



REGULATING THE FOURTH INDUSTRIAL REVOLUTION AT HEALTH PROFESSIONS COLLEGES

Discussion Paper

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Regulating the Fourth Industrial Revolution at Health Professions Colleges

By: Michaela Hill and Paula Rowland

Abstract

Like industrial revolutions before it, the fourth industrial revolution has the potential to greatly improve quality of life on a global scale. Here, we refer to the fourth industrial revolution as an era of work defined by rapidly emerging technologies combining physical, digital, and social spheres of life (Wharton, 2022). In this way, the fourth industrial revolution is more than a continuation of the earlier explosion of electronics, information technologies and automated production. The potential for billions of people to be connected via mobile technologies with unprecedented processing power and storage capacity, along with rapid advances in artificial intelligence, robotics, and the Internet of Things renders this as a unique moment in time for human kind (Floridi, 2016).

In healthcare, this industrial revolution is unfolding at the same time as the role of experts and expert knowledge in society is being closely scrutinized (Eyal, 2019). It is important to understand how the regulatory bodies that govern healthcare professionals are responding to the emerging industrial revolution. In particular, we focus on the statements, regulations, and guidelines that are available from these regulatory bodies in the public domain. With this overview, we invite broader discussions on what kinds of assurances are being made but also where the regulatory landscape might seem underprepared for these new futures.

In this discussion paper, we begin with an overview of our material collection from a selection of regulatory Colleges. In reviewing these materials, we describe common themes across the Colleges, including their collective focus on digitizing their own practices, the

opportunities and responsibilities afforded by virtual care technologies, and the responsibilities of members engaging with social media. We also note absences in these materials, including the absence of a sustained focus on emerging technologies and artificial intelligence. In reviewing these materials, we invite readers to consider what patients and publics might expect from healthcare professionals and the bodies governing them in the fourth industrial revolution.

Methods

In order to understand how Ontario regulated health professional colleges are responding to the fourth industrial revolution, we chose six colleges as the focus of our study. Given their size and prominence, we began with the College of Physicians and Surgeons of Ontario (CPSO) and the College of Nurses of Ontario (CNO). We then added two of the most prominent rehabilitation health regulators, the College of Physiotherapists of Ontario (CPO) and the College of Occupational Therapists of Ontario (COTO). Finally, we selected two other health professions whose roles will be particularly implicated by the digital health revolution: the College of Medical Radiation and Imaging Technologists of Ontario (CMRITO) and the Ontario College of Pharmacists (OCP).

To collect data on how the Colleges are responding to the fourth industrial health revolution, we read and analyzed all publicly available information on the websites of the six Colleges selected available by August 2023. For each College, we comprehensively scanned the main and subpages of the website, as well as collected information from all attached documents and embedded files. Across the six websites, we read every policy, guideline, FAQ, report, strategic plan, and Board meeting minutes available to the public, as well as listened to every video, webinar, podcast, and speaker series on or linked through the website. We also followed any relevant links the Colleges provided to



information from other sites and included this linked information within our analysis of what information the College provides to its members and/or the public. To ensure that we found all relevant information, we also used the search bar on each website's homepage to locate resources related to the following terms: "technology," "online," "digital," "virtual," "cyber," "remote," "electronic," "e-health," "automated," "artificial intelligence," and "social media." For each relevant resource located, we recorded the name and type of resource, its date of creation or last review, and a short summary of its content.

Once our data collection was complete, we compared results across Colleges and conducted an analysis of common themes and gaps in information the Colleges are providing or failing to provide. These themes and gaps form the basis of the Results and Discussion sections of this paper.

Limitations

A few aspects of our data collection process may limit the generalizability and accuracy of our results. Firstly, limited resources forced our research team to select a finite number of regulated health professions to study. Of the 26 professions covered by the *Regulated Health Professions Act*, our research design focused on six. While we tried to limit the impact of this narrow focus by intentionally selecting a breadth of Colleges based on size, prominence, and likelihood of being impacted by the digital health revolution, our results would be strengthened by including a wider scope of regulated health professions.

