RCDC
THE ROYAL COLLEGE OF DENTISTS OF CANADA

Update: RCDC AI Task Force

The Royal College of Dentists of Canada (RCDC) was established by an Act of Parliament of Canada in 1965 to promote high standards of specialization in the dental profession, and to recognize properly trained dental specialists and the designation of dentists who possess special qualifications in areas not recognized as specialties. Recognizing the profound implications that artificial intelligence (AI) in dentistry will have on clinical practice, the training of dentists, and the expertise required to deliver the highest standard of oral healthcare to the public, in 2023, the RCDC established a Task Force on AI and Emerging Digital Technology (RCDC AI Task Force).

The RCDC AI Task Force commends the Royal College of Dental Surgeons of Ontario (RCDSO) for its efforts to gain a deeper understanding of the way that AI technologies are currently being integrated into practice and develop an RCDSO guidance document for dentists, 'Artificial Intelligence in Dentistry'. The RCDC AI Task Force appreciates the opportunity to participate in this consultation and provide feedback to the RCDSO regarding this guidance document and the development of AI-related guidelines more generally.

RCDC and the RCDC AI Task Force are, and must continue to be, deeply involved in developing any guidelines that will apply to AI technologies in dentistry. Any guidelines developed by the RCDSO will impact how universities teach undergraduate and graduate students to ensure compliance with the to-be-written guidelines. In creating the RCDC AI Task Force, RCDC foresaw that the introduction and promotion of AI into the practice of dentistry would reshape the curriculums at dental schools in Canada. This, in turn, would have implications for the evaluation of competent professional practice, possibly requiring the development of new specialties or the recognition of dentists with further qualifications in the clinical use of AI technologies. As a result, the RCDC AI Task Force has recruited several academic and clinical leaders from across Canada who are involved in specialty programs at universities as task force members.

The Need for an AI Governance Framework for the Practice of Dentistry

AI technologies used in dentistry have the potential to enhance oral healthcare delivery and improve clinical outcomes and the patient experience. AI technologies already support dentistry in practice management, imaging and diagnostics, treatment planning, patient care and communication, and clinical delivery, including surgeries. However, the

unintended consequences of unregulated AI technology use in dentistry are not fully known or understood. A range of professional, legal, ethical, training and operational considerations associated with AI must be addressed and mitigated so that dentists and dental specialists can continue to understand and meet their professional obligations. The RCDC AI Task Force is actively working to understand the potential consequences of AI in dentistry and to advance recommendations for governance, risk mitigation, training and curriculum reform, and the evaluation and monitoring of competent professional practice.

It will be important for the RCDSO to canvass both the current and future legal and regulatory landscape when developing specific guidance for dentists and dental specialists to use AI technologies safely, legally, ethically, and effectively. Any guidance developed by the RCDSO is most helpfully made within the context of existing laws and regulations, including privacy law, intellectual property, negligence and product liability, and individual rights and freedoms. The RCDSO will also need to identify legal and regulatory gaps presented by AI technologies and develop a plan to address and mitigate those gaps through guidance and advocacy.

As described below, the RCDSO may find it helpful to develop partnerships with relevant stakeholders to identify or develop measures, including AI governance frameworks, policies and procedures, and risk mitigation and monitoring mechanisms.

Key among these measures is AI governance frameworks, which establish the rules that ensure AI technologies are safe and ethical and define the principles, norms and standards driving AI development, use, and implementation. AI governance can mitigate the risk of undesirable repercussions as AI is deployed. By establishing clear foundations for AI governance, the RCDSO (and its provincial counterparts) will be in an improved position to develop aligned protocols for use by dentists across the country, as well as consistent standards for monitoring and AI incident and malfunction response required to serve the public interest in providing Canadians with the highest quality of oral health.

An AI governance framework includes:

- Guiding Principles
- Organizational Structure (for Accountability)
- Mapping or Inventory of AI in Use
- Assessment(s) of potential and actual impact

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

- Risk Mitigation and ongoing monitoring, and
- Policies, Procedures, and/or Processes.

