Other journals in brief

A selection of abstracts of clinically relevant papers from other journals.
The abstracts on this page have been chosen and edited by **Paul Hellyer.**

AI in radiographic caries detection

Estai M, Tennant M, Gebauer D *et al*. Evaluation of a deep learning system for automatic detection of proximal surface dental caries on bitewing radiographs. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2022; DOI: 10.1016/j.oooo.2022.03.008.

Larger studies needed.

Artificial intelligence (AI) is defined as 'the science and engineering of making intelligent machines' which can solve problems. Machine learning is a subcategory of AI and deep learning models are based on convolutional neural networks (CNNs) which allow computers to learn by observing patterns in data (for review see doi.org/10.1016/j.dent.2022.104115).

Research shows that even experienced dentists are not consistent at diagnosing proximal caries on radiographs. If early lesions are missed, the opportunities for instigating minimally invasive dentistry are also missed.

In this study 2,468 bitewing radiographs were assessed by 3 dentists for the presence or absence of proximal caries. This dataset was then used to train the CNNs. Using a two-step process – one CNN to identify areas prone to caries as regions of interest (ROI) and another to identify caries within the ROI – the system demonstrated promising results and a greater accuracy than previous studies. Further studies with larger datasets are needed before such systems can be used as independent diagnostic tools.

https://doi.org/10.1038/s41415-022-4274-y

AI in oral cancer diagnosis

Yoshizawa K, Ando H, Kimura Y *et al*. Automatic discrimination of Yamamoto-Kohama classification by machine learning approach for invasive pattern of oral squamous cell carcinoma using digital microscopic images: a retrospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2022; **133:** 441–452.

Possible greater consistency.

Oral squamous cell carcinoma (OSCC) is invasive, leading to metastases and poor survival prognosis. The Yamamoto-Kohama (YK) classification differentiates the histopathological appearance of OSCC into grades 1 to 4D, the higher grades being the most invasive.

Here, historic (1989 to 2009) stained specimens of OSCC (n = 101) were graded according to the YK system. Using a two-stage machine learning approach – identifying a region of interest (the invasive front of the lesion) and evaluating the mode of invasion – results showed no significant differences in classification accuracy between clinician and machine (except for YK grade 2 cases, the reasons for which discrepancies are discussed).

It is known that visual examination of specimens leads to significant differences in determinations between examiners and the use of AI may introduce greater consistency. AI may also be useful in countries where there are few pathologists. However, where 'decision making and prediction' are left to the machine, caution is needed.

https://doi.org/10.1038/s41415-022-4275-x

Can artificial intelligence replace humans?

Kempt H, Nagel S K. Responsibility, second opinions and peer disagreement: ethical and epistemological challenges of using AI in clinical diagnostic contexts. *J Med Ethics* 2022; **48:** 222–229.

A rule for the use of AI is proposed.

Dentistry can be a lonely business. One only has to wait a short time on an online dental forum for a dentist to post radiographs and/or photographs, seeking a second opinion (and usually receiving multiple differing opinions!) Cooperation between colleagues and seeking second opinions have been at the core of health care practice for decades and rightly so. What then are the ethical considerations of using artificial intelligence decision support systems (AI-DSS) to provide that second opinion?

AI, whilst not yet perfect, is rapidly achieving a diagnostic accuracy which may eventually surpass that of human medical experts. When that happens, if the input of AI is rejected then there is an acceptance that worse diagnostic outcomes are acceptable. The medical professional in charge of the patient's care should, however, always have the ultimate legal responsibility for the diagnosis and treatment. If a second opinion is needed in cases of doubt, then a peer colleague of equal standing can be asked for a second opinion. A reasoned discussion backed up by explanation can then be had, based on skills to assess evidence and form conclusions. Disagreements can be resolved by noting reasons for disagreement. In cases of unresolved difference, 'the epistemic justification of why the final diagnosis and the second opinion differ' and 'why one of them should be favoured' can be recorded.

What are the consequences if the second opinion is based on AI-DSS and does not confirm the initial diagnosis? An exchange of views is not possible, yet the 'opinion' cannot be ignored. The dataset on which AI-DSS works cannot be discussed nor tweaked by the lead physician until a 'sensible' result is obtained, since this risks leading to a self-confirming bias in the diagnosis. The physician-physician relationship is thus ethically different from the physician-machine relationship.

A rule of disagreement is proposed that states that if AI-DSS contradicts the initial diagnosis, this will be counted as disagreement and the second opinion of another physician will be required. When AI-DSS confirms the initial diagnosis, patient confidence may be increased and there may be a saving of resource, in that a second human opinion is not needed.

The dangers of over-reliance on, and misuse of, the technology of AI-DSS are discussed. The importance of a human being taking full responsibility for diagnosis and treatment is stressed. (The reliability of second opinions generated on social media remain outside of the scope of this paper.)

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