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# IMPACT OF HEALTH INFORMATION EXCHANGE (HIE) ON THE COMPLETENESS AND ACCURACY OF SHARED MEDICAL RECORDS

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## Abstract

With the increasing number of electronic health records that are interoperable (iEHRs) or health information exchanges (HIEs), there is a growing need and opportunity to evaluate the existing evidence on the effectiveness and limitations of adopting, using, and the impact of iEHRs. The objective of this research is to evaluate the global body of evidence about the implementation, use, and effects of iEHRs. We performed a comprehensive evaluation by searching several databases, including MEDLINE, Embase, and the Cumulative Index to Nursing and Allied Health material (CINAHL), along with additional searches in Google Scholar and sources of unpublished material. This study provides an overview of a dynamic and vibrant subject that examines the use and influence of iEHRs. Although the aggregate results indicate several beneficial effects, the main studies were not rigorously assessed for their quality. When analyzed based on individual measurement criteria, the findings highlighted both consistently good outcomes and mostly negative or inconclusive results.

**Keywords:** health information exchange; electronic health record; interoperability; utilization; influence; systematic review

## 1. Introduction

Interoperable electronic health records (iEHRs) are being used to provide patients a safe and confidential record of their health history and treatment throughout the healthcare system [1]. The iEHR utilizes fundamental electronic systems for gathering information, such as registries for client and provider demographics, diagnostic imaging systems, drug information systems, laboratory information systems, public health systems, and clinical reporting systems [2]. This record is specifically intended to enhance the exchange of data across the whole spectrum of healthcare, between various healthcare delivery companies, and across different geographical regions. According to data, both nurses and primary care doctors have access to provincial and

territorial patient information systems, with a reported percentage of 42% for both professions [3,4]. Nevertheless, the approach to retrieve information, the accessibility of information in care settings, and the user data required to access information vary throughout provinces and territories.

With the increasing availability of iEHRs, there is a growing need and opportunity to evaluate and comprehend the existing evidence on the effectiveness and ineffectiveness of adopting, using, and the impact of iEHRs. This evidence is crucial for directing efforts and enhancing the capabilities of iEHR. Additionally, it helps highlight areas where further investment and review are required due to gaps in the existing evidence base. Hence, the objective of this research is to do a methodical examination of the global body of information about the implementation, use, and consequences of iEHRs or HIEs. The results will also contribute to a nationwide investigation into the significance of iEHRs and other interconnected data, which is part of a collection of research aimed at assessing the important advantages of digital health [5].

## 2. Methods

The search strategy involved developing and testing multiple search strategies for "interoperable electronic health record" (iEHR), "health information exchange" (HIE), "interoperability," "adoption" or "use," and "effectiveness, impact," or "value." Health informatics experts provided feedback on the search strategies, and a final search strategy was selected and translated for use in several traditional databases.

Articles were eligible for inclusion if they were published in English, published between 2006 and 2017, and focused on iEHRs and HIEs across two or more healthcare settings. They also needed to focus on the impact or effectiveness of iEHR or HIE adoption or use. Two reviewers independently screened all titles and abstracts, and discrepancies were resolved through discussion and/or review by a third reviewer.

Data from all articles identified for inclusion were extracted independently by two reviewers using a predeveloped data extraction template that included the year of publication, article type, approach, methodology, jurisdiction, and health care setting. Prioritizing evaluation relevance over quality, the review did not use available quality criteria to exclude primary studies. The study aimed to capture the breadth of iEHR evaluation activity and ensured the relevance of the research.

## 3. Results

Examining the review findings in relation to the benefits evaluation framework allows for an assessment of the areas where evaluative work has been focused and identifies any gaps that future evaluative efforts should prioritize. Out of a total of 522 measurement results, 298 of them, which is equivalent to 57.1%, were positive. The aspects of quality of care and productivity had the largest proportion of favorable measurement results, with 64.7% and 64.1%

respectively. The quality of care category primarily focused on the topics of care coordination and clinical decision support. The productivity factor was characterized by the key themes of efficiency in healthcare operations, time savings, and cost reduction [6-11].

The benefits assessment framework (Figure 1) showed that the left side, which includes system, service, and information quality, as well as user satisfaction, had substantially lower proportions of positive measurement results, ranging from 39% to 53%. Achieving quality and productivity gains necessitates focused efforts on the left side of the framework, since many crucial components are located there [12-20]. Research on change management and the advantages of iEHRs and other information systems indicates that user satisfaction improves when users can use technology that performs well, is seamlessly integrated into their workflow, works well with existing systems, and provides them with the necessary information in a timely manner [21-25]. Furthermore, it is important to provide enough levels of assistance and training to guarantee the effective utilization of information systems.

