



Medicine for Managers

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AI comes to Dentistry

The ramifications of artificial intelligence in healthcare will be considerable. Quality of diagnosis will improve but its use will require radical rethinking and there will be the challenge of managing what clinicians will see as a threat to their autonomy and even to their existence. I recently had the opportunity to look through a window onto the future with AI and dentistry, and it is already here. I was invited to a demonstration of its use in detection of dental disease, and it is fascinating.

The pre-eminent Company which developed the system and which provided the demonstration is **Overjet AI** (other companies are also developing similar facilities). Developed in the United States, it has created a system, approved by the Food and Drug Administration (FDA), the US federal agency responsible for protecting public health by ensuring safety, efficacy and security of products.

The FDA has cleared the system to identify oral disease and to precisely outline and measure its extent. It also supports effective treatment planning and assists patients in better understanding their oral health.

So, what does this mean for dentists and for patients?

For dentists, the system improves the detection of dental disease. It is an alarming statistic that research has shown that dentists may under-diagnose dental decay by up to 40% and

periodontal (gum) disease by up to 67%.

Why should under-diagnosis be so great in a profession of which the *raison d'être* is specifically detection and management of disease?

The answer is multifactorial.

Time pressures generated by the NHS system result in dentists rushing examinations and standard radiographs may not fully recognise the decay or the bone loss status of the periodontium.

The use of the Overjet AI system can accurately detect pathology present on standard radiographs. It supports the dentist to diagnose with confidence and accuracy the disease resulting in cavities in the teeth and accurately shows where and how much bone loss exists around the teeth as a result of progression of gum damage and tissue loss.

- In powder blue, existing fillings
- In pale purple, the position of the pulp (nerve) chambers
- In orange the areas of decay identified by the AI system
- In yellow or red lines, the extent of bone loss in millimetres associated with the roots of each tooth

The AI system therefore provides for the dentist a clear display of any caries (decay) present in any of the teeth, including changes which may be difficult to visualise, together with the position of the pulp chambers and the existing fillings.

The location of supporting tissue damage and its exact extent is also clearly shown.

The radiographs below show another case (Figure 3) with the AI interpretation (Figure 4),



Figure 3

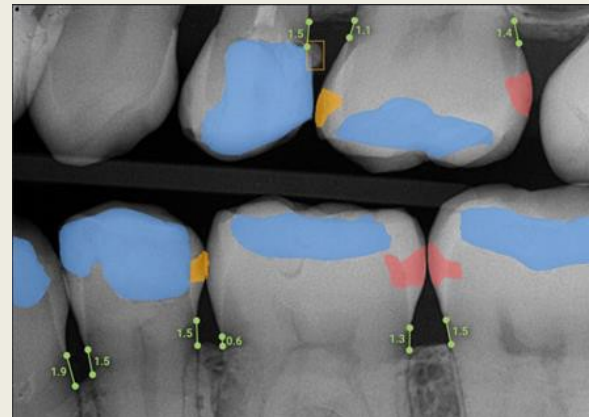


Figure 4

Existing fillings pale blue, decayed cavities marked in pale yellow or pale orange, calculus (tartar) in the yellow box associated with the upper premolar (top middle tooth) and the bone loss in millimetres marked by yellow lines.

So the system enables:

- More accurate diagnoses of hard tissue and soft tissue disease
- Much easier illustration of dental issues and treatment requirements to patients so that they can much more easily understand the status of their oral health
- Improved image clarity and, importantly for patient understanding, pathology displayed in full colour AI findings

This development is a huge step forward in harnessing the benefits of Artificial Intelligence with the skill of the Dental Surgeon to ensure

the highest standards of disease detection and diagnosis with reduced risk of complications by obtaining enhanced images which will give warning of possible pulpal or other complications in advance of embarking on the treatment.

This is only the beginning.

How long, I wonder before other types of radiograph and perhaps other investigations will be assessable in the same way to visualise root canal systems where infection will need to be removed, the presence of abscesses, cysts, or even malignancy and 3-D images to make the creation of restorations such as fillings or crowns much less complex.

Over the last two hundred years, dentistry has progressed stepwise with developments in decay identification, equipment, radiography, scanning and new techniques.

AI detection is set to be one of those leaps forward to improve care, the quality of assessment by the dentists and the ability of patients to more easily understand their management.

The future looks exciting.

I am most grateful to Dr Eddie Coyle for his expertise and the loan of the AI pictures.

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