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# ELECTRONIC HEALTH RECORDS : A HYBRID SYSTEMATIC LITERATURE REVIEW AND BIBLIOMETRIC ANALYSIS

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**Abstract**
In recent years, electronic health records have been the subject of numerous research studies. However, a comprehensive and integrative review remains scarce. This study aims to bridge that gap by conducting a hybrid systematic literature review and bibliometric analysis on electronic health records (EHR) research using current empirical evidence. A total of 122.308 publications were retrieved from the Scopus database using the keywords "Electronic AND Health AND Records" in article titles, abstracts, and keywords, covering the period from One thousand nine hundred fifty-eight to May Thirteen, Two thousand twenty-five. The PRISMA framework guided the systematic review process, and VOSviewer was employed to analyze citation networks, author collaborations, and keyword co-occurrence patterns. The study reveals that electronic health records research has shown exponential growth, especially in the last decade, with increasing interdisciplinary interest from healthcare, computer science, and information systems. Key contributors, thematic clusters, and emerging research fronts were identified, providing insight into the intellectual and collaborative landscape of electronic health records scholarship. The study is limited by its exclusive reliance on the Scopus database and English-language publications, potentially omitting relevant research from other databases or languages. Additionally, bibliometric tools capture publication patterns but not the qualitative depth of individual contributions. By mapping trends and collaboration patterns, this research can inform healthcare policymakers, system designers, and academic institutions in prioritizing efforts, allocating resources, and fostering partnerships to advance electronic health records development and adoption, ultimately contributing to more efficient and integrated healthcare systems. It offers valuable insights for academics and practitioners seeking to understand the evolution, structure, and future directions of this critical area in digital health.
**Keywords**- Electronic Health Records. Literature review, VOSviewer, Bibliometric analysis

## INTRODUCTION

Conducting a Systematic Literature Review (SLR) on the Electronic Health Records (EHR) variable presents several key challenges due to the complexity, scale, and ethical dimensions of digital health data. One major challenge lies in the rapid growth and diversity of healthcare data, which introduces issues related to processing, analysis, storage, privacy, and interoperability (Negro-Calduch et al., 2021). Moreover, the lack of comparative outcomes among different data structuring methods creates a gap in the literature that limits the ability to evaluate and optimize EHR frameworks (Hyppönen et al., 2014). Technological obstacles, such as poor system interoperability, limited IT infrastructure, and emerging concerns like blockchain integration and federated learning, further complicate EHR implementation (Zukaib et al., 2023). Common operational issues include documentation burdens and risks of medical errors due to outdated manual systems, emphasizing the need to systematically assess EHRs' efficiency and impact on care quality (Nugroho & Pramudita, 2024). To overcome these challenges, researchers suggest adopting standardized quality control protocols throughout the clinical data life cycle, including stages like planning, construction, and utilization (An et al., 2025). Enhancing the role of nurse leadership and involving healthcare professionals in all phases of EHR design also supports system acceptance and usability (Corbett et al., 2025). Additionally, improving documentation practices can enhance data reliability and patient safety in inpatient settings (Otero Varela et al., 2019). Ethical concerns—especially regarding patient autonomy, confidentiality, and system accountability—must also be addressed to ensure trust and responsible EHR usage (Jacquemard et al., 2020; Mahfuth et al., 2016). Overall, recognizing and addressing these challenges is crucial to producing a high-quality SLR that supports effective and ethical implementation of EHR systems. This document is then further analyzed in this study to answer RQ1: *What is the publication trend on EHR research between 1958 and 2025?* RQ2 : *Who are the most influential authors and institutions in the field?* RQ3 : *What are the thematic gaps and future directions in EHR research?*

## METHODOLOGY

In order to identify trends, patterns, and important research entities within a discipline, a systematic literature review using a bibliometric technique quantitatively evaluates the literature. This method guarantees a thorough and repeatable literature review by utilizing frameworks like PRISMA, which presents an unambiguous and transparent image of the subject under study. The following were the established inclusion criteria: (1) article published up until May, 13 2025, (2) publication in English, and (3) focusing on the topic of Electronic health records. VosViewer was used for bibliometric analysis. Analyzing citation networks, author partnerships, and co-occurring keywords through the visualization of bibliographic data reveals the dynamics and intellectual structure of the subject of study. Researchers can integrate empirical data and map the landscape of research activity, including identifying important contributors and developing trends, by combining bibliometric analysis and systematic review. (Marzi et al., 2024)

