

GUIDANCE: Artificial Intelligence in Dentistry

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Introduction

Like many other areas of healthcare, dentists have access to new artificial intelligence (AI) technologies that can significantly impact professional practice and patient care; however, there is not yet a clear body of research or established best practices to inform ethical and professional conduct.

Due to the rapidly evolving nature of this issue, the College has created this guidance to support registrants who are using and exploring AI-supported tools and technologies for professional purposes. This document will also support patients and the public in understanding what to expect from their dentists as AI becomes more commonplace in clinical practices.

This document does not set out new professional requirements, but instead highlights existing responsibilities that may be relevant to the use of AI in dentistry. It also provides guidance to help registrants exercise their professional judgment and make decisions in the best interests of patients when using AI for professional purposes.

Definition

Artificial intelligence (AI) generally refers to computer systems that can perform tasks commonly associated with human intelligence, such as finding patterns in data, problem solving, learning, and making predictions, recommendations, and decisions.¹

In dentistry, AI can be used for various purposes, including helping dentists with managing their practices, creating patient charts and documentation, diagnosing and detecting conditions and diseases, developing treatment plans, outcome prediction, patient monitoring, and patient education.

¹ There are different types and subsets of AI, including machine learning, generative AI, and large language models. For definitions of related terms, visit the University of Saskatchewan's [Glossary of AI Related Terms](#).

42 Principles

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44 The following principles form the foundation for the guidance set out in this document:

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- 46 1. The responsible and ethical use of AI in dentistry is guided by what is in the best interests of
- 47 patients.
- 48 2. The responsible and ethical use of AI involves implementation of AI in a manner that is safe,
- 49 transparent, unbiased, non-discriminatory, and safeguards patient privacy and confidentiality.
- 50 3. AI in dentistry has the potential to benefit dentists and patients by improving the delivery of safe
- 51 and quality oral health care, improving patient outcomes, and enhancing the patient experience.
- 52 4. AI is not a substitute for dentists' clinical or professional judgment. Dentists remain responsible and
- 53 accountable for their clinical care, decision-making, and documentation.
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55 Existing Professional Requirements

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57 Dentists are reminded that adopting AI for professional purposes does not change their fundamental

58 duties and responsibilities which can be found in existing Standards of Practice, Code of Ethics, and law.

59 These include, but are not limited to:

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- 61 • ethical principles in the College's [Code of Ethics](#), including the principle that the dentist's
- 62 paramount responsibility is to the health and well-being of their patients;
- 63 • professional requirements articulated in the College's [Standards of Practice, Guidelines, and](#)
- 64 [Practice Advisories](#), including, but not limited to those relating to consent to treatment, conflicts
- 65 of interest, professional advertising, and recordkeeping;
- 66 • legal and regulatory requirements,² including those under the [Professional Misconduct](#)
- 67 [regulation](#) under the [Dentistry Act, 1991](#); Ontario's [Personal Health Information Protection Act,](#)
- 68 [2004 \(PHIPA\)](#) with respect to consent for the use, collection, and disclosure of personal health
- 69 information;³ and Ontario's [Accessibility for Ontarians with Disabilities Act, 2005](#).
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71 Guidance for the Adoption and Use of AI in Dentistry

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73 This guidance is grounded in existing professional and ethical duties and is intended to assist dentists in

74 interpreting how these can be applied when using AI in practice. The following guidance should be

75 considered carefully by dentists who are exploring or adopting AI in their practices.

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77 Risk-Based Approach

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79 AI tools can assist dentists in a range of administrative, operational, and clinical applications; however,

80 risks may vary based on the nature of the AI tool. Generally, where the potential risk is greater, dentists

81 will need to exercise greater caution and oversight.

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² Additional federal and provincial legislation related to the regulation of AI, such as Canada's [Artificial Intelligence and Data Act](#), may be in development at the time of publication of this guidance.