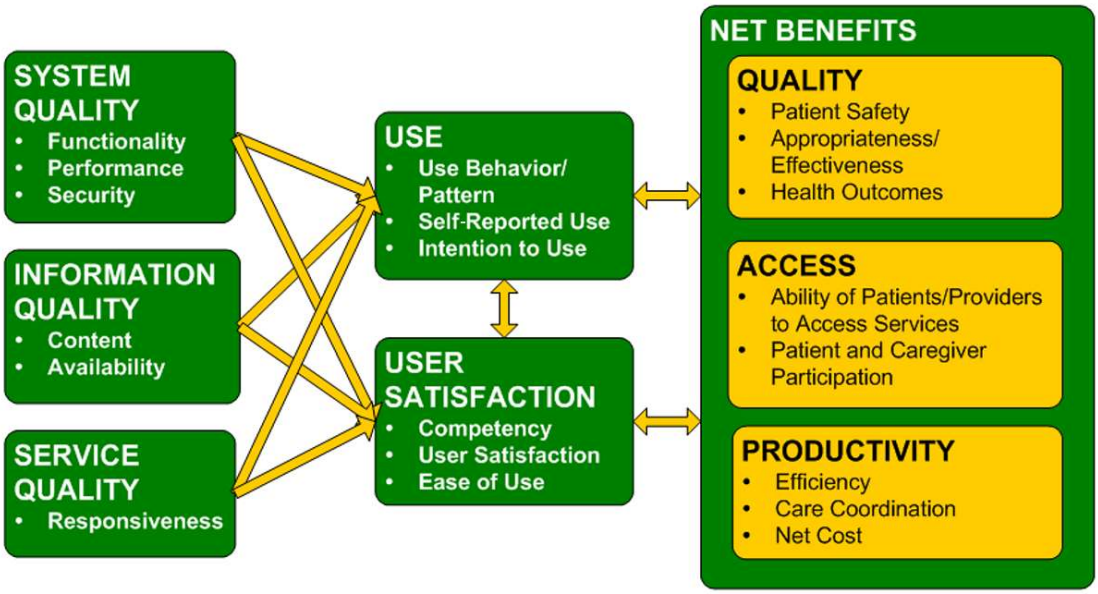


**Figure 1.** Health Infoway benefits evaluation framework.

In summary, our research indicates that favorable outcomes tend to draw more scrutiny, possibly due to the use of increasingly stringent research methods. However, this could also indicate a misallocation of limited evaluation resources, which could be better utilized to study less-explored aspects of integrated electronic health records (iEHRs) and health information exchanges (HIEs). The findings indicate the need for further investigation into various evaluation aspects, including use and access, which currently lack specific measurement items. Additionally, the dimensions of service quality, system quality, user satisfaction, and information quality have fewer measurement items compared to productivity and quality dimensions [26,27].

It is crucial to acknowledge that we did not conduct thorough evaluations of the original studies. Since a consequence, the findings of this review should be regarded with caution, since

this is a recurring trend in the reviews we examined. Although there is some promising research, there is a definite need for more thorough and complete review, with a focus on supporting approaches that can provide high-quality data [28]. In summary, the review results emphasize the need of promoting more rigorous and thorough evaluative research worldwide about the effects of linked health information. This research should include a wider range of disease areas, healthcare environments, and demographics.

## 4. Constraints

This study found a substantial quantity of research that investigate the use and influence of linked health information via integrated electronic health records (iEHRs) and health information exchanges (HIEs). Most of the researches have been published in the last 5 years, indicating an evolving rather than established body of data. Considering that the majority of this body of information is up-to-date, worries about possible temporal biases that may not fully represent the rapidly changing advancements of iEHRs and HIEs should be minimized. However, our research did not examine if there were systematic variations in the assessment of certain dimensions over time (for example, evaluating service and quality shortly after the system launch compared to evaluating productivity at later stages after the launch).

In line with the evolving body of evidence, it is worth mentioning that a significant number of the publications included in this study (12 out of 130, or 9.2%) originated from grey literature sources. This underscores the wider impact on the assessment of integrated electronic health records (iEHR) and health information exchange (HIE).

## 5. Summary

Ultimately, this study encompasses critical analysis from a dynamic and engaged area that centers on the use and influence of iEHRs and HIEs. Although iEHRs and HIEs have been shown to have several favorable effects, the main research' quality was not assessed in a systematic manner. When analyzed based on specified measurement criteria, some measurement results consistently showed favorable outcomes, while others were mostly negative or inconclusive, indicating the need for more focus in those areas. Findings that are particular to the setting give further understanding of areas that need greater evaluative focus.

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