Selecting keywords is the first step in this academic analysis, which can be completed using a macro methodology that moves from broad search trajectories to more focused studies and themes. Keyword search utilized both free text terms and controlled vocabulary from MeSH and Scopus thesaurus, including " Electronic health records", "Medical Informatics", and "Digital Health Data". This investigation uses the term "electronic health records" as a focus point in the article title, abstract, and keyword sections after assessing the limitations of previous research and the dearth of studies addressing electronic health records. Researchers use the scopus database for performing literature reviews, finding subject-matter specialists, and keeping an eye on research trends, among other investigative tasks.

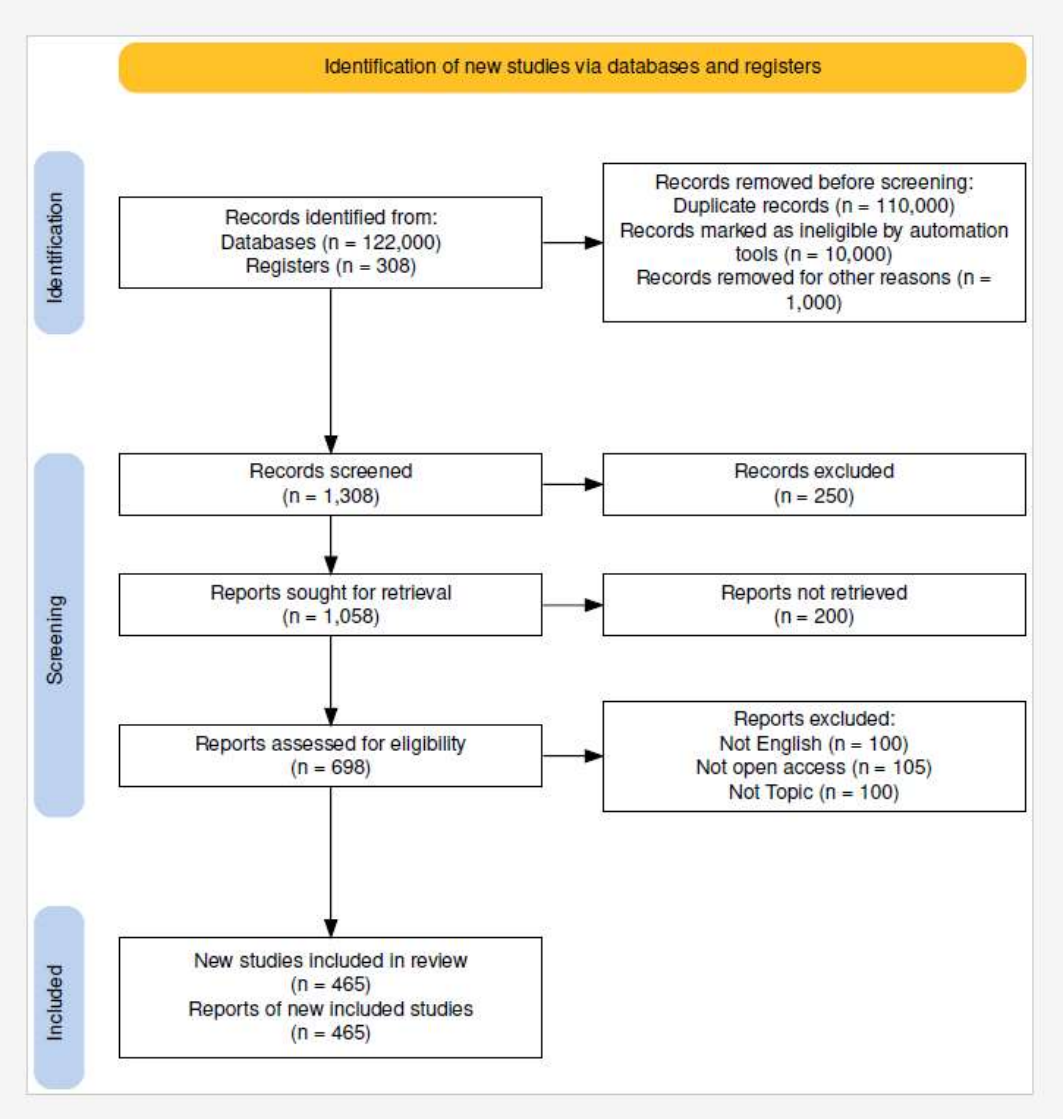


Figure 1. Systematic Literature Review information flow using PRISMA

The total number of articles about electronic health records is 122.308, based on search results obtained on May 13, 2025, from the scopus database using the article title, abstract, and keywords: "Electronic AND Health AND Records" across a variety of academic disciplines, from the earliest publication in 1958 to the most recent in 2025.

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## RESULT AND DISCUSSION

The results of this study focus on findings from articles in the Scopus database on Electronic health records. This data is sourced from identifying the numbers of article published, publications, throughout the years, and journal sources. This study will also highlight the most influential elements in Electronic health records, including the authors, affiliations, and the countries involved.

RQ1*: What is the publication trend on EHR research between 1958 and 2025?*