Secondly, our relationship to the College may have impacted our access to information, and consequently, the accuracy of our results. Though we intended to search through the entirety of each College website, some Colleges had a member's portal that granted access to further resources. As members of the public, we

did not have access these portals, which may have impacted our ability to identify patterns and gaps with complete accuracy. We attempted to limit this impact by reading and listening to included resources on how to use these member portals to get a sense of what kind of information they contained. For some Colleges, we were able to discern that the member's portal was merely a place to report professional development activities, rather than a hub in which resources themselves are housed.

Finally, the accuracy of our results may be impacted by the inconsistent length of archives held by each College. Throughout our research, we discovered that some Colleges maintain reports, plans, and publications from the last five years, while others hold archives dating back a decade or further. Though we expect the impact of this inconsistency to be minimal given that conversations around the digital health revolution have emerged quite recently, it is still possible that the accuracy of our results was impacted by the variation in records kept by each College.

Results

a) Common Themes

Digitization

Though the Colleges differ in the degrees to which they are discussing technology-related topics, some evident commonalities emerged from our analysis. One such commonality was a focus on digitization, both in terms of digitizing internal processes at the College itself and in terms of the digitization of health information within professional practice.

From an internal perspective, all six Colleges had a clear focus on digitizing their own processes and resources. This focus was most evident in annual reports and strategic planning documents, which commonly emphasized transitions to online platforms and internal priorities around optimizing



technology. The College of Physiotherapists of Ontario's 2015-2016 Annual Report, for example, talked about enhancing technology use, creating a new website, moving to an online newsletter, and enhancing their social media presence. In each report since then, the CPO has continued to discuss their own digitization, including new priorities around improved database technology and cybersecurity audits to improve data processes. The other five Colleges exhibited a similar pattern and set similar goals and priorities. Unsurprisingly, over the last three years, each Colleges also showed a marked increase in their discussions about remote work and online platforms as a result of the COVID-19 pandemic. While most Colleges have shifted back to hybrid or in-person work, the College of Medical Radiation and Imaging Technologists of Ontario remains the only College that has transitioned to a permanent remote work format, as was emphasized in their 2022 Annual Report.

Evidently, the Colleges are paying attention to how they can internally keep pace with our digital world. The more interesting digitization-related theme for our study, however, was the information they provided to their members on the digitization of professional practice. In this regard, the central focus was on the creation, use, and storage of electronic medical records (EMR). With the exception of CMRITO, all the Colleges had numerous policies, statements, modules, FAQs, and/or other guidelines involving discussions of electronic storage of personal health information (PHI). The College of Physicians and Surgeons, for example, discussed electronic record keeping in their Medical Records Documentation and Medical Records Management policies, their eHealth statement related to electronic information management, and their link to the Canadian Medical Protective Association's Electronic Records handbook. At the CNO, CPO, COTO, and OCP, rules and advice for electronic documentation appeared in similar types of documents. The outlier, CMRITO, only shared

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information related to EMR through a link to the Canadian Association of Medical Radiation Technologist's Professional Development website, which contained a module on the future of EMR.

Notably, a number of the electronic record keeping and documentation resources from across the Colleges dated back five to ten years. Of all the themes gathered throughout this study, information related to digital record-keeping seemed to have been created the earliest, which suggests that EMR was one of the first technology-related priorities for regulated health professional colleges.

Virtual Care

In addition to digitization, a common theme across a number of the College websites was virtual service delivery. The level of discussion about virtual care, however, varied significantly across the six professions. The CPSO, CPO, and COTO had the greatest breadth and depth of virtual care resources of the six Colleges. These resources often came in the form of virtual care policies and standards, FAQs, videos, case studies, and links to resources from other associations. While many of these virtual care resources looked similar, there was some variation in content between the Colleges. Most notably, COTO had a unique focus on jurisdictional issues related to providing virtual care out of province, which did not appear as prominently at other Colleges.

