJ*, *Lancet* and *BDJ*, has extensive teaching experience of both undergraduate and postgraduate students and is a recipient of numerous personal and research awards.

References

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https://doi.org/10.1038/s41407-023-1781-x