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Commentary

AI scribes in rural and remote primary care: an antidote to physician burnout or Pandora's Box?

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Abstract

Context: Artificial Intelligence (AI) is rapidly advancing and permeating every industry, including health care, with promises to enhance workflow efficiencies and reduce medical errors. Despite several proposed benefits of AI technology in healthcare settings, there may be numerous unforeseen consequences due to the speed at which AI is being implemented, especially with limited research and lagging regulatory support. This is particularly relevant in northern, rural, and remote communities that are often

under-supported during inequitable technology implementation, placing an onus on local primary care providers (PCPs) to implement new technologies despite contextual challenges. The current priority for the Canadian government is to address the massive healthcare workforce shortages and the burden of clinical administration with digital AI scribes. Whether or not AI scribes will contribute to or address the digital divide, a gap in technology access between urban and rural communities, leading to inequities, is up for debate.
Issues: Over 2.5 million people in Ontario, Canada, do not have a family physician, and the shortage of PCPs is further amplified in northern, rural, and remote communities. The time spent on non-essential administrative tasks equates to approximately 55.6 million patient visits, making administrative burden one of the primary causes of physician burnout. AI scribes utilize machine learning, deep learning, and natural language processing to interpret patient–PCP interactions and produce clinical notes, reducing the time PCPs spend on administrative tasks. Contrary to this 'techno-optimism,' there are risks with AI-generated notes, including biased databases and privacy concerns, that may disproportionately affect northern, rural, and remote communities.
Lessons Learned: AI will continue to evolve and gain functionalities while taking on greater responsibility in healthcare settings. Although there is a demand for funding and national regulatory frameworks, there is also a significant need to build the capacity of PCPs to be active voices in the development and implementation of new technology and expand rural AI research to ensure AI scribes are used to address the digital divide rather than widen it.

Keywords

AI scribe, artificial intelligence, digital scribe, documentation, electronic medical record, health information technology, primary care, professional burnout, rural medicine, speech recognition software.

Context

Artificial Intelligence (AI) is permeating every industry, including health care. Despite numerous potential diagnostic and clinical administration applications, AI use in primary care settings remains limited[1-3]. AI health technologies may contribute to the quintuple aims of better patient outcomes, population health, and health equity at reduced cost while maintaining primary care providers' (PCPs) wellbeing[4]. Patients in northern, rural, and remote primary care settings, such as northern Ontario, Canada, report poorer health outcomes and health inequities associated with the social determinants of health[5]. These inequities are further amplified by massive shortages of healthcare professionals and decreased access to health services[5,6]; therefore, there is an increased opportunity to realize AI's benefits.

AI health technology has the potential to make faster and more accurate diagnoses, enhance self-management of care through conversation chatbots, optimize medical best practices based on electronic medical record (EMR) data, promote public health surveillance, and reduce administrative burden[7-10]. In theory, AI's benefits could help address common challenges faced by northern, rural, and remote settings through increasing workforce capacity, optimizing resource allocation, enhancing health research, and reducing burnout.

Rural communities are often under-supported during inequitable technology implementation due to urban-focused research and inadequate consideration of context-specific barriers[11]. This results in a digital divide, a gap between communities with access to technology and those without access, that may lead to significant disparities[8,12]. Despite the enthusiasm for AI use in primary care settings, the WHO Guidance on Ethics and Governance of Artificial Intelligence for Health (2021)[8] and Timmermans & Kaufman (2020)[12] have warned against 'technological solutionism' and 'techno-optimism,' terms that highlight the associated risk with technology, such as AI, being positioned as a perfect solution to deep-rooted systemic problems. This technology-in-theory lens often overemphasizes technology's ability to create change, especially when there is a lag in research, policy, and evaluation, which risks exacerbating, as opposed to addressing, health inequities[8,12,13].

As reported by Upshaw et al. (2023)[14], patients and healthcare providers identified that supporting clinical documentation should be one of the highest priorities for AI in primary care[14]. An AI scribe, a tool that transcribes patient–PCP interactions and creates EMR notes to alleviate administrative burden, is considered beneficial and low-risk compared with AI clinical decision-making tools, despite minimal research[3]. Many Canadian healthcare settings have begun piloting AI scribes to assess their real-world feasibility and benefits. Although pilot projects perform well, scaling has challenges due to the need for maintenance and software updates, a greater challenge in under-resourced communities with inadequate digital infrastructure and technological support[8].