Currently, specific legal frameworks governing AI continue to evolve, both in Canada through the introduction of the *Artificial Intelligence and Data Act* (AIDA, from Bill C-27[1]) and around the globe[2]. The specific regulatory requirements and how these may apply to the regulated health professions, including dentistry, are not yet fixed. It remains unclear whether there will be a requirement that dental practices will need to appoint an AI officer (much as there is a requirement for a privacy officer in each office), leading to the need to educate and upskill the profession on an accelerated basis through new continuing education streams, and potentially develop new professional accreditations or practice standards.

However, even without introducing a specific law or regulation, it is possible to develop guidance and practical recommendations that dentists can follow. Various self-regulatory AI governance frameworks, such as the NIST Artificial Intelligence Risk Management Framework (AI RMF 1.0) (January 2023), have been published. Existing frameworks have set out guiding principles that the RCDSO may wish to consider recommending or adopting.

For example, some core global principles that may be appropriate for the work of the RCDSO (and other provincial dental regulators) are:

- Sustainability – AI systems must be used to advance inclusive growth and sustain global development objectives, including but not limited to enhancing creativity, reducing economic, social, gender and other inequalities and protecting natural environments.

  In the context of dentistry, this may mean that the use of AI systems could be prioritized to:

[1] Bill C-27, *An Act to Enact the Consumer Privacy Protection Act, the Personal Information and Data Protection Tribunal Act and the Artificial Intelligence and Data Act and to make consequential and related amendments to other Acts*, introduced November 22, 2021, and currently in consideration by the Standing Committee on Industry and Technology.
[2] For example, the European Parliament enacted the *EU AI Act* on March 13, 2024. The President of the United States issued an Executive Order on the Safe, Secure and Trustworthy Development and Use of AI in October 2023.

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

- improve patient outcomes, including delivery of care and treatment options;
- increase (remote) delivery options;
- promote more efficient and effective use of practitioners' time;
- gather better quality data to improve research and clinical outcomes; and
- enhance and promote access to specialists and specialty services.

- Lawfulness, Fairness & Ethics – AI systems must be developed and used in compliance with applicable laws, human rights, and democratic values, including fairness, diversity and equality, non-discrimination, social justice, dignity and autonomy, privacy, and consumer rights.

  For dentistry, the RCDSO may need to ensure:

  - guidance for acceptable use of AI and Generative AI systems;
  - criteria for the use of high-risk AI technologies, such as in diagnosis, treatment plan development, treatment, and patient education and interaction;
  - patient consent to the use of AI and the use of clinical data in training AI models;
  - guardrails on the use of AI that can be anthropomorphized, particularly for patient interactions and the delivery of treatment plans or clinical recommendations; and
  - training and reference data sets and learning models are free from bias, including bias associated with recency and prevalence, such as under-reporting rare and specialty conditions.

- Robustness, Safety & Security – AI systems must be robust, safe, and secure against risks to privacy, digital security, physical safety, and bias. Systems must be traceable, including in relation to data sets, processes and decisions made during the system lifecycle. Risk management processes must also be in place to assess, prioritize and mitigate risks.

  For dentistry, the RCDSO may need to ensure:

  - AI systems are designed and implemented safely and securely;

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

- patient personal health data and public personal data are handled in conformity with applicable privacy and data protection laws, including international data transfers; and
- incidents and malfunction monitoring and management is operational, and there are mechanisms to provide redress for harms, including in the context of system-wide errors.

- Transparency & Explainability— Individuals should be informed when and how AI is being used. They should be able to understand the system and make informed choices, including understanding and challenging the process and logic of AI-generated outcomes.

  For dentistry, the RCDSO may need to craft guidance and monitor outcomes to:

  - ensure that AI-generated outputs can be understood, challenged, and modified by humans or overridden;
  - manage automated decisions about clinical outcomes, including triage and patient care;
  - avoid unlawful surveillance in clinical and remote monitoring contexts;
  - ensure patient data is used appropriately and lawfully for research or model training; and
  - avoid the risk of anthropomorphism and patient manipulation in public and patient-facing applications.

