International Journal of Multidisciplinary Research and Growth Evaluation.

Electronic Health Records: Benefits, Barriers and Best Practices

Dr. Nagabhushana Doggalli [1], Dr. Sushma Rudraswamy [2*], Dr Thippeswamy [3], Dr. Sowmya Srinivas [4]

[1] MDS, PhD, Reader. Department of Oral Medicine and Radiology, J.S.S Dental College and Hospital, J.S.S Academy of Higher Education and Research, Mysore, India

[2] MDS, PhD, Lecturer. Department of Public Health Dentistry, J.S.S Dental College and Hospital, J.S.S Academy of Higher Education and Research, Mysore, India

[3] H M MDS, PhD, Reader. Department of Public Health Dentistry, J.S.S Dental College and Hospital, J.S.S Academy of Higher Education and Research, Mysore, India

[4] MDS, PhD, Lecturer. Department of Prosthodontics and Crown & Bridge, J.S.S Dental College and Hospital, J.S.S Academy of Higher Education and Research, Mysore, India

* Corresponding Author: **Dr. Sushma Rudraswamy**

Article Info

ISSN (online): 2582-7138
Volume: 05
Issue: 06
Novembar-Decembar 2024
Received: 05-09-2024
Accepted: 08-10-2024
Page No: 445-449

Abstract

The progress of information technology has impacted the healthcare sector. Some of these impacts are caused by adopting Electronic Health Records. One of the main goals of EHR is to support continuity, efficiency, and quality in healthcare. These systems can offer benefits, such as ease of access to patient data, research support, and greater completeness and documentation comprehensiveness. In addition, these systems have shown a capacity for reducing medical errors and increasing patient safety, mainly through decision-making support mechanisms.

Despite these benefits, the literature also presents evidence that EHR can incur risks to patient safety when developed and misused. Studies have also documented user dissatisfaction with current systems and usability problems. They have also created a host of new issues, including authorship attribution, data integrity, and regulatory concerns over billed services' accuracy and medical necessity. The predominant EHR-related safety concerns identified can help focus future safety assessment activities on prioritizing ongoing interventions for further research. 'Safe technology' and 'safe use of technology' are necessary for efforts to improve and monitor patient safety.

Keywords: Computerized records, electronic records, health records, health informatics, medical informatics, medical systems

1. Introduction

Our world has been radically transformed by digital technology – smartphones, tablets, and web-enabled devices have changed our daily lives and the way we communicate. Medicine is an information-rich enterprise. A more significant and seamless flow of information within a digital health care infrastructure, created by EHRs, encompasses and leverages digital progress and can transform how care is delivered and compensated. With EHRs, information is available whenever and wherever it is needed.

Inadequate care coordination has been identified as a significant problem in healthcare delivery [1]. Most chronic conditions require care to be coordinated among multiple clinicians, and most patients with these conditions visit providers from many different medical groups [2].

Coordinating these patients' care can involve assembling enormous amounts of disparate information, requiring substantial cognitive effort and administrative time. As a result, care coordination is a generally poor and leading cause of medical errors.

EHR systems enable hospitals to store and retrieve detailed patient information for use by health care providers and sometimes patients, during a patient's hospitalization, over time, and across care settings. Embedded clinical decision support and other tools can help clinicians provide safer, more effective care than is possible by relying on memory and paper-based systems. In addition, EHRs can help hospitals monitor, improve, and report health care quality and safety data.

Meaningful-use incentive payments appear to be promoting adoption, possibly in combination with the availability of new and better EHR products and the growing emphasis on integrating care in accountable care organizations [3]. HIT encompasses a broad range of hardware, software and networking technologies whose primary purpose is to collect, store and transmit health data among the different stakeholders of the healthcare system [4].