This commentary outlines the administrative burden on PCPs and the benefits and challenges of AI scribe technology within the context of northern, rural, and remote primary care settings. We highlight the need for context-specific PCP training, rural research on patient and healthcare provider acceptance, and AI's impact on health equity.

Issues

The clinical administrative burden

As of July 2024, 2.5 million people in Ontario, Canada, did not have a family physician[15]. Globally, Canada ranks 23rd out of 32 Organization for Economic Co-operation and Development countries in the doctor-to-population ratio[16]. The Ontario Medical Association has stated that this shortage is dire in northern and rural areas, where communities have faced deficits for decades and over half of the current physicians are expected to retire in the next 5 years[16]. Clinical administrative burden is a significant challenge: 38% of physicians' administrative tasks could be eliminated or do not require physician expertise, resulting in approximately 18.5 million hours (or 55.6 million patient visits) spent on non-essential administrative tasks yearly[17]. Without sufficient primary care access, patients are flooding walk-in clinics and emergency departments, increasing wait times and resulting in a fragmented system with reduced quality of care.

Based on a survey of family physicians in Alberta, physicians spend an average of 15–20 hours per week on administrative tasks, often outside clinic time[18]. This administrative burden has contributed to burnout, decreased job satisfaction, and reduced patient care quality[17,18]. These factors have exacerbated physician shortages across northern, rural, and remote settings, leaving many rural generalist physicians, who maintain a broad scope of practice, feeling overwhelmed[6,19]. As the population simultaneously grows, ages, and requires more complex care plans, the fragile primary care workforce needs real solutions to their overwhelming workload.

AI scribes: the technology

AI generally refers to computer simulations of human intelligence processes[10,20]. Machine Learning (ML) is a subset of AI that enables these simulations to learn and improve from experience without being explicitly programmed[10,20]. ML utilizes prediction models and algorithms to improve AI performance with every iteration[10,20]. Deep Learning (DL) is a type of ML that uses neural networks with multiple layers, like a human brain, to extract higher, more complex levels of abstractions from raw, more unstructured data[10,20]. Natural Language Processing (NLP) is a branch of AI that allows machines to read, understand, and interpret human language[21].

AI scribes typically utilize NLP algorithms that leverage ML and speech recognition capabilities to capture, summarize, and document patient–PCP interactions[22]. AI scribes use ML algorithms to interpret medical data, DL to extract insights from datasets, and NLP to generate human-like text. Today, AI scribes are emerging as mixed-initiative systems in which conversations are converted into EMR notes, reviewed by a PCP, and entered into an EMR[22]. As DL evolves and ML algorithms are refined, these tools will have greater functionalities.

Benefits of AI scribes

AI scribes can significantly reduce documentation time and effort, improving overall efficiency and quality of patient–PCP interactions[8,14,23]. AI scribes share similar benefits to human medical scribes, including alleviating PCP burnout and reducing repetitive administrative tasks in addition to streamlining documentation, reducing cost, addressing workforce shortages, and generating SOAP (Subjective, Objective, Assessment, Plan) and referral notes[8,14,23]. AI scribes enhance documentation completeness by capturing detailed information during patient encounters while allowing the PCP to provide undivided attention, strengthening continuity of care, data analysis, and information sharing among healthcare teams.

Although research beyond AI scribes' theoretical benefits is limited, multiple forums are beginning to validate these claims[24,25]. Professional associations have begun lobbying the province to support AI scribe implementation across Ontario[24]. Recent results from a government-funded study on the performance of AI scribes across primary care settings demonstrated an average decrease in documentation time of approximately 69.5%, and a reduction in average time spent on administrative tasks after AI scribe implementation by 6.3 hours per week[26]. This study is one of the first to highlight the opportunity for AI scribes in Ontario.

