

Artificial Intelligence in Dentistry

The Royal College of Dental Surgeons of Ontario (the “College”) is exploring the use of artificial intelligence (AI) in the field of dentistry and is interested in learning about dentists’, patients’, and others’ views on the use of AI in dentistry.

Your participation and feedback are valuable to us and will help inform the development of a College document setting out relevant guidance for dentists using AI.

- **The survey should take approximately 10-15 minutes to complete.**
- **Survey responses will be saved and submitted when you click the ‘Next’ or ‘Done’ button on each page of the survey. You may complete a portion of the survey and return later to either finish the survey or edit your responses, however, you must use the same device and web browser that you used to start the survey.**
- **The deadline to provide feedback is July 14, 2024.**

All survey responses will be reviewed, and a summary of the results will be provided to RCDSO’s Council after the consultation closes.

The identity of all individual respondents will be kept strictly confidential, and your feedback is anonymous. Responses submitted from individuals on behalf of organizations will be attributed to the organization and not the individual respondent.

If you are representing an organization, you may prefer to send us an [email](#).

If you have any questions about this survey or the Standards review and development process, please email RCDSO’s Policy Team [here](#).

Introduction

“Artificial intelligence” generally refers to the performance by computer programs of tasks that are commonly associated with intelligent beings.* For example, these tasks can include learning, reasoning, problem-solving, decision-making, speech recognition, and visual perception.

In the field of dentistry, AI can have many uses. These can include, but are not limited to:

- **Acting as virtual assistants or chat bots (i.e., AI that mimics human conversation) to schedule appointments and provide general information to patients**
- **Analyzing x-rays and other imaging to assist in detecting and diagnosing conditions and diseases, such as cavities or gum disease**
- **Developing personalized treatment plans and predicting treatment outcomes for patients**
- **Transcribing conversations and assisting with generating chart notes for patient records**
- **Assisting with remote disease monitoring for patients at home**
- **Creating custom education materials for patients**

***As defined in Ethics and Governance of Artificial Intelligence for Health: WHO Guidance (2021)**

* 1. How would you rate your knowledge of AI generally?

- Not at all knowledgeable
- Slightly knowledgeable
- Moderately knowledgeable
- Very knowledgeable
- Extremely knowledgeable
- I prefer not to answer

* 2. How would you rate your knowledge of AI in dentistry?

- Not at all knowledgeable
- Slightly knowledgeable
- Moderately knowledgeable
- Very knowledgeable
- Extremely knowledgeable
- I prefer not to answer

3. **Optional:** Please feel free to elaborate on your answers above. For example, if you are knowledgeable about using AI, how did you gain this knowledge (e.g., using AI, attending seminars, reading research)? Are you knowledgeable about specific uses of AI (e.g., chat bots, diagnostic tools)?

Respondent type

We have tailored some of the survey questions for different participants. We would like to better understand who you are and direct you to the appropriate questions.

* 4. Are you a:

- General dentist (including retired)
- Specialist dentist (including retired)
- Dental student
- Member of the public
- Other oral health care professional (e.g., dental hygienist, denturist, dental technician, including retired)
- Other non-oral health care professional (e.g., nurse, doctor, pharmacist, etc., including retired)
- Person responding on behalf of another type of organization (please specify the organization)

- I prefer not to answer

Questions for Organizations - Location

5. Where is your organization located?

- Ontario
- Another province or territory in Canada
- Outside of Canada (please specify)

- I prefer not to answer

6. Which of the following categories describes the general area(s) where you live, or where your organization is located? Please select all that apply:

- Extra-large urban area (population of 500,000 or more)
- Large urban area (population between 100,000 and 499,999)
- Medium urban area (population between 30,000 and 99,999)
- Small urban area (population between 1,000 and 29,999)
- Rural and/or remote (population less than 1,000)
- Other (please specify)

- I prefer not to answer

Questions for Specialists - Specialist Type

Your answers to the next several questions tell us more about you and your practice, and will help inform our analysis of your feedback.

* 7. What is your primary specialty?