Benefits of EHR

These include

- Improved patient care
- Improved care coordination
- Practice efficiencies and cost savings
- Increase patient participation
- Improved diagnostics and patient outcomes

Table 1: Representative Studies of EHR-based applications showing the benefits of EHR for improved patient care

Authors	Study objectives	EHR applications	Outcome indicator
Staroselsky *et al.* [5]	Evaluation of the impact of patient corrections to their own EHR data via a patient portal on the rate of cancer screening and immunization compliance	Patient portals	Cancer screening
Martin *et al.* [6]	Evaluation of monitoring of high-risk asthma patients requiring immunization	Patient rosters	Immunization
Feldstein *et al.* [7]	Evaluation of the impact of reminders on guideline compliance for patient testing and treatment	Automated reminders	Osteoporosis
Fiks *et al.* [8]	Evaluation of the impact of EHR-associated alerts on pediatric immunization rates for inner-city children	Physician alerts	Routine pediatric immunization
Weber *et al.* [9]	Evaluation of the impact of EHR-based intervention to notify physicians of risk for falls based on age and medication use	Electronic messaging through the EHR	Risk of falls in the elderly
Bordowitz *et al.* [10]	Evaluation of the impact of HER implementation on the documentation of patient obesity and the decision to provide medical treatment	Documentation in EHR	Obesity
MacPhail *et al.* [11]	Comparison of diabetes healthcare team coordination in four different care team models using EHR systems for team communication	HER documentation of patient care	Diabetes
Linder *et al.* [12]	Evaluation of the impact of HIT prompts and reminders on the level of patient interventional care by healthcare providers	Smoking status Icons Automated Reminders Smart form	Tobacco use

Barriers to EHR [13].

There are eight categories of barriers: namely A) Financial, B) Technical, C) Time, D) Psychological, E) Social, F) Legal, G) Organizational, and H) Change Process. All these categories are interrelated with each other. In particular, Categories G (Organizational) and H (Change Process) seem to be mediating factors on other barriers. Barrier-related interventions that could overcome the identified obstacles are also discussed below.

Financial: The "Financial" category of barriers includes the monetary issues involved in implementing EHRs. The costs of an EHR system can be divided into two: start-up costs and ongoing expenses. EHR system is a complex process with several stages involving purchasing, coordinating, monitoring, upgrading, and governance costs.

- High start-up costs
- High ongoing costs
- Uncertainty over Return on Investment
- Lack of financial resources

Technical-Electronic Medical Records are hi-tech systems and, as such, include complex hardware and software. A certain level of computer skills by suppliers and users (the physicians) is required. Further, there are still some technical problems with EHRs, which lead to complaints from physicians, and they need to be improved. Therefore, barriers exist related to the systems' technical issues, the physicians' technical capabilities, and the suppliers.

- Physicians and staff lack computer skills
- Lack of technical training and support
- Complexity of the system
- Limitations of the system
- Lack of customizability
- Lack of Reliability
- Interconnectivity/Standardization EHR
- Lack of computers/hardware

Time: A fluent workflow is essential to the work of physicians. The introduction of EHRs will show a physician's workflow, as it will always lead to additional time being required to select, implement and learn how to use EHRs, and then enter data into the system. As a result, their productivity will be reduced, and their workload will be increased. This can cause financial problems, such as a loss of revenue.

- Time required to select, purchase, and implement the system
- Time to learn the system
- Time required to enter data
- More time per patient
- Time to convert patient records

Psychological: Physicians have concerns about using EHRs based on their issues, knowledge, and perceptions. Their perceptions of the questionable quality improvement associated with EHRs and worries about loss of professional autonomy.

- Lack of belief in EHRs
- Need for control

Social: Rather than working alone, physicians in medical practices cooperate with other parties in the healthcare industry, such as vendors, subsidizers, insurance companies, patients, administrative staff, and managers. The decision-making process over EHR implementation by physicians is influenced by these parties and will affect the relationship between physicians and patients. The relationships between a

physician having to make an EHR decision and these other parties can create what can be categorized as "Social" barriers.

- Uncertainty about the vendor
- Lack of support from external parties
- Interference with the doctor-patient relationship
- Lack of support from other colleagues
- Lack of support from the management level

Legal: Electronic Medical Records deal with patients' medical information, which should be treated as private and confidential. Physicians believe that keeping such information safe is very important because otherwise, it could create legal issues. However, there is a lack of clear security standards which can be followed by those involved in using EHRs.