Challenges of AI scribes

Widespread EMR adoption aimed to improve documentation and continuity of care, yet many people did not anticipate undermining face-to-face patient care and increasing administrative workload[27-29]. Similarly, AI scribes may have unintentional consequences that hinder rather than support clinical administrative burden. AI scribe-generated notes are generally more detailed and lengthier than traditionally typed or written notes. AI scribe documentation may initially be proposed as a time-saving solution; however, we have yet to consider that the time and cost of reviewing notes may counteract the efficiencies gained[22]. We may be unable to anticipate the consequences of the rapid uptake of AI scribes, especially with lagging regulatory support, limited data contributions from rural populations, and the urgency at which this tool is being pushed.

AI scribes are not replacements for direct patient contact with PCPs; the technology is still evolving with the intention of enhancing patient–provider encounters[22,30]. This evolution requires clinical datasets for ML, which introduces the risk of ethical and privacy challenges[22]. Privacy concerns in health care are a long-standing issue, with EMR use raising concerns about inputting sensitive patient information into a digital network with varying levels of security and regulation, and those concerns are now heightened by the use of AI technologies in practice[31]. Insufficient regulatory oversight of AI technology poses a public risk, because existing laws do not prevent developers from monetizing or misusing private health data[31-33]. Health system decision-makers do not fully know the potential uses of AI data, making patient consent difficult as patients are unaware of all future data uses[8,34].

Ethical considerations also arise with the use of clinical datasets for ML, with one systematic review of 97 articles revealing seven distinct types of algorithmic bias in medical settings, including historical bias mirroring existing societal prejudices, representation bias arising from under-representation of certain populations in medical research, measurement bias, aggregation bias, learning bias, evaluation bias, and deployment bias[35]. Additional literature has further explored these ethical issues, highlighting the data challenges that are likely exacerbated in northern, rural, and remote settings, including small sample sizes, lack of representation in existing datasets and research on AI tools, and contextual differences that influence how data can be interpreted, which may lead to, or perpetuate, systemic bias[2,3,8,36]. Rural communities are heterogeneous, with diverse demographic characteristics and greater proportions of the population who face socio-economic challenges[5]. Rural communities may have limited staff with technical expertise to support AI integration, limited financial resources to acquire and sustain the technology, and skepticism from a historically marginalized patient population, hindering technology uptake and implementation[33,36]. It is also worth noting that most AI scribes are currently only proficient in English and sometimes French[30]. The performance of AI scribes trained on and researched in urban-centred pilot projects may not be safely generalized to northern, rural, and remote settings, particularly those with prominent Indigenous and Francophone populations.

Concerns have also been raised around automation bias, a new source of error, because PCPs may accept scribe suggestions and submit documentation without critical review[8,22,37,38]. 'AI hallucinations,' or, more appropriately, 'AI misinformation,' when data is extrapolated to produce inaccurate content, further demonstrates the current technological limitations and call for PCPs to be prudent with AI scribe use[39]. This necessitates careful training of technical aptitude and education on AI capabilities, limitations, and ethics[40]. The onus of critical review of AI-scribed notes and AI-education demands placed on PCPs adds to an already overstretched workforce, especially in rural settings, for the aforementioned staffing and technical support challenges in these settings. An example of this is the concern that AI algorithms might not receive or consider new medical information, limiting their ability to retrain themselves and ultimately inhibiting medical innovation and safe introduction into practice[41]. AI uptake may also have negative societal impacts, such as unemployment, reduced clinical skills, erosion of patient–PCP relationships, and cybercrime[8,42].

Lessons Learned

Strategies to address AI adoption challenges

Strategies have been proposed to mitigate the perceived consequences of implementing AI health technologies. Darcel et al (2023)[33] proposed strategies such as participatory co-design, ethics training, AI literacy, and national regulation. Participatory co-design would involve all relevant stakeholders, including PCPs, patients, administrative staff, and policymakers, in the conception phase of AI technology with representation from diverse socio-demographics to ensure an equitable lens is present in its design and production[33]. Ethics training for those involved in the life-cycle development of this technology is one proposed approach to preventing systemic bias within AI algorithms[33]. Routine analyses that intentionally and longitudinally assesses bias, for example, within data set representation, would also be a proactive approach to maintaining algorithm neutrality[33]. Improving the AI literacy of PCPs is also critical in AI technology adoption so that they can fully appreciate its functionalities and flaws, allowing them to effectively utilize the technology and be prudent with delegating clinical tasks and decisions to AI technology[33]. Equipping PCPs with AI literacy training with an emphasis on critical review of AI-generated content would attenuate concerns around automation bias and AI misinformation[33]. Lastly, cohesive leadership within healthcare and policy spheres is necessary to develop national AI regulatory frameworks regarding AI use protocols, content standards, and privacy and security to maintain patient trust and prevent technology misuse[33].