³ Dentists must be aware of whether they have obligations under the federal [Personal Information Protection and Electronic Documents Act](#), SC 2000, c 5, which applies to commercial activities relating to the exchange of personal health information between provinces and territories and to information transfers outside of Canada.

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Risk increases when an AI tool

- directly impacts clinical decision-making (e.g., to help formulate a diagnosis or treatment plan for a patient);
- poses a risk of harm to patient health and/or safety (e.g., to inform the diagnosis and treatment of an oral disease or condition);
- involves the use of patient’s personal health information.

1. Accountability and Responsibility

Assessing the Appropriateness of AI

Dentists have a responsibility for the health and well-being of patients and to provide competent care to patients.⁴ This responsibility applies when providing care with the support of AI technology. The following guidance can help dentists fulfill their obligations while assessing the appropriateness of using AI within their practice:

1. Prioritize patients’ best interests when making decisions to adopt and use AI in dentistry.
2. Understand the reliability and appropriateness of the AI tool for its intended uses. When there is insufficient information to form a clear understanding, avoid the use of the AI tool.

Understanding AI Tools

Transparency from manufacturers and developers can help dentists make informed decisions about whether to use AI for professional purposes. Prior to adopting a particular AI product, dentists may wish to seek information from the manufacturer and developer, including the following details, if applicable:

- legal and regulatory compliance, including with applicable privacy legislation (e.g., *PHIPA*);
- clinical validity, safety, accuracy, and effectiveness of the AI tool;
- data used to train the AI tool (e.g., data diversity, timeframes, size) and any limitations (e.g., underrepresented patient demographics, such as race, ethnicity, age, gender, or socioeconomic status);
- how end users (e.g., health care practitioners) and impacted populations may have been involved in the design, development, and testing of the AI tool;
- intended uses, known limitations, associated risks, and steps taken to mitigate risks, including risk of bias;
- performance monitoring, updates, and handling of errors and/or adverse events.

Dentists are also encouraged to research and seek information from other sources about the AI tool they are considering using.

3. Understand and evaluate the risks (including the nature of the risk, severity, and likelihood) and limitations associated with the AI tool being considered, including, for example, the potential for inaccuracies, errors, and biased outputs.
4. Take steps to prevent and mitigate the potential risks associated with the AI tool.

⁴ Royal College of Dental Surgeons of Ontario, [Code of Ethics](#).

- 127 5. Train staff who will be involved in using any AI tools on their appropriate uses, limitations, risks, and
128 steps to mitigate risks.

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130 *Using AI*

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132 It is important for dentists to be aware that AI can produce outputs which contain inaccuracies, errors,
133 and misleading information, or which may be incomplete and/or outdated (for instance, when
134 generating documentation or making diagnostic recommendations). AI may also unintentionally
135 perpetuate biases, which can be found in training data that is not representative of the patient
136 population being served, or from biases in the way the tool was developed and designed.

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138 Dentists play a critical role by actively overseeing the use of AI and exercising their clinical judgment to
139 prevent adverse impacts on patients. The following guidance can help dentists using AI provide care that
140 mitigates risks and is appropriate to the patient and their circumstances:

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- 142 6. Undertake relevant and ongoing training and education, as needed, in order to use AI and specific AI
143 tools safely and appropriately.
- 144 7. Critically review and evaluate all AI-generated outputs for accuracy, completeness, and biases
145 and/or stereotypical associations.
- 146 8. Ensure that decisions made and implemented with the support of AI take into consideration the
147 patient's unique characteristics, circumstances, and clinical presentation.
- 148 9. Maintain an audit system which allows AI-generated outputs and AI-supported decision-making to
149 be tracked and AI performance to be monitored.
- 150 10. Review and evaluate AI-generated gaps, errors, and adverse events to identify contributing factors,
151 implement improvements, and take appropriate corrective actions (e.g., report problems to the
152 manufacturer and developer of the AI tool, report privacy breaches to the [Information and Privacy
153 Commissioner](#), ensure the tool is up-to-date, discontinue use of the AI tool).