- Dental Anesthesiology
- Dental Public Health
- Endodontology
- Oral and Maxillofacial Radiology
- Oral and Maxillofacial Surgery
- Oral Medicine and Pathology
- Orthodontics and Orthopedics
- Pediatrics
- Periodontics
- Prosthodontics
- Other (please specify)

* 8. If applicable, where did you complete your specialty education and training?

- Canada
- United States of America
- Another country (please specify)

- I prefer not to answer

Questions for Dentists - General Demographics

Your answers to the next several questions tell us more about you and your practice, and will help inform our analysis of your feedback.

* 9. Where did you complete your dental education?

- Canada
- United States of America
- Another country (please specify)

- I prefer not to answer

* 10. How many years have you been in practice?

- 0-10 years
- 11-25 years
- 26+ years
- I prefer not to answer

* 11. What is your primary practice environment? Please select all that apply:

- Solo Private Dental Clinic - 1 location with 1 dentist
- Group Private Dental Clinic - 1 or more locations with more than 1 dentist
- Corporate Dental Clinic (practice with some degree of third-party ownership and/or business support)
- Not-for-profit Dental Clinic (e.g., public health, community health centre, hospital, school, community-based)
- Non-clinical setting (e.g., education, research, legal)
- Other (please specify)

- I prefer not to answer

* 12. We would like to know more about your role(s) in your practice. Which of the following best describes your primary role(s)? Please select all that apply:

- Owner/Principal
- Associate Dentist/Independent Contractor
- Employee
- Clinic/Practice Manager (either formally or informally)
- Other (please specify)

* 13. Do you provide clinical care?

- Yes
- No
- I prefer not to answer

* 14. Which of these describes the general area(s) where you practice? Please select all that apply:

- Extra-large urban area (population of 500,000 or more)
- Large urban area (population of 100,000 or more)
- Medium urban area (population between 30,000 and 99,000)
- Small urban area (population between 1,000 and 29,999)
- Rural and/or Remote (population less than 1,000)
- Other (please specify)

- I prefer not to answer

Questions for Dentists, Other Health Care Professionals, and Organizations

To inform the development of relevant and useful guidance for the profession, the College is interested in knowing how dentists in Ontario may currently be using AI in their practices and whether and how they may intend to in the future.

15. Are you currently using AI in your practice?*

- Yes
- No
- Not applicable/I prefer not to answer

* 16. In what way(s) are you using AI in your practice? Check all that apply.

- Administrative and/or operational (e.g., scheduling patients, answering patient questions)
- Assisting with detecting and diagnosing conditions and diseases
- Treatment planning and outcome prediction (e.g., imaging analysis)
- Record-keeping (e.g., AI scribes)
- Other (please specify)

- I prefer not to answer

17. **Optional:** If you are using any specific tools or technologies, please indicate their name(s).

18. **Optional:** Did you receive supports, resources, and/or training to implement the AI technology? If so, please describe them.

19. **Optional:** How did you decide to implement this AI technology in your practice? Check all that apply.

- I heard of it through other clinician(s) using the AI technology
- I was approached by a vendor of the AI technology
- I personally sought out AI technology
- Someone else made this decision
- Other (please specify)

* 20. Are patients aware that AI is used in your practice?

- Yes
- No
- I don't know/I prefer not to answer

21. **Optional:** How do patients know that AI is being used in your practice?

* 22. How likely do you think you are to adopt AI technologies in your dental practice in the next five years?

- Not at all likely
- Not very likely
- Somewhat likely
- Very likely
- Definitely
- Not applicable/I prefer not to answer

23. **Optional:** Please feel free to elaborate on your answer above. For example, why or why not? If likely, what specific ways do you anticipate using AI in your practice?

24. **Optional:** What benefits do you think AI will have in dentistry?

25. **Optional:** What risks do you see or concerns do you have about AI in dentistry?

26. **Optional:** How do you think dentists can manage or mitigate the risks of AI that you have identified?

27. **Optional:** If you were seeking guidance around using AI in dentistry, where would you look? Check all that apply.