According to the data retrieved from the scopus database, it has been determined that there have been 465 articles written about electronic health record over the course of four decades. The study of Electronic health record has been developing steadily over the past eight years, especially since 2018. The inaugural study was executed by (Chen et al., 2010) and was entitled "An agile enterprise regulation architecture for health information security management". In 2022, a significant number of academics are becoming interested in the development of research on electronic health records, with a focus on Impact of EHR on Physician Time Efficiency, The Relationship between EHR Complexity and Quality of Care, Doctors' Behavior Towards Digital Systems, and Implications for EHR System Design (Jensen et al., 2022), EHR Integration into Clinical Decision Support (CDS), Automation and Real-Time Access to EHR Data. (Kanbar et al., 2022).

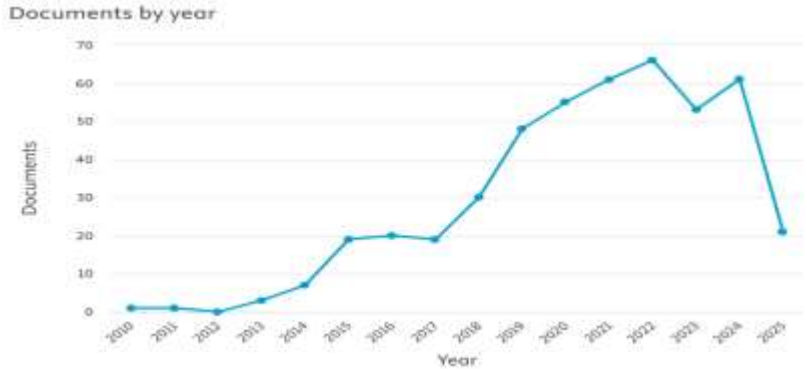


Figure 2. Number of Electronic Health Record publication

Since 2010, there has been some literature on electronic health records, and every year more and more literature can be found. This research is significant for advancing insights into electronic health records. This research could help people understand the practical and long-term use of electronic health records in a variety of industries on a deeper level.

RQ2: *Who are the most influential authors and institutions in the field?*
By grouping the articles into categories such country, area, affiliation, source, and author, and limiting the analysis to the top 10 papers in each category, the distribution of research on electronic health records among the 465 articles was examined. Scholars and practitioners will benefit from having a keen understanding of how to distribute scholarship related to electronic health records in order to clarify the future research agenda, especially with reference to the long-term development of the electronic health record paradigm.
With 237 publications, United States leads the world in the distribution of academic research related electronic health record by country or region, United Kingdom with 79 articles, Caanda with 30 articles, Australia with 29 articles, China with 24 articles, Germany with 21 articles, South Korea with 20 articles, Netherlands with 15 articles and Spain with 13 articles (see figure 3).