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155 2. Transparency and Disclosure

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157 Being transparent with patients about the use of AI supports informed decision-making, patient
158 autonomy, and patient trust. Especially as the use of AI in dentistry is new and evolving, being
159 transparent and involving patients in decision-making can help build patient trust. The following
160 guidance can help dentists be transparent about their use of AI in their practice:

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- 162 11. Inform individuals when they are interacting with AI rather than with a human (e.g., the use of a
163 virtual assistant chatbot that simulates human conversation).
- 164 12. Prior to its use, inform patients when AI will be used in a manner that will directly impact their care
165 or clinical decision-making (e.g., what AI is being used, for what purposes, its benefits and
166 limitations). The level of information provided may be tailored based on how and when AI is being
167 used, as well as the patient's technological literacy. Document these discussions.
- 168 13. Provide reasonable accommodation, when possible, to patients who express a desire for no or
169 minimal involvement of AI in their care.

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171 3. Protecting Patient Health Information

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173 In keeping with dentists' obligation to safeguard patient privacy and confidentiality and to comply with
174 *PHIPA*,⁵ the following guidance can help dentists meet these obligations while using AI:

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176 14. Understand the privacy and security settings and measures of the AI tool being used and be satisfied
177 that any patient data involved is securely stored.

178 15. Do not permit AI-generated outputs containing patient health information to be used for other
179 purposes (e.g., training the AI tool, sharing with third parties), unless patients have provided express
180 and knowledgeable consent to the specific use of their health information for that purpose.⁶

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182 Additional Resources

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184 As the use of AI is more widely adopted in dentistry, it is important for registrants to seek continuing
185 learning and educational opportunities on the responsible and ethical use of AI. Registrants may find the
186 following resources helpful for understanding the various uses of AI in healthcare, learning the principles
187 around the responsible and ethical use of AI, and evaluating and assessing AI tools.

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189 General Information and Resources

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191 • **American Dental Association**, [SCDI White Paper No. 1106: Dentistry – Overview of Artificial and](#)

192 [Augmented Intelligence Uses in Dentistry](#)

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194 • **Canadian Centre for Cyber Security**, [Cyber security guidance](#)

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196 • **Centre for Effective Practice**, [Artificial Intelligence \(AI\) Learning Centre](#)

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198 • **National Institute of Standards and Technology**, [AI Risk Management Framework](#)

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200 • [Statistics Canada](#)

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202 General Principles

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204 • **Government of Canada**, [Responsible use of artificial intelligence in government](#)

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206 • **Government of Ontario**, [Principles for Ethical use of AI](#)

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208 • **Health Canada**, [Good Machine Learning Practice for Medical Device Development: Guiding](#)

209 [Principles](#)

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211 • **Health Canada**, [Transparency for machine learning-enabled medical devices: Guiding principles](#)

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213 • **World Health Organization**, [Harnessing Artificial Intelligence for Health](#)

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215 Guidance: Evaluating and Procuring AI

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217 • **Accessibility Standards Canada**, [Accessible and Equitable Artificial Intelligence Systems](#)

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219 • **Government of Canada**, [Algorithmic Impact Assessment tool](#)

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221 • **NHSX**, [A buyer's guide to AI in health and care](#)

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⁵ The Office of the Privacy Commissioner of Canada's [Principles for responsible, trustworthy and privacy-protective generative AI technologies](#) includes considerations for organizations using generative AI and who are obligated to comply with privacy law.

⁶ Section 18 of the [Personal Health Information Protection Act, 2004](#), S.O. 2004, c. 3, Sched. A.

208 **Guidance: Using Generative AI**

- 209 • **Canadian Medical Protective Association**, [AI Scribes: Answers to frequently asked questions](#)
- 210 • **Government of Canada**, [Guide on the use of generative artificial intelligence](#)
- 211 • **Office of the Privacy Commissioner of Canada**, [Principles for responsible, trustworthy and privacy-](#)
- 212 [protective generative AI technologies](#)

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