- Royal College of Dental Surgeons of Ontario
- Ontario Dental Association
- Canadian Dental Protective Association
- Information and Privacy Commissioner of Ontario and/or Office of the Privacy Commissioner of Canada
- Government and/or governmental agencies (*please specify below*)
- Academic institutions (*please specify below*)
- Newspaper, magazine, and/or journal publications (*please specify below*)
- Seminars, lectures, and/or conferences
- Other (please specify any other resources or specific names of agencies/institutions/publications)

28. **Optional:** If you have sought out information related to using AI, what kind of information or guidance were you looking for or did you find helpful?

Questions for the General Public/Patients

To inform the development of relevant and useful guidance for the profession, the College is interested in knowing the public and patients' views on the use of AI in dentistry.

* 29. Is your dentist using AI in their dental practice?

Yes

No

I don't know/Not applicable

* 30. How is your dentist using AI in their practice? Check all that apply.

- Administrative and operational (e.g., scheduling patients, answering patient questions)
- Assisting with detecting and diagnosing conditions and diseases (e.g., imaging analysis)
- Treatment planning and outcome prediction
- Record-keeping (e.g., AI scribes)
- Other (please specify)

- I don't know/I prefer not to answer

31. **Optional:** How do you know that your dentist is using AI in their practice? Check all that apply.

- My dentist told me that AI was being used
- Staff told me that AI was being used
- I asked the dentist/staff whether AI was being used
- I read a notice that AI was being used
- Other (please specify)

32. **Optional:** What reaction did you have to learning that your dentist is using AI?

36. **Optional:** Please feel free to elaborate on your answers above. For example, if you feel uncomfortable with your dentist using AI in a particular way, what specifically makes you uncomfortable?

AI can enhance patient care, for instance, by allowing dentists to use their time more efficiently and improve treatment planning for patients. However, AI also raises issues that may create legal, ethical, and professional considerations for dentists. These issues include, but are not limited to, the following:

- **Privacy and security:** AI often relies on large amounts of data to be trained and to make decisions, raising concerns about how to obtain patient consent, protect patient privacy, and protect data from misuse.
- **Fairness and non-discrimination:** Data used to train AI may be incomplete (e.g., exclude certain groups of people), which can risk replicating bias or worsening existing inequalities when AI is used.
- **Transparency and explainability:** A lack of transparency and explainability can make it challenging to understand how and why AI reaches certain outcomes, which can lead to a lack of public trust in AI decisions.
- **Accountability and responsibility:** If an error or harm occurs when AI is used, determining who is responsible can be complicated. AI developers, health care institutions, health care providers, and government may all have played a role in the implementation of the AI.

* 37. Given the rapidly evolving landscape of AI, the College is considering developing guidance for dentists who use AI in their practices.

In your opinion, to what degree is it important for the College to set guidance around the following key topics related to AI in dentistry?

	Not at all important	Slightly important	Moderately important	Very important	Extremely important	I don't know/I prefer not to answer
Protecting patient information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Addressing bias/discrimination in use of AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accountability of dentists and staff using AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Education/training of dentists and staff using AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Transparency with patients when using AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtaining patient consent when using AI	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

38. **Optional:** Please feel free to elaborate on your answers above.

39. **Optional:** What other topics not listed above do you think are important for the College to set guidance around, if any?

41. **Optional:** Please feel free to elaborate on any of your answers above.

42. **Optional:** Please feel free to provide any other comments you may have related to the use of AI in dentistry.

Questions for Everyone - Location

* 43. Do you live in:

- Ontario
- Another province or territory in Canada
- Outside of Canada (please specify)

- I prefer not to answer

* 44. Describe the general area(s) where you live. Please select all that apply:

- Extra-large urban area (population of 500,000 or more)
- Large urban area (population of 100,000 or more)
- Medium urban area (population between 30,000 and 99,000)
- Small urban area (population between 1,000 and 29,999)
- Rural and/or remote (population less than 1,000)
- Other (please specify)

Questions for Individuals - Demographics

Note: If you are responding on behalf of an organization, please skip to the end of the survey as these questions are for those who are responding as individuals.

We welcome you to voluntarily share some demographic information about yourself. The RCDSO strives to protect the public interest while using processes that achieve meaningful equity, diversity, inclusion and accessibility across all of our regulatory programs and projects.

Therefore, we are collecting demographic information to help us identify whether our consultation process is inclusive, and whether we are receiving a diversity of perspectives.