- Accountability – AI systems must be fit-for-purpose and function appropriately and compliantly throughout their lifecycle in relation to their specific uses. Roles and responsibilities for AI governance and oversight must be clearly allocated.

  For dentistry, the RCDSO may need to:

  - determine which regulator or body is responsible for which aspects of implementing an AI governance framework, including what a practitioner must do when deciding to use AI to do so safely and to the appropriate standard of care;

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

- create AI risk guidelines, particularly for potentially higher-risk use contexts such as in diagnosis, treatment plan development, treatment, and patient education and interaction;
- develop human-in-the-loop requirements, including for the inclusion of specialists and/or human consultations prior to diagnosis and treatment; and
- ensure incident and malfunction monitoring and management, such as when training or reference data is corrupted, systems hallucinate or produce incomplete or biased outcomes.

Mapping AI Technologies and Assessing Potential and Actual Impacts

The RCDC AI Task Force believes that dentists and dental specialists would most benefit from guidance from the RCDSO that is aligned with the potential and actual impact of AI on the practice of dentistry and patient care. Dentists will need to know what training in AI technologies they need and what risk management practices they need to adopt. The development of this guidance will involve determining the potential harm from the use of AI technology and who could be affected. In practice, this will involve identifying the AI technology being used at large, what data the AI consumes, how that data was collected, processed, and used for training, the methods used to train the AI, and how the AI performs.[3]

---

[3] In its survey of AI use in dentistry, the RCDSO has an opportunity to collect information directly from dentists about what technologies they are integrating into practice. This makes it possible to better understand what kinds of AI technologies are currently being used, and start to inform a profession-wide mapping or inventory of AI systems. This inventory may also inform an assessment of the risks to the public through the use of these systems, and therefore what information and training dentists and dental regulators may need to use, evaluate, monitor, and manage these technologies.

It is also important to note that AI encompasses multiple technologies and methodologies, which may each have different risk profiles when used in dentistry:

> The technologies underlying **Artificial Intelligence (AI)** make it possible for machines to learn from experience and data inputs to perform humanlike tasks. Many AI examples rely on deep learning and natural language processes. Using these technologies, computers can be trained to perform specific tasks by processing large amount of data and recognizing patterns in the data.
>
> **Machine learning** is a technique of data analysis and building automated models. It is a branch of AI that trains a machine how to learn, and involves systems that can learn from data, identify patterns, and make decisions with minimal or no human intervention. There are many ways machines can learn such as techniques involving supervised learning, unsupervised learning, semi-supervised learning, and reinforcement learning.

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

The RCDSO may wish to provide guidance to help dentists understand and evaluate the risks of selecting and using specific AI technologies in their practice. The RCDSO may also consider the benefits of encouraging dentists to identify the AI technologies they use and document the purposes and objectives of each use within their practice, versus the administrative burden of maintaining this information.

Current and potential AI laws recognize that some AI use cases and technologies present higher risks. For example, Canada's *AIDA* lists healthcare and emergency services as "high-impact" systems, and so it is possible that some AI technologies developed for dental practice could be so characterized, attracting regulatory obligations on those that develop such systems or sell them into Canada. The RCDSO may need to consider its role in such contexts, including whether and how to monitor the use of "high-impact" AI systems in dental practice.

If, in the future, certain uses of AI by dentists are designated as "high impact" under the *AIDA*, the RCDSO may also consider developing education or guidance for dentists on conducting AI risk-impact assessments of various AI technologies and uses of AI within their practice. To the extent that either future legislation or guidelines developed by the RCDSO require an AI officer for each practice, the obligations – and training – of such personnel would also need to be established. The RCDSO may need to consider what, if any, mandatory Continuing Education requirements relating to AI would be required.