The CPSO, CPO, and COTO also stood out for the amount they highlighted the creation of virtual



care resources in their newsletters, magazines, annual reports, and strategic plans. The CPSO, for example, wrote about virtual care in eight different articles within their “eDialogue” publication over the past four years. This four-year timeline was consistent across Colleges who provided virtual care resources, which suggests that the pandemic was a significant accelerator of the College’s role in providing virtual care guidance.

In comparison to the CPSO, CPO, and COTO, the nursing and pharmacy colleges did not focus as heavily on virtual care. That said, the CNO and OCP did have virtual care or tele-practice policies, both of which were created or have been under review since the pandemic. Again, CMRITO was the only outlier, with no information about virtual care in any of its publicly available resources.

These scales of focus on virtual care are likely representative of the feasibility of providing virtual services in each profession, especially during a pandemic. Physicians, physiotherapists, and occupational therapists frequently delivered services virtually over the past few years, which correlates with a higher level of focus on virtual care at the College level. Nursing and pharmacy likely have less guidance on virtual care at their respective Colleges because, though they can provide some services virtually, they were largely still available in-person during the pandemic. At the other end of the spectrum, medical radiation and imaging technologists do the great majority of their work in-person, which likely explains the lack of information on virtual care at their College.

Social Media

Beyond digitization and virtual care, guidance around social media use was another emerging theme from our data collection. Some Colleges, including medicine, physiotherapy, and occupational therapy, had formal social media policies and/or practice guidelines. Others, like

the CNO, embedded expectations around social media use into their core competency documents and codes of conduct. The CPSO, CPO, COTO, and CNO also provided advice related to social media through discussions in e-publications, FAQs, public statements, modules, case studies, and links to resources from other organizations. In comparison, the CMRITO and OCP websites had very few mentions of social media across their websites.

While some regulators provided guidance on social media use before the pandemic, there was a noticeable increase in the frequency and sense of importance of social media resources after March 2020

Like virtual care, social media guidance at the Colleges has become much more prevalent since 2020. While some regulators provided guidance on social media use before the pandemic, there was a noticeable increase in the frequency and sense of importance of social media resources after March 2020. The CPSO, for example, turned their 2013 Social Media Statement into a Social Media Policy in 2022 after posting three pandemic-related articles and hosting a podcast on the spread of health misinformation and the responsibility of physicians when engaging online. While other regulators similarly increased their social media guidance during the pandemic, none mirrored the CPSO’s intense focus on combatting misinformation. Though the CNO, CPO, and COTO websites all made some mention of the positions of authority their respective health professionals hold in society, the CPSO’s sharp focus on the obligations of physicians is likely related to how the public views the health professions in terms of power and hierarchy.



Privacy

A final theme that emerged from our search was a focus on privacy and confidentiality in the digital context. Attention to privacy was fairly even across Colleges, though CMRITO had the fewest resources related to privacy and technology use. Unlike other themes, privacy and confidentiality in the digital space rarely formed the basis of its own resources. Often, conversations about privacy in a technological era were embedded within general privacy and confidentiality resources. As an example, the CPSO does not have a specific digital privacy policy, but instead discusses privacy and technology in a separate section of the Protecting Personal Health Information Policy. Some other general privacy resources across Colleges, however, made no mention of the electronic context whatsoever. The CNO website, for example, had a comprehensive subpage dedicated to answering Privacy and Confidentiality questions, but none of the questions related to technology or digital privacy.

