Lifting the Administrative Burden with MedLLM

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Background: A Canadian Medical Association (CMA) National Physician Health Survey conducted in 2021, reported that physicians will spend up to 10 hours per week performing administrative tasks outside of their regular working hours[1]. This is in addition to the previously reported 37% of working hours physicians spend documenting encounters on electronic health records (EHRs) and completing other deskwork[2]. These statistics are representative of a growing trend in which health care practitioners are spending an increasing amount of time completing a rising number of administrative tasks rather than participating in direct, patient-facing care. According to the same 2021 CMA survey, nearly 60% of physicians have said that this burden has directly contributed to worsening mental health, and 75% have said that that their administrative workload is an impediment to caring for their patients and interferes with their job satisfaction[1]. From a health care systems perspective, a Canadian Federation of Independent Business analysis found that physicians spend 18.5 million hours each year on unnecessary administrative work, which is the equivalent of 55.6 million patient visits – inevitably contributing to longer wait times and physician burnout[3]. This stark reality has made the reduction of administrative burden a priority for many national organizations[1] and provincial health care authorities[4,5], with significant investment being directed to novel strategies tackling this growing problem[6–8].

The emergence of advanced large language models (LLMs) has generated considerable excitement in the health care sphere. There is a growing interest in the deployment of these technologies to solve problems and improve workflows in areas such as patient triage, differential diagnosis development and even screening for complex diseases[9,10]. The unique ability of LLMs to generate nuanced and comprehensive text based on user provided prompts has significant potential to streamline the process of documentation, billing, and consultation[1]. Implementation of LLMs in this way will enable physicians to focus on the care they provide their patients, leading to improvements in physician and patient quality of life, as well as major cost reductions in the form of unlocked efficiency for health systems.

Aims: We propose the development of MedLLM an intuitive, and easy-to-use health care technology platform that leverages LLMs to help clinicians streamline their workflows and reduce the administrative burden associated with patient encounters via:

1. Generation of comprehensive progress notes and external referral notes based on conversations between physicians and patients or previous EHR documentation.
2. Recommendation of relevant and province-specific billing codes associated with patient encounters.
3. Provision and case-specific decision aids such as differential diagnoses, risk calculation tools, and emergency detectors.

Methods: MedLLM is a web-based health care technology platform with a user chat interface that was created using the Python Flask microweb framework paired with HTML, CSS, and Javascript. In the app, users can upload audio-based recordings that they have obtained from patient interactions with patient consent. These recordings are converted to a transcript with the use of the Open AI Wisper API. Users can then interact with the app in everyday language to create multiple clinically relevant materials, such as progress notes, consultation notes, and external consultation letters. Additionally, users can ask the app to provide relevant billing codes from the Alberta Government Schedule of Medical Benefits document (https://www.alberta.ca/fees-health-professionals.aspx). Finally, the app is able to suggest potential management plans, additional pertinent questions to ask, or reasonable differential diagnoses.

The following tools were used to enable the features of our app:

- The audio transcription capabilities of MedLLM relies on the OpenAI Whisper API: https://github.com/openai/whisper,
- The storage of relevant billing codes relies on the Chroma vector storage database: https://www.trychroma.com/,
- The retrieval of relevant billing codes relies on the LangChain question answering pipeline from the Chroma database: https://python.langchain.com/en/latest/use_cases/question_answering.html
- The generation of answers to user inputs relies on the OpenAI ChatGPT API: https://openai.com/blog/introducing-chatgpt-and-whisper-apis. Any language can be used to interact with the app, e.g., English, French, Mandarin.

References:

1. A profession under pressure: results from the CMA's 2021 National Physician Health Survey | CMA. https://www.cma.ca/news/profession-under-pressure-results-cmas-2021-national-physician-health-survey. Accessed May 8, 2023.
2. Arndt BG, Beasley JW, Watkinson MD, et al. Annals Journal Club: Tethered to the EHR: Primary Care Physician Workload Assessment Using EHR Event Log Data and Time-Motion Observations. *Ann Fam Med*. 2017;15(5):419. doi:10.1370/AFM.2121
3. Patients before Paperwork: Nova Scotia's approach to improving patient care by reducing physician red tape. Canadian Federation of Independent Business . https://www.cfib-fcei.ca/en/research-economic-analysis/patients-before-paperwork-nova-scotias-approach-to-improving-patient-care-by-reducing-physician-red-tape. Accessed May 8, 2023.
4. How Doctors of BC is reducing administrative burdens – WorkSafeBC and ICBC | Doctors of BC. https://www.doctorsofbc.ca/news/how-doctors-bc-reducing-physician-burden--worksafe-bc-and-icbc. Accessed May 8, 2023.
5. Reducing physician administrative burden | Doctors Nova Scotia. https://doctorsns.com/contract-and-support/admin-burden. Accessed May 8, 2023.
6. Maintaining Ontario's leadership on prohibiting the use of sick notes for short medical leaves - CMA Policybase - Canadian Medical Association. https://policybase.cma.ca/link/policy13934?_gl=1*1l9so2p*_ga*NzAzNTQyMDAwLjE2ODM1NjMxNTY.*_ga_91NZ7HZZ51*MTY4MzU3MDczOC4zLjEuMTY4MzU3MTEzOS42MC4wLjA.#_ga=2.131115340.2103053250.1683563156-703542000.1683563156. Accessed May 8, 2023.
7. Third-party forms (Update 2017) - CMA Policybase - Canadian Medical Association. https://policybase.cma.ca/link/policy13643?_gl=1*1gcx493*_ga*NzAzNTQyMDAwLjE2ODM1NjMxNTY.*_ga_91NZ7HZZ51*MTY4MzU3MDczOC4zLjEuMTY4MzU3MTA3NC42MC4wLjA.#_ga=2.96601308.2103053250.1683563156-703542000.1683563156. Accessed May 8, 2023.
8. Health Human Resource Policy Recommendations: Summary. Briefing to the House of Commons Standing Committee on Health - CMA Policybase - Canadian Medical Association. https://policybase.cma.ca/link/policy14473?_gl=1*1hggm7n*_ga*NzAzNTQyMDAwLjE2ODM1NjMxNTY.*_ga_91NZ7HZZ51*MTY4MzU3MDczOC4zLjEuMTY4MzU3MTAyMS41Mi4wLjA.#_ga=2.168880610.2103053250.1683563156-703542000.1683563156. Accessed May 8, 2023.
9. Cascella M, Montomoli J, Bellini V, Bignami E. Evaluating the Feasibility of ChatGPT in Healthcare: An Analysis of Multiple Clinical and Research Scenarios. *J Med Syst*. 2023;47(1). doi:10.1007/S10916-023-01925-4
10. Sallam M. ChatGPT Utility in Healthcare Education, Research, and Practice: Systematic Review on the Promising Perspectives and Valid Concerns. *Healthcare*. 2023;11(6). doi:10.3390/HEALTHCARE11060887