Please note that any demographic information that you provide through the survey will be anonymous, and your responses will be stored securely. Your demographic information will be aggregated for internal/external reporting purposes and will not be linked to you.

We encourage you to answer the following demographic questions, which are voluntary and anonymous.

* 45. Would you like to complete some or all of these demographic questions?

Yes

No (skip me to the end of the survey)

46. How old are you?

- 19 years old or under
- 20-29 years old
- 30-39 years old
- 40-49 years old
- 50-59 years old
- 60-69 years old
- 70 + years old
- I prefer not to answer

47. What is the highest degree or level of education you have completed?

- Some High School
- High School
- College Degree/Diploma
- Bachelor's Degree
- Master's Degree
- Ph.D. or higher
- Dental Degree (BDS/DDS/DMD or higher)
- Other Professional Degree (e.g., law, medicine, engineering)
- Trade School
- Other (please specify)

- I prefer not to answer

48. Please indicate which of the following terms best describes your gender identity. A list of definitions for the terms can be found [here](#). Please select all that apply (options are in alphabetical order):

- Genderqueer
- Man
- Nonbinary
- Questioning
- Two-Spirit
- Woman
- Not listed (please specify)

- I prefer not to answer

49. Do you identify as trans/transgender or consider yourself to be a part of a trans/transgender community?

- Yes
- No
- Not sure
- I prefer not to answer

50. Please indicate which of the following terms best describe your sexual orientation. A list of definitions for the terms can be found [here](#). Please select all that apply (options are in alphabetical order):

- Asexual
- Bisexual
- Gay
- Heterosexual
- Lesbian
- Pansexual
- Queer
- Questioning
- Two-Spirit
- Not listed (please specify)

- I prefer not to answer

51. Do you identify as an Indigenous person? Please select all that apply

- Yes, First Nations (Status and Non-Status)
- Yes, Inuit
- Yes, Métis
- Yes, an Indigenous person from outside of Canada
- No
- Yes, other

- I prefer not to answer

52. Ethnic origin refers to the ethnic or cultural origins of a person's ancestors. Some examples include: Anishinaabe, Brazilian, Canadian, Chinese, Colombian, Cree, Dutch, South Asian (e.g., Indian, Nepalese, Pakistani, Sri Lankan), English, Ethiopian, Filipino, French, German, Ghanaian, Guyanese, Haitian, Haudenosaunee, Inuit, Iranian, Irish, Italian, Jamaican, Korean, Lebanese, Nigerian, Mi'kmaq, Métis, Ojibway, Polish, Portuguese, Scottish, Somali, Trinidadian, Ukrainian, etc.

What is your ethnic or cultural origin(s)?

If you would like to answer this question, please specify:

53. Do you speak French?

- Yes
- No
- I prefer not to answer

54. What is your faith, religion and/or spiritual affiliation? Please select all that apply (options are in alphabetical order):

- Agnostic
- Atheist
- Buddhist
- Christian
- Hindu
- Indigenous spirituality
- Jewish
- Muslim
- Sikh
- No religion or spiritual affiliation
- I identify with another faith, religion or spiritual affiliation not listed:
- I prefer not to answer

55. Do you identify as a person with a (dis)ability or (dis)abilities?

- Yes
- Sometimes, depending on the context
- No
- I prefer not to answer

56. How would you describe the symptoms or functions/systems that are impacted by the type of (dis)ability or (dis)abilities that you identify with? Please select all that apply (options are in alphabetical order)

- Auditory
- Cognitive (memory, focus, attention, consciousness etc.)
- Dexterity (relating to use of fingers, hand etc.)
- Developmental
- Fatigue-related
- Flexibility
- Gastrointestinal
- Intellectual (e.g., Learning)
- Mobility (movement, balance, coordination etc.)
- Mental health-related
- Pain-related
- Sight
- Speech
- Urinary
- Not applicable
- Other (please specify):

- I prefer not to answer

Thank you for participating in this survey!

57. How would you rate your overall survey experience?



If you have any comments on the survey, please include them below or reach out to ai@rcdso.org.

58. **Optional:** How might your survey experience be improved?