[N]one of the plans or reviews from any College provided details on how they would actually respond to or explore new technologies

Beyond general privacy resources, the other way in which privacy and technology conversations appeared on College websites was in discussions about the risks of engaging with the other three themes (electronic records, virtual care, and social media). Of the five Colleges that had virtual care standards and guidelines, for example, all of them outlined the importance of safeguarding

privacy and confidentiality when providing virtual care. The same was largely true of resources about social media use and electronic documentation, many of which had a central focus on privacy and confidentiality considerations and linked to external resources related to privacy and technology. Evidently, even though privacy in the digital context did not form the basis of its own resources, it was still a central thread throughout many other College resources.

b) Gaps

Emerging Technology and Artificial Intelligence

Across the six College websites, there was a lack of guidance related to artificial intelligence and emerging technologies. Where there were mentions of emerging technology, they generally came in the form of broad statements within Strategic Plans, annual reviews, or practice competencies. The CNO's 2021-2024 Strategic Plan, for example, framed itself around responding to "rapidly developing new technologies,"¹ while COTO's 2022-2023 Year in Review promised to explore regulatory guidance for the "use of AI technology for record keeping."² The most expansive discussion of emerging technology within strategic documents came from CMRITO, whose 2017-2021 and 2022-2024 strategic plans acknowledged that innovative technologies are changing the workplace environment and committed to advancing a regulatory plan related to emerging technology. Importantly, however, none of the plans or reviews from any College provided details on how they would actually respond to or explore new technologies. The same lack of specificity was evident in mentions of emerging technology in

¹ College of Nurses of Ontario, *2021-2024 Strategic Plan*, January 2021, accessed August 4, 2023.

² College of Occupational Therapists of Ontario, *2022-2023 Year in Review*, June 2023, accessed August 13, 2023.



core competency documents. CMRITO's Standards of Practice, for example, requires MRITs to “maintain the necessary knowledge, skills, and judgement to respond to changes in practice environments, advances in technology, and other emerging issues,”³ but provides no further information on what this might mean or look like.

Beyond general statements in strategic documents and practice competencies, a few Colleges made mention of an emerging technology specific to their profession within other resources. The Virtual Care Policy at the CPO, for example, briefly mentioned the scale of data collection and resulting privacy risks associated with using wearable technology in physiotherapy. In pharmacy, the OCP had a number of resources related to opening and maintaining remote dispensing sites using automated dispensing systems. Finally, in medicine, the CPSO published a single article entitled “Can AI Help Deliver Deep Medicine,” which discussed how AI may change healthcare and highlighted caveats like diagnostic bias. Importantly, the article also made mention of the fact that doctors, hospitals, and health systems are accountable for decisions made by artificial intelligence. Beyond the OCP noting in their 2020 Annual Report that accountability in light of technology would be an important priority moving forward, this CPSO article was the only mention of accountability for emerging technologies within the six College websites reviewed.

Notably, the College of Medical Radiologists and Imaging Technologists was the only regulator with evidence of robust professional development opportunities related to AI and emerging technology. CMRITO's quality assurance program, which requires 25 hours of professional development per year, linked to the Canadian

Association of Medical Radiation Technologists (CAMRT) professional development site. This central hub for MRIT professional development contained nine different modules on artificial intelligence in the profession, which covered topics including how AI may change the profession, how MRITs can prepare for this change, possible ethical issues and associated risks, and whether AI can learn without compromising patient safety. CAMRT's professional development catalogue also included a module on the next generation of technology for radiation, as well as modules on 3D printing and virtual reality in the profession. No other College regulator linked to a site that included modules on AI. Moreover, no regulator, including CMRITO, provides internal modules on AI or emerging technology.

Further Conversations

Through this review of regulatory College materials available in the public domain, we see a relatively narrow focus on the implications of the fourth industrial revolution for professional practice in healthcare. However, this focus on implications for members, specific aspects of healthcare delivery (i.e. virtual care), and broader questions of data privacy are consistent with other institutions in the healthcare space (see Rowland et al, forthcoming).

Healthcare leaders may want to consider:

Where and how will healthcare professionals seek guidance on issues of accountability emerging with the implementation of new technologies?

Where and how will patients and members of the public seek guidance on issues of accountability with the implementation of new technologies in healthcare settings?

³ College of Medical Radiologists and Imaging Technologists of Ontario, *CMRITO Standards of Practice*, 2020, accessed August 8, 2023.



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