Policies, Procedures, and Processes

AI Governance is implemented by developing rules, regulations, internal and external policies, and procedures. The RCDSO may need to consider whether it advocates for

---

Deep learning is a specific type of machine learning that improves the ability to classify, detect, describe, and recognize uses of data. It requires using large amounts of data to train a computer to make predictions, recognize speech or identify images. Deep learning sets up basic parameters about the data, but then trains the computer to learn on its own by recognizing patterns using many layers of processing.

Natural language processing (NLP) is the branch of AI that helps computers understand, interpret, and manipulate human language, making it possible for computers to communicate with humans in human language. Applications of NLP make it possible for computers to 'read' text, 'hear' speech, 'interpret' text and spoken language, measure sentiment, and determine importance.

Computer vision is the branch of AI that trains computers to interpret visual inputs. It uses deep learning models against digital images to identify and classify objects and then react to what is detected (i.e., they "see").

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

rules and regulations to be promulgated by federal or provincial legislators, which would establish foundational requirements on Ontario dentists and dental specialists.

When it comes to the development of policies and procedures, the RCDSO may have two key roles to play:

- establishing policies and procedures for itself and the dental profession in Ontario; and
- requiring that individual dentists and dental practices establish policies and procedures for their practices, including which ones need to be published or provided to patients and the public.

Emerging best practices on AI governance (including the NIST AI RMF) pointedly recommend creating specific documents, policies and frameworks that may contribute to compliance with AI governance principles. For example, below is a list of policy and procedure documents that the RCDSO may consider developing as templates for dentists to use in their own practices:

- AI Governance: Clearly outline usage expectations, ownership, data classification requirements and data protection controls that dentists must follow when using AI in administrative and clinical practice;
- Acceptable Use Criteria: Develop robust and scalable baseline frameworks for the use of AI by dentists that are applicable across contexts, and between generalists, specialists, and other allied health professionals;
- AI Risk Management & AI Product Risk Assessments: Develop service and product assessment frameworks that can be used to evaluate and implement AI technology;
- AI Data Handling: Guidelines to use data and patient data in the AI context, including collection, security, retention, and consent;
- Vendor Risk Management: Guidance that establishes AI third-party risk management practices when dentists select AI technologies;
- Rights Impact Assessment (AI-RIAs): Develop questionnaires or criteria to protect human rights and the public during the selection and use of high-risk AI applications;
- Training and Awareness: AI-specific training and guidelines to ensure AI use is compliant with regulatory guidance and expectations;

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

- Post-Market Monitoring: Develop post-market monitoring/deployment monitoring requirements to ensure continued AI technology function and use compliance;
- Expert Operational Support: Operational support in conducting risk assessments in relation to higher-risk products and services;
- Incident Management: Guidelines for identifying, escalating, and responding to serious incidents and malfunctions, both those that impact AI systems and their operation, and those that impact use and outcomes; and
- Skills, Capabilities and Competency Assessments: Review and assess skills, capabilities and competencies and ongoing training and reviews or design role requirements.

There may also be AI use cases that would benefit from specific policy development. For example, with the public attention being given to Generative AI (GAI) and the proliferation of products such as OpenAI ChatGPT and Microsoft Copilot, many organizations and businesses have developed specific Generative AI Use Policies[4]. Guidelines for the use of Generative AI may be helpful where it is being used by dentists in patient-facing communications and contexts.

Organizational Structure for Regulating AI and the Role of a Health Regulatory College

Dentists across the country need to understand how AI technologies will be regulated generally and will also need to understand how their provincial health regulatory college will regulate, monitor, and enforce guidelines relating to the use of AI technologies. Dentists, their patients, and members of the public will all need to have confidence that dentists and dental specialists have the necessary education and training to incorporate AI into clinical practice safely, effectively, and ethically. Despite the urgent need to provide answers, the complexity and challenges posed by the use and integration of AI technology in dentistry, as well as a gap in sectoral healthcare AI legislation, means that it is unlikely that all the necessary guidance documents or regulatory programs can be developed uniquely by the RCDSO.

