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The Impact of the COVID-19 Pandemic on Physician Electronic Health Record Use and Burden at a Canadian Mental Health Hospital

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Abstract. The COVID-19 Pandemic has significantly changed the delivery of care through new workflows and models of care. However, the impact of these changes on the usage of electronic health record (EHR) systems remains unclear. This mixed method study aims to understand how EHR usage patterns changed between the pandemic onset and the pre-pandemic period at a Canadian mental health hospital, using an analysis of EHR usage log data and a qualitative focus group. An increase in after-hours EHR usage and documentation time per patient was observed, as well as a decrease in order time. Virtual care (VC) use also had an impact on time spent per patient within the EHR and after-hours EHR usage. Qualitative results highlighted physician concerns related to VC workflows and documentation, which contributed to additional EHR burden. Future work should focus on different contexts and developing relevant interventions to address these issues.

Keywords. Usage logs, EHR burden, clinician workflow, medical informatics

1. Introduction

The COVID-19 pandemic has led to the implementation of many guidelines and models of care to reduce the spread of the virus. This included the transition of mental health care to hybrid or virtual delivery, as well as the development of new processes to facilitate safety and care such as screening forms and order sets [1]. Electronic health record (EHR) systems have had a critical role in supporting decision making, communication and planning across these new workflows [2]. However, it is unclear how these new workflows have affected clinicians' use of the EHR system.

Unfortunately, in the last several years, there has been significant recognition and awareness of how the EHR has contributed to the all-time high of clinician burnout, which can detract from patient care [3]. Thus, it is critical to evaluate the impact of pandemic-related changes in the EHR on clinician burden [4]. This study addresses this unmet gap through the following two aims:

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1) Examine how use of the EHR has changed before (Apr-Jun 2019) and during the pandemic (Apr-Jun 2020) through various EHR tasks and after-hours
2) Understand the experiences and perceptions of front-line physicians in adapting to the use of the EHR during the COVID-19 pandemic

2. Methods

An explanatory, sequential mixed methods approach was used to identify the impact of the pandemic-related EHR changes on physician practice. This includes a quantitative component exploring EHR usage patterns and a qualitative component exploring physician perspectives. Ethics was obtained at the Centre for Addiction and Mental Health.

2.1. Setting

Our study took place at a Canadian academic mental health hospital in Toronto, Ontario with a comprehensive EHR system. When pandemic-related protocols were introduced in March 2020, the organization introduced changes to the EHR, including additional COVID-19 screening documentation and new note templates. Given the nature of mental health care, many outpatient physicians also transitioned to delivering care virtually from home, which has also led to the development of VC specific EHR documentation.

2.2. Quantitative EHR usage logs analysis

To examine the impact of pandemic-related changes on EHR usage, back-end usage logs were extracted for all physicians during the following time periods: pre-pandemic (April to June 2019) and following onset of the pandemic (April 2020 to June 2020). We used the same months to account for changes in seasonality. We collected data on the following metrics: (1) Number of patients seen; (2) Time spent in EHR per patient; (3) EHR after-hours usage; (4) Documentation time per patient; and (5) Order Time per patient. In addition, to determine the impact of VC changes on EHR use, we also collected the number of VC encounters each physician conducted during the pandemic time period.

Analysis included an interrupted time series [5] analysis in R v.3.6.1 to determine if there were significant changes in each metric between the pandemic period and the pre-pandemic period. Similar methods have been used in previous research to study the effects of COVID-19 on electronic consultation use within primary care[6]. Time and encounter type (inpatient/outpatient/emergency) were entered as a fixed effect and physician was accounted for as a random effect. For VC, only outpatient encounters were included in the analysis and the number of VC encounters of each physician was added to the model through interaction effects with time.

2.3. Qualitative Focus Groups

To understand the impact of pandemic-related changes on EHR use and contextualize findings from the EHR usage logs, a virtual focus group was conducted by two research fellows (BL; LS). Physician EHR champions from each academic division were invited

to share their division's experience with using the EHR during the pandemic (including any new or unique frustrations), and their experience with adapting to the pandemic-related EHR changes. Additionally, we showed the liaisons the findings from the EHR usage log analysis and asked whether the findings resonated with their division's experiences. A content analysis was carried out on the notes recorded by the student (AK).

3. Results

3.1. Quantitative Analysis of EHR Usage Log Data

An overview of the findings from the EHR usage log data (n = 314 physicians) is presented in Table 1. We found no changes in time spent in the EHR per patient between the two time periods. However, a significant decrease in the orders time per patient (mean change = -1.1 min) was seen, with the time taken to complete orders per patient being lower during the months of the pandemic than in the pre-pandemic months. In addition, a significant increase in after-hours usage (mean change = 2.6%) and documentation time per patient (mean change = 6.0 mins) was seen, with the period of the pandemic higher than the pre-pandemic period.

Table 1. Summary of findings from EHR Usage Log Data.

