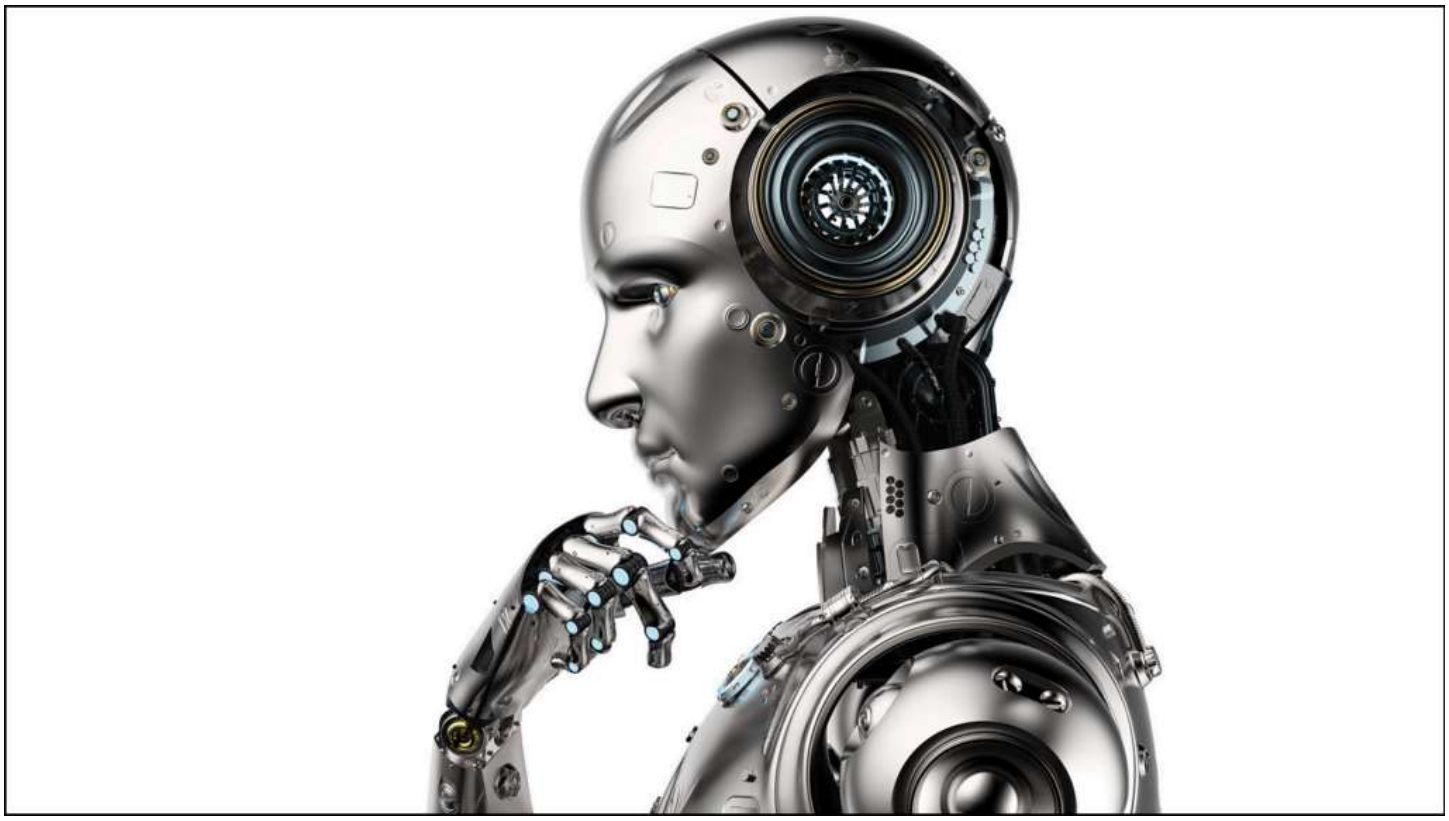
Beyond the “Rise of the Bots”

05/02/2024 by Naren Arulrajah, President and CEO of Ekwa Marketing



Latest guidelines, considerations, and applications for AI-powered dentistry

Since 2021, there has been a surge of information related to artificial intelligence and dental applications, both driven by and further spurring interest in these most intelligent of “machines.” And, while AI and machine learning have been popularized in the entertainment media as sci-fi scary (“the robots are taking over!”), there are potentially transformative implications for properly regulated platforms. These AI-powered platforms could dramatically improve patient care and fight some of the world’s most pressing labour-oriented challenges: workforce shortages and “burnout.” And, of course, these solutions and functions are just the tip of the iceberg.

Validating emerging technologies

In October 2021, California-based dental AI firm Pearl announced that Health Canada had cleared its Second Opinion® radiology solution. As noted in the announcement, approval of the assistive diagnostic tool indicated big strides in AI’s role in the Canadian dental “space.”