Responsibility for implementing the best practices for AI Governance and AI Risk management listed above do not map cleanly into existing health regulatory structures,

[4] Key points in such policies include: authorized uses; requirements for transparency of use of GAI; requirements about the use of intellectual property, personal data, and confidential data; data protection and cybersecurity; access control of the GAI to sensitive and proprietary data; monitoring and incident reporting; and training and awareness.

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

including those applicable to dentists. For example, unless provided for by AI legislation, will it be the role of a health regulatory college such as the RCDSO to:

- provide an AI Risk Matrix for deploying and using AI that is context- and purpose specific (i.e., considers the type of AI and the context in which it is being used) and identify high-impact systems?
- Articulate an enterprise or practice readiness assessment and whether this will be mandatory or voluntary?
- Require AI product conformity or benchmarking assessments before dentists select and use these?
- Advocate for post-marketing monitoring systems for AI products sold or provided to dentists & usage?
- Establish minimum training or competency requirements for dentists and allied professionals who use AI for diagnostics, treatment planning or delivery?
- Provide guidance for incidents and AI system malfunction management?
- Require dentists to inventory and disclose what AI they are using?
- Require human-in-the-loop practices and documentation in specific contexts, such as patient education and interactions, diagnosis, treatment planning and treatment monitoring?
- Address and advocate to remediate potential inequalities in data gathering and use, such as generalist vs. specialist, regional, and patient demographics, which in turn could impact AI product availability and efficacy?
- Provide educational support to the public about the benefits and risks of AI in dentistry without AI Risk frameworks and outcome benchmarking?

It will also be helpful for the RCDSO to consider the longer-term implications of the adoption into practice of AI technologies. For example:

- How will the RCDSO approach the potential need for recertification or ongoing education of dentists (including through continuing education requirements) as AI technologies rapidly evolve?

- As AI becomes established in practice, will the RCDSO provide guidance on when the use of AI is recommended (i.e., when its use involves demonstrated improvement of patient outcomes) or mandatory?

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca

Multiple relevant stakeholders have roles to play in this process. Many of the guidance documents and policies yet to be drafted will benefit from the contributions and perspectives of other provincial dental regulators so that there is an alignment across the country. Additionally, the federal and provincial governments, various privacy commissioners, voluntary professional associations, other allied health professionals, educators, dental schools and examiners, and members of the public will have an interest in contributing to the safe, ethical, and effective delivery of oral healthcare using all available advanced technologies, including AI. Finally, universities, educators and accreditation bodies will be critical to ensuring that dental curricula and professional accreditation processes continue to reflect the standards required to deliver quality oral healthcare to the public.

As the leader in the development, maintenance and administration of dental specialty Fellowship Examinations since 1965, RCDC is well positioned to assist in the needs evaluation and development of recertification and ongoing education of dentists and dental specialists in their use of AI technology in practice, and therefore in the benchmarking and evaluation of the evolution of clinical standards of care that are enforced by the RCDSO and other provincial dental health regulatory bodies. Effectively, any guidance to dentists on incorporating AI technologies into dental practice will also implicate changes to how universities teach dental students and specialists and how specialists and dentists with special qualifications in AI are recognized and designated. These requirements fall within the traditional purview and purpose of the RCDC, and the RCDC AI Task Force is already actively engaged in these efforts.

To protect the public interest in high-quality dentistry and oral healthcare, it is necessary to thoughtfully develop the training, certification and evaluation mechanisms in a manner that leads to public trust in dentists and members of the dental profession across Canada. RCDC, therefore, asks the RCDSO for a commitment to be consulted on the development of new standards and guidelines for the competency and training standards for dentists and dental specialists and on the effective regulation of the use of AI in dentistry.

1501 -110 Yonge St., Toronto, Ontario, Canada, M5C 1T4 | tel 416.512.6571 | www.rcdc.ca