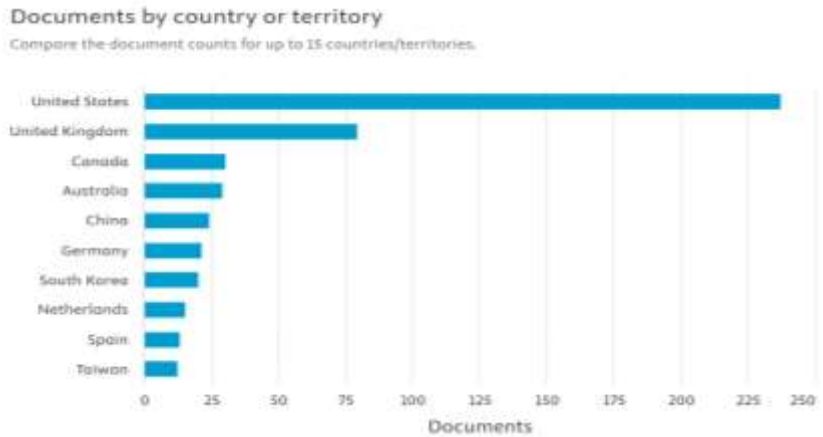


Figure 3. Numbers of articles by country or territory (top 10 country)

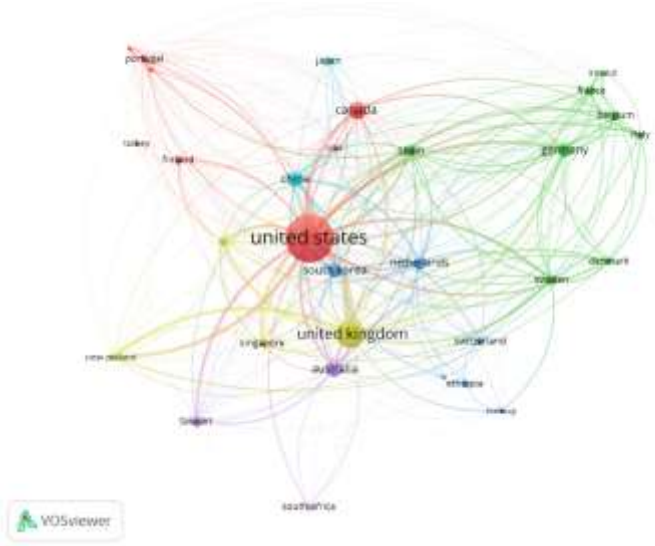


Figure 4. Network Country Visualization

These finding further strengthens the idea that the principle of electronic health records is a digital change in line with developments in the times that can occur in all countries. The allocation of scholarship pertinent to Electronic health record predicated on institutional affiliation is predominantly characterized by University College London (London) with 22 articles, Mayo Clinic (United States) with 19 articles, Harvard Medical School (United States) with 16 documents, Imperial College London (London) with 16 articles, University of oxford (England) with 14 articles, VA Medical Centre (United States) with 12 articles, University Of Oxford Medical Sciences Division (United Kingdom) with 11 Articles, University of Washington (United States) with 11 articles, King's College London (London) with 10 articles, Bringham and Women's hospital (United States) with 10 articles (see figure 5).

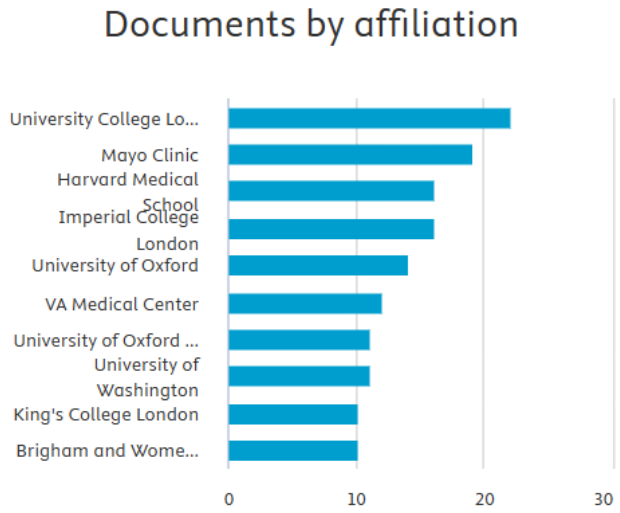


Figure 5. Network country visualization

Electronic health record articles are mostly discussed by universities in the United States. This graph illustrates the level of research involvement of these institutions in the development or study of EHR. The more documents published, the greater the institution's contribution to innovation, technology development, policy, or evaluation of EHR systems.