On the heels of this announcement, Health Canada and like organizations in the United States (the Food and Drug Administration) and the United Kingdom (the Healthcare

Products Regulatory Agency) issued their joint guidelines on AI- and machine learning-powered medical devices. These guidelines represent a “best practices” of sorts and may further bolster confidence and peace of mind among those clinician-entrepreneurs who have been cautiously sitting on the sidelines in terms of investing in the technologies at the heart of these guidelines. These best practices reflect, in part:

- The implementation of sound software engineering and security processes
- Appropriate selection of subjects in clinical studies (and data sets)
- The training and performance of the “human user”
- The solicitation and use of experts across multiple disciplines when developing a product (and across the product’s “lifecycle”)

Around the same time as these industry-defining developments, the Canadian Dental Association, in its Journal, took a deep dive into *“Current Clinical Trends and Research Advances.”* Similarly to how you empower your patients with information to make the best decisions about their health, it is important for your team to know what it is getting into as it relates to AI. The researchers behind the report (published in May 2021) provided just that, setting a firm foundation for our understanding of AI and its origins, applications and implications, and the abundance of opportunities and challenges.

As a branch of the computer sciences designed to understand and build intuitive systems to perform specific tasks, AI’s potential use in dental practices such as yours was isolated to five key branches or areas of dentistry:

Radiology (See above) – This is what the Pearl Second Opinion® system is tasked with; such intelligently designed solutions partly function to detect and ID anatomical structures, with precision rates that reportedly almost rival that of the “clinical experts.” The manufacturers behind these types of systems also tout how the “machines” can do the same repetitive tasks predictably and accurately without getting tired, bored, or distracted.

Orthodontic care – As noted by the report authors, intelligent products can minimize the number of extractions associated with long-range orthodontic treatment plans. The technologies may be accounted for when determining the actual need for tooth removal before the placement of orthodontia. In turn, a potentially unnecessary and irreversible procedure could be avoided while arriving at the best clinical outcomes and decision-making for the patient.

Periodontal treatments – A branch of machine learning and AI, deep learning algorithms (known as "Artificial Neural Networks") were reported to have a robust and favourable track record of recognizing Aggressive and Chronic Periodontitis. The authors surmise that such ANNs could be deployed to accurately distinguish between clinical types within simple and convenient parameters, for instance, via leukocyte counts.

Endodontic procedures – It was noted that AI has been successfully introduced to minimize the use of higher-dose CBCT radiation when pinpointing mandibular molars' morphological characteristics. In turn, AI-powered solutions may be applied to support better treatment outcomes (minimizing RCT and surgical endodontic failures) while containing radiation exposure.

Oral cancer therapy – Thus far, some of the algorithms leveraged by some neural networks were shown to have comparable specificity and accuracy of diagnoses to the human specialists who evaluated maxillary masses with "similar radiologic appearance" and "different clinical properties." Strikingly, the authors spotlighted how the "machine diagnosis" was derived in 38 seconds, while the specialists averaged around 23 minutes to reach similar conclusions. The researchers indicated that any accurate and early precancer/cancer detection methods are helpful due to the substantial improvement in prognoses associated with such findings.

The scrutinized technologies were not without their challenges, which furthermore present challenges to practice clinicians and managers as they wade through the emergence and evolution of dynamic systems. For one, researchers expressed concern over the management and sharing of clinical and personal patient data and what they deemed "ambiguous accountability in the use of AI systems." It remains to be seen how relatively recently announced guidelines will shake out over the long term as it relates to resolving these and other algorithm and data transparency issues.

The government's "responsible use of artificial intelligence" statement furthermore outlined five caveats and considerations, which apply to our practices as well as our friends in other healthcare sectors. These include:

Measure, measure, measure. You can have a positive, transformative effect on not only your practice but the industry as a whole by tracking the impact and results of AI-powered systems.

Transparency. Yes, this is a government and industry-wide issue; however, we can all do our part by ensuring that our communities (teams, patients, friends and family) are aware of how AI is being used. This approach should demonstrate and communicate "clear user needs" and general public benefits.

Ensure no stone is left unturned (when it comes to AI decision-making). It is essential to establish the real, meaningful reasoning behind the investments that you are making in software and tools and training on said tools. There should also be room and psychological safety within your organization to review results regularly and for others to challenge, question, and provide helpful feedback on decisions made on this front.

In summary ...

We leave you on a high note; besides the applications mentioned throughout this article, we see considerable traction in further bolstering relationships between patients and dental teams.

After all, much of what AI-assisted services accomplish is minimizing or eliminating human limitations, such as the risk of human error when doing everything from scheduling dental appointments and performing rote tasks to fatigue when looking at a never-ending series of images of hard-to-see areas.

Since AI is not simply based on a "hunch" but rather millions of data points, you furthermore have sound information at your fingertips when developing plans that support effective treatments. Such analyses can also be communicated to patients, which helps them feel more confident in their treatment decisions. So, the possibilities for AI in both the "back-office" or "soft skills" area of your practice and the clinical and technical areas are seemingly limitless.

The pace of change in dental and health care technologies can be dizzying, and calls for a little breathing room – stepping back and applying careful consideration to the latest, proven shiny object while not getting so wrapped up and overwhelmed with the new and evolving that you suffer from decision-making paralysis, which ultimately puts you behind the competition and behind in terms of progress in general.

About the Author

Naren Arulrajah, is the President and CEO of Ekwa Marketing. He has been a leader in medical marketing for 20 years and provides curated digital marketing solutions for dentists through Ekwa. He is happy to provide a free consultation session to Oral Health readers and has created a free downloadable workbook especially for dentists to assess their marketing needs in today's digital age. Feel free to call 855-598-3320 to book a free session with Naren or visit the Oral Health Website for the workbook download.