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Towards a Regulatory Framework for Electronic Medical Record Data Visualization

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Abstract. Physicians struggle to retrieve data from electronic medical records. We evaluated a digital tool that enhances physician efficiency in retrieving and analyzing patient information for treatment decision-making. Our use case is the care of diabetic patients. Evaluation results showed that healthcare providers who used the i4C (Insights for Care) dashboard experienced greater time efficiency than those who used traditional EMR information retrieval methods. A comprehensive evaluation of the i4C Dashboard confirms its effectiveness in facilitating diabetic care data management, as well as its potential application to a wide range of healthcare scenarios. In order to further maximize its effectiveness on clinical efficiency and patient care, future research should focus on improving its usability and scalability.

Keywords. Electronic medical records, diabetic care, user experience, time efficiency, digital health tools, quality improvement, primary care

1. Introduction

Efficient management of patient data is crucial for providing high-quality care. Electronic medical records (EMRs) have revolutionized the way healthcare providers collect, store and access patient information. However, navigating and retrieving data from EMRs is time-consuming and cumbersome for clinicians, which contributes to clinician burnout and hinders provider productivity [1,2].

Digital health dashboards aim to simplify clinicians' access to and analysis of patient data. This tool is designed to improve the efficiency of data retrieval from EMRs for treatment planning. Reviewing all relevant information before making treatment decisions is a critical step to prevent prescribing errors. In many cases, decision-making information is buried in a variety of data tables within the EMR, creating delays in and increasing the cognitive overhead of treatment planning. An intuitive and efficient dashboard can streamline data retrieval workflows and enable more effective real-time decision-making. The dashboard offers a technological solution that is not only more efficient but also potentially transformative for healthcare settings, particularly in the management of diabetes and other chronic diseases.

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2. Methods

The primary purpose of the evaluation was to assess the relative efficiency of the i4C dashboard against Native Query in the EMR in clinical data retrieval within the context of diabetes care. We conducted a timed evaluation to study the efficiency of the i4C dashboard (*OntarioMD*) in the context of diabetes care. We compared clinicians' time spent on data retrieval using the i4C dashboard (i4C) compared with in-built EMR data retrieval methods (Native Query).

In a crossover evaluation design, 10 primary care physicians reviewed 10 elements of diabetes care data; the physicians used their own computer and EMR system. They were randomly allocated to initially use either i4C or Native Query and then switched to the other method. Two independent observers recorded the time taken to perform the tasks. Ethics approval was not required for this study because it was categorized as a co-design Quality Improvement study. The primary focus is on enhancing operational processes or systems rather than on patient outcomes or clinical interventions.

3. Results

3.1. Clinicians save significant time when using a digital data retrieval tool

Clinicians using i4C dashboard saved significant time, outperforming themselves when using Native Query. Specifically, i4C users took a maximum of 33 seconds to find information from patients, compared to nearly 2250 seconds with Native Query. The mean time for i4c was 13 seconds compared to a mean time in Native Query of 315 seconds.

i4C dashboard also demonstrated more consistent performance, with a lower standard deviation in search times of 9.61 seconds compared to 628.30 seconds with Native Query, as shown in Figure 1.

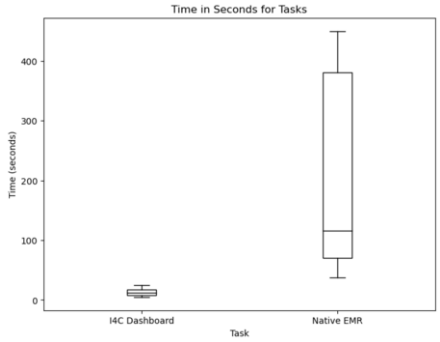

Figure 1. Comparison of the maximum time, mean time, and standard deviation in seconds between the i4C dashboard and native query.

3.2. Potential time saving with a dashboard tool

Table 1: Potential time saved by clinicians per day using dashboard.