The distribution of research related to Electronic health records based on authors reveals no clear dominance. The author with the most contributions is De Lusignan, S., with a total of 6 documents. Followed by Hemingway, H. and Yu, H., each with 5 documents. Other names such as Banerjee, A., Bates, D.W., and Denaxas, S. each have 4 documents, as do five other authors. These authors are likely to be experts or principal researchers in the fields of health information systems, digital health data, or electronic patient data management. The more documents an author writes, the greater their scientific influence and contribution in shaping the development and understanding of EHR systems.

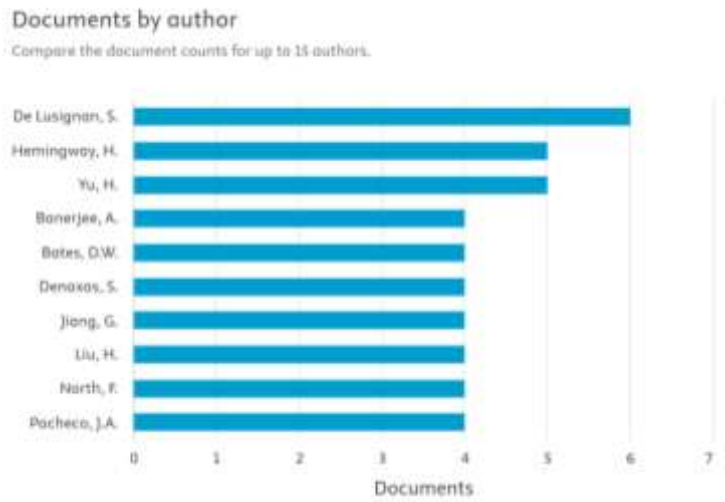


Figure 6. Count of publications by author (top 10 authors)

RQ3 *: What are the thematic gaps and future directions in EHR research?*
The examination was done on 465 manuscript accumulated from the scopus repository, VOS viewer was employed to indicate that the results may possess theoretical and pragmatic repercussions for forthcoming inquiries into electronic health record. Researchers and practitioners will gain a better understanding of the assumptions and conclusions pertaining to electronic health records thanks to the outcomes of the metadata analysis conducted with Vosviewer. Future study can be built upon the bibliometric analysis results obtained by VOSviewer, which can reveal which factors have been thoroughly studied by earlier researchers and which have not. From a practitioner's point of view, the findings of the literature analysis utilizing VOS viewer will help practitioners promote electronic health records for organizations globally and implement them in the future.
From figure 7, the occurrences of electronic health records (2914), electronic medical record (485), health record (285), ehealth (262), electronic data processing (85), and others.

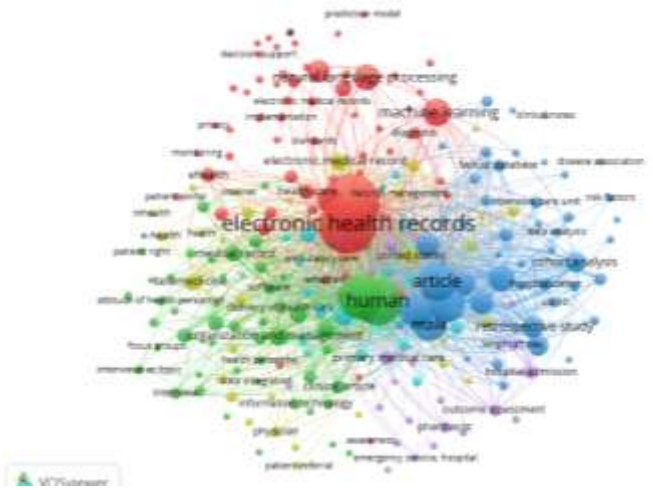


Figure 7. Co-occurrence framework and representation of key terms.