Metric (Mean/Std. Deviation)	Pre-Pandemic (Apr-Jun 2019)	Pandemic (Apr-Jun 2020)	Mean Change (95% CI)	P-Value
After-Hours Usage (%)	18.1 (27.8)	24.6 (30.2)	2.6 (0.3 to 4.9)	0.02
EHR Time/patient (mins)	40.9 (73.9)	44.3 (71.6)	2.9 (-3.3 to 9.2)	0.36
Documentation Time/ patient (mins)	19.1 (27.6)	23.4 (31.1)	6.0 (3.3 to 8.7)	<.001
Orders Time/patient (mins)	4.0 (7.9)	3.0 (6.9)	-1.1 (-1.8 to -0.5)	<.001

When overlaying VC usage on the metrics, interaction effects were observed between documentation time and VC usage. In comparison to non-VC users, physicians with moderate use of VC (10-100 encounters) had a significantly larger increase in documentation time per patient (mean change = 2.6) during the pandemic than users without VC (p= 0.04). Moreover, physicians with low use of VC (<10 encounters) also had a significantly larger increase in time on EHR per patient (mean change = 7.1) during the pandemic than users without VC (p= 0.005).

3.2. Qualitative Analysis

A total of 8 physician EHR champions participated in the focus group, with most physicians having a positive experience or experienced little difference with EHR usage during the pandemic. There were a few concerns raised including connection and freezing issues with organizational laptops. Additionally, scheduling and use of the VC platform contributed to challenges during the initial days of the pandemic. Physicians seemed to find creative workarounds to scheduling, including copying the clinic coordinator to transfer all e-mail invites into the EHR for patient registration purposes.

With regards to findings from the EHR log data, physicians suggested that the reduction in order time was due to workarounds of telephoning pharmacies for prescriptions, rather than writing the prescriptions through the EHR. Mixed rationales were found for increase in documentation time, some of which included extra

documentation that needed to be completed due to COVID-19 and VC usage (e.g. screening). For VC, simultaneous documentation often required a split screen, or multiple screens. If physicians were unable to do this documentation concurrently, then it would be likely that documentation was done following visits.

4. Discussion

Across settings, EHRs supported the implementation of COVID-19 adaptations such as modified documentation templates for standardized screening and testing [7]. This study provides an objective overview of how EHR utilization patterns changed following the onset of similar adaptations at a Canadian hospital. Recently published implementation guidelines higlight the advantage of double monitors for simultaneous documentaton, a concept identified within our population of physicians.[8] Our findings noting significantly higher documentation time overall suggests a need to balance delivery of care and the well-being of clinicians, complimenting findings on the use and challenges of telepsychiatry for pandemic care delivery [9]. Limitations of our study include the single-site data used for the analysis and the lack of a controlled environment for gathering usage data, hence influences outside of the COVID-19 pandemic could have impacted EHR usage patterns.

5. Conclusions

This study provides preliminary insight into the impact of the pandemic on EHR usage and EHR-related burden on physicians. Future work should explore the root causes of usage changes in other organizations..

References

[1] Yellowlees P, Nakagawa K, Pakyurek M, Hanson A, Elder J, Kales HC. Rapid conversion of an outpatient psychiatric clinic to a 100% virtual telepsychiatry clinic in response to COVID-19. Psychiatr. Serv. 2020 Jul 1;71(7):749-52

[2] O'Connor PJ, Sperl-Hillen JM, Rush WA, Johnson PE, Amundson GH, Asche SE, Ekstrom HL, Gilmer TP. Impact of electronic health record clinical decision support on diabetes care: a randomized trial. Ann. Fam. Med. 2011 Jan 1;9(1):12-21

[3] Lo B, Kemp J, Cullen C, Tajirian T, Jankowicz D, Strudwick G. Electronic health record-related burnout among clinicians: Practical recommendations for Canadian healthcare organizations. Healthc Q. 2020 Oct 1;23(3):54-62.

[4] Doan H, Harmon-Jones B, Sarfraz MA. Burnout among psychiatrists after COVID-19 pandemic. Br. J. Med. Pract. 2021;14(2).

[5] Bernal JL, Cummins S, Gasparrini A. Interrupted time series regression for the evaluation of public health interventions: a tutorial. International journal of epidemiology. 2017 Feb 1;46(1):348-55.

[6] Leyton C, Zhang C, Rikin S. Evaluation of the effects of the COVID-19 pandemic on electronic consultation use in primary care. Telemedicine and e-Health. 2022 Jan 1;28(1):66-72.

[7] Deeds SA, Hagan SL, Geyer JR, Vanderwarker C, Grandjean MW, Reddy A, Nelson KM. Leveraging an electronic health record note template to standardize screening and testing for COVID-19. InHealthcare 2020 Sep 1 (Vol. 8, No. 3, p. 100454). Elsevier.

[8] Persaud YK, Portnoy JM. Ten rules for implementation of a telemedicine program to care for patients with asthma. The Journal of Allergy and Clinical Immunology: In Practice. 2021 Jan 1;9(1):13-21.

[9] Stoll J, Sadler JZ, Trachsel M. The ethical use of telepsychiatry in the Covid-19 pandemic. Front. Psychiatry. 2020:665.