Furthermore, Olugboja & Moghalu Agbakwuru (2024)[36] recommended rural-centred strategies, including grant acquisition, collaborations with larger institutions, return-on-investment analyses, and data-sharing initiatives. In the United States, government entities and private companies are beginning to recognize the inequitable financial constraints on rural communities for AI technology uptake; therefore, lobbying for rural-focused grant opportunities for AI implementation is one opportunity to reduce financial barriers[36]. Rural primary care practices could also benefit from collaborative grant efforts with larger academic and medical institutions[36]. Despite higher capital costs and fewer practitioners in rural health systems, providing funders with longitudinal return-on-investment analyses and tangible success metrics would encourage continued financial investment[36]. The successful implementation of AI technology also relies on access to quality patient data. Data-sharing initiatives, which involve the integration of data from diverse sources, with special consideration for populations facing systemic barriers to health care, would address ethical concerns by generating more comprehensive and accurate AI algorithms[36]. Despite the desperate need for national regulatory frameworks and funding, we focus on the capacity building of PCPs and rural research.

Capacity building

Capacity building and improving digital literacy among PCPs in northern, rural, and remote primary care settings are essential to harnessing the potential of AI technology to enhance healthcare delivery[36,42]. The introduction of AI has placed a new demand on PCPs to become competent in using the tools while effectively educating and communicating their benefits and risks to patients[8]. Despite the request for training from overextended PCPs who feel unprepared to adopt new technologies[4], PCPs often lack the time and resources to implement them successfully[2]. Lack of proper training risks exacerbating inequalities and straining the patient–PCP relationship[4]. Findings from the AI-NORTH project at the Dr. Gilles Arcand Centre for Health Equity emphasized that clinicians in northern Ontario expressed a need for context-specific AI training that incorporates essential northern, rural, remote, Indigenous, and Francophone perspectives[43]. Educational programs that are accessible (e.g., online platforms and webinars) and context-specific can encourage PCPs to take an active role in AI uptake[36].

Rural research

Rural research is critical to enhancing AI applications in rural primary care settings[42]. Responsible research must engage with the structural challenges of rural communities to identify barriers to, and unique opportunities for, AI use. Due to rapid AI uptake, few trials have been replicated, little has been reported on patient harm, and there is a risk of ML performing less effectively in different clinical settings[38]. There is a need for rural AI research concerning:

1. Patient perspectives on AI implementation, specifically those of northern, rural, remote, Indigenous, and Francophone communities. Populations that have historically been discriminated against may be less likely to trust and utilize AI[2]. Understanding patients' perspectives is essential for defining challenges to implementation and encouraging community participation in technology development.
2. Healthcare provider perspectives, including whether northern, rural, and remote PCPs experience the benefits of improved job satisfaction, strengthened patient–PCP relationships, and reduced administrative burden.
3. The longitudinal impact of AI scribes on health equity and whether it improves or exacerbates the digital divide. Downstream interventions, such as AI scribes, in an overextended northern, rural, and remote primary care setting may exacerbate health disparities as rooted in the theory of fundamental causes, which predicts that already advantaged people will benefit most from health technologies[2,12].

Conclusion

In conclusion, AI technologies, especially AI scribes, have the potential to ease administrative burden, improve healthcare delivery, and address workforce shortages in northern, rural, and remote areas. Successful implementation requires context-specific considerations like infrastructure, training, and equitable access for all PCPs and healthcare teams. Challenges, such as digital divides, privacy concerns, and health inequities, must be addressed through rural research, inclusive co-design strategies, and strong regulatory frameworks. By prioritizing capacity building and involving diverse communities in the development process, we can ensure AI technologies promote equitable healthcare outcomes and enhance primary care delivery.

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Conflicts of interest

The authors declare no conflicts of interest.

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