Table 2. Keyword by authors

| Rank | Keyword | Total link strength |
|---|---|---|
| 1. | Electronic health records | 3684 |
| 2. | Article | 2941 |
| 3. | Major clinical study | 1649 |
| 4. | Controlled study | 1365 |
| 5. | Machine learning | 901 |
| 6. | Primary health care | 787 |
| 7. | Medical informatics | 782 |
| 8. | Electronic medical record | 636 |
| 9. | Organization and management | 622 |
| 10. | Medical information system | 555 |

*Source : Output VOSviewer software*

Electronic Health Records (EHR) ranks first with a Total Link Strength of 3684, highlighting it as the most central and frequently connected term in the analyzed literature. This indicates that EHR is a key concept in the field and is widely discussed in relation to many other topics. Article is the second most connected term with a link strength of 2941. Although general, its high ranking suggests a frequent occurrence in the literature, likely representing the document type or general content category. Major Clinical Study and Controlled Study rank third and fourth, with link strengths of 1649 and 1365, respectively. These terms are common in clinical and evidence-based research, indicating a significant relationship between EHRs and clinical study designs. Machine Learning appears in fifth place (901), showing growing interest in the integration of advanced computational methods within the EHR domain. Keywords such as Primary Health Care (787) and Medical Informatics (782) reflect the broader healthcare and informatics context in which EHRs are used. Electronic Medical Record (636) is closely related to EHRs and appears further down the list, indicating a notable but slightly less central role compared to EHRs in the literature. Organization and Management (622) and Medical Information System (555) suggest that operational and systemic aspects of EHRs are also significant research themes.

## LITERATURE REVIEW

The paper emphasizes the importance of adopting structured diabetes data coding more widely across the UK, recognizing its significant potential to enhance both research and clinical practice. By standardizing data through systems such as SNOMED-CT, healthcare providers can enable more consistent and accurate information sharing. However, the successful implementation of such systems requires convincing NHS staff to transition to new clinical terminologies. Scotland's approach to diabetes data collection is presented as a valuable model that other regions could emulate. Early efforts should prioritize minimizing inconsistencies in data capture between general practices and hospitals to ensure continuity of care. Additionally, the establishment of specialist diabetes health information technology (HIT) systems could facilitate real-time data exchange and support more integrated care. Despite these efforts, the study found limited evidence of improved communication across NHS organizations, indicating a need for stronger integration strategies. Ultimately, structured and coded diabetes data holds the potential to empower patient self-management and contribute to better overall healthcare outcomes. (Robertson et al., 2015)

Table 1. Practical Implications of Electronic Health Record

| No. | Practical Implications | Reference |
|---|---|---|
| 1. | The paper highlights the need for standardized digital diabetes data collection across the UK, particularly in England and Scotland. It emphasizes the importance of reducing discrepancies in health information technology between family practices and hospitals | (Robertson et al., 2015) |
| 2. | The costs and workflow integration challenges of HIE (Health Information Exchange) adoption are significant concerns for healthcare providers. Understanding HIE functionality is crucial for provider satisfaction and realistic expectations. The findings emphasize the need for improved data sharing and system security to encourage HIE use | (Cochran et al., 2015) |
| 3. | The paper emphasizes that CDS (Clinical Decision Support System) must be well-designed and properly implemented to improve healthcare quality | (Miller et al., 2014) |
| 4. | The research indicates that electronic transmission of prescriptions (ETP) remains a significant challenge, particularly in social insurance system (SIS) countries and transition countries (TCs). Many general practitioners (GPs) in these regions still rely on paper prescriptions, which can hinder the efficiency and effectiveness of healthcare delivery | (Brennan et al., 2015) |
| 5. | The study highlights that the EMR system facilitated the identification and support of quality improvement initiatives. Although initial costs were high, the long-term benefits became apparent as the data from EMRs were utilized to enhance care quality. This indicates that organizations should be prepared for upfront investments with the expectation The implementation of EMRs contributed to improved patient safety by reducing incidents of restraint and seclusion, as well as minimizing medication errors. This is crucial in mental health settings where patient safety is a primary concern of future returns. | (Riahi et al., 2017) |

## CONCLUSIONS

This study provides a comprehensive synthesis of electronic health records (EHR) research by integrating systematic literature review and bibliometric analysis, offering both theoretical and practical contributions. Theoretically, it enriches the academic discourse by mapping the intellectual structure of EHR scholarship, identifying key themes, influential authors, and emerging research trends across disciplines. The findings illuminate critical gaps, such as the need for enhanced interoperability, standardized data practices, and ethical governance of health data. Practically, the study supports healthcare policymakers, system developers, and practitioners by revealing collaboration patterns and technological directions that can guide more effective design, implementation, and adoption of EHR systems. By capturing the evolution and future trajectory of EHR research, this work lays the foundation for informed decision-making and sustained innovation in digital health infrastructure globally.

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