Metric	Calculation	Result
Time saved per search	315 seconds (Native Query) – 13 seconds (i4C)	302 seconds
Total time saved per day per clinician	5 searches/day x 302 seconds/search	302 seconds/day (approx. 25.17minutes/day)
Additional patients that can be seen per clinician per day	25.17 minutes saved/day at 15 minutes per patient	Approx. 1.678 additional patients per day per clinician
Additional patients that could be seen across Canada per day	1.67 additional patients/doctor/day x 80,000 doctors across Canada	Approx. 134,240 additional patient visits/day
Physician Equivalents Freed Up	134,240 patients per day 1 doctor sees 30 patients/day	Equivalent of 4,474 additional doctors added to the system.

4. Discussion

The evaluation study demonstrates that the i4C Dashboard integrated to the EMR significantly reduces data retrieval time for care of individuals with diabetes by primary care physicians, halving the time compared to conventional methods and aligning with previous research on the efficiency benefits of integrated dashboards [3,4].

Qualitative analysis revealed positive feedback from clinicians regarding the user experience of the i4C dashboard. User-centered design principles should continue to be prioritized to optimize the usability and acceptance of such tools along with quality improvement [5,6].

As a result of the i4C Dashboard evaluation, it is essential to consider the implications of such efficient data retrieval tools across healthcare systems and strategize for their implementation. In the study, the dashboard was demonstrated to be a time-saving tool for diabetic care, and to improve user experience, suggesting the potential for bridging care gaps and reducing clinician burnout. Difficulties in EMR use not only affects the quality of care provided by clinicians but also leads to physician burnout and decreases the efficiency of the healthcare system as a whole when the inefficiencies are experienced by the large numbers of family physicians across Canada. The successful implementation of the dashboard provides evidence that data-driven tools can improve efficiency and reduce the burden of EMRs on healthcare professionals. With these advantages in mind, we examine various policy approaches for the widespread and rapid integration of these technologies, emphasizing their role in elevating healthcare quality and operational efficiency.

4.1. Policy options for rolling out data retrieval tools to enhance physician efficiency

We consider 3 policy options for rolling out physician efficiency enhancing tools for data visualization and for improving treatment formulation.

Option 1. Maintain the status quo, which is continuing with inefficient EMR systems that consume significant clinician time and contribute to burnout. The

advantage of this option is that there are no expenditures to make and no risks of failed technology to explain. There is also no need to engage EMR vendors in a project that they are likely to resist because of the high costs and effort associated with change. This option does not address existing care gaps; provider burnout caused by poor EMR usability nor improve the quality of healthcare provided. It also does not address the shortage of family physicians in Canada.

Option 2. Allow market players to develop data retrieval tools and integrated dashboards and charge what the market will support. This approach is inefficient, slow to move ahead and will end up costing too much as the cost of customer acquisition in this space is too high. The benefits of the tools will not be achieved or will be achieved in a too long time framework.

Option 3. Design and develop a regulatory framework that ensures that every EMR embeds data retrieval and analytics tools into its system. This tool not only achieves significant time savings—freeing clinicians up to see thousands of additional patients each day—but also enhances the user experience and identifies care gaps more effectively. This makes it a cost-effective solution that can enhance healthcare quality and reduce clinician burnout, all in a single intervention.

Therefore, Option 3 could potentially save around 25 minutes per day per physician across Canada, freeing up substantial time for patient care. In summary, Option 3 offers a technological solution that is not only more efficient but also potentially transformative for healthcare settings, particularly in the management of patients with chronic diseases. The study delves into the dashboard's functionalities and algorithms, demonstrating its ability to provide clinicians with actionable insights for improved patient care in diabetes management [7,8]. Electronic medical records must be enhanced to increase efficiency and reduce time spent on administration. Hiring more doctors is the only alternative to technology tools. Our study suggests we would need to hire 4,000 more primary care physicians, a considerably more costly and time-consuming solution.

5. Conclusion

To comprehensively validate these promising findings, additional research with large, diverse clinician samples across different healthcare settings is required. Its limitations include a small sample size and a narrow focus. In the study, the EMR integrated dashboard was validated as an effective means of optimizing diabetes care data retrieval. This suggests its applicability to several healthcare specialties. Clinicians have reported significant time savings, which is indicative of the tool's potential for widespread use. The scalability, interoperability, and user-centric design of the system should be refined in future research to improve its impact on clinical practice and patient outcomes. OntarioMD and provincial governments could integrate such dashboard technology into future EMR development, saving them both time and money in the long run.

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