•privacy or security concerns

Organizational: Physicians work in medical practices and hospitals, and the organizational characteristics of individual approaches will be a factor in the adoption of EHRs. Physicians of different sizes and types of methods may well have different attitudes toward EHRs.

•Organizational size and Organizational type

Change Process: Implementing EHRs in medical practices amounts to a significant change for physicians who tend to have the unique working styles they have developed over the years. This can make them unwilling to create or adapt to changes in their work. Therefore, the change process is a challenge and a problem. Problems that occur during the change process, such as the lack of proper organizational culture, lack of incentives, individual and local resistance, lack of community-level participation, and lack of leadership, fall within this category.

- Lack of support from the organizational culture
- Lack of incentives
- Lack of participation
- Lack of leadership

Table 2: Perceived barriers and related possible interventions

Perceived barrier	Possible barrier-related intervention strategies
Finance	Provide documentation on return on investment. Show good examples from other EHR implementations. Provide financial compensation.
Technical	Educate physicians and support ongoing training. Adapt the system to existing practices. Implement EHR on a module-by-module basis. Link EHR with existing systems. Promote and communicate the reliability and availability of the system. Acquire a third party for support during implementation
Time	Provide support during the implementation phase to convert records and assist. Provide training sessions to familiarize users. Implement a user-friendly help function and help desk. Redesign workflow to achieve a time gain
Psychological	Discuss the usefulness of the EHR Include the trial period. Demonstrate ease of use. Start with voluntary use. Let fellow physicians demonstrate the system. Adapt the system to current medical practice
Social	Discuss advantages and disadvantages for doctors and patients. Information and support from physicians who are already users. Ensure support, leadership, and communication from management.
Legal	Develop requirements on safety and security in cooperation with physicians and patients. Ensure the EHR system meets these requirements before implementation. Communicate on safety and security of issues.
Organization	Redesign workflow to realize a better organizational fit. Adapt EHR to organization type. Adapt EHR to the type of medical practice.
Change process	Select a project champion, preferably an experienced physician. Let physicians (or representatives) participate during the implementation process. Communicate the advantages for physicians. Use incentives. Ensure support, leadership, and communication from management.

The table-2 indicates that policymakers should be more aware of the reality that removing technical, financial, and legal barriers is not sufficient to ensure the realization of the promises of EHR. As suggested in this Table, a range of other measures may be needed if physicians are to come to a favorable decision over using these systems in their daily practices. This also suggests interventions that could be helpful to implementers in overcoming these barriers. However, it would be wrong to conclude that there is a "one way fits all" route. EHR implementers and change managers must choose and decide on relevant interventions based on their conditions and situation. At the same time, they should consider the structures and conditions of the practices they are dealing with - an exciting and challenging task.

Best practices of HER

As EHRs become increasingly sophisticated and integral to healthcare operations, clinicians and other stakeholders look for empirical evidence pointing to implementing the most efficient, effective, safe, and user-friendly EHR system.

The ideal model posits that all of the following dimensions must work in harmony if a complex, adaptive healthcare system is to provide safe and effective care for all patients [14]. Digital health technologies have rapidly progressed in the last five to ten years, and digitizing medical records was one of the logical steps in modernizing the healthcare system [15]. Huge resources in various forms have been deployed worldwide to overhaul the system and maximize efficiency. The promise and intended benefits of electronic health records (EHR) were many at the outset, for instance, elevating the levels of care, enhancing patient safety, streamlining chaotic processes, and cutting costs [16].

Better informed decision-making:

Availability of patient information in a structured and processed format with tracking in real-time provides an unmatched decision-making opportunity for a busy clinician in the electronic version as opposed to cumbersome paper-based scribbles. Time-bound alerts and reminders for patients aligned to management, prevention, and screening have been proven to improve the quality of care, especially in chronic diseases [17].

- Hardware and software – computing infrastructure used to power, support, and operate clinical applications and devices;
- Clinical content – text, numeric data, and images that constitute the 'language' of clinical applications;
- User interface – all aspects of technology that users can see, touch or hear as they interact with it;
- People – everyone who interacts in some way with technology, including developers, users, IT personnel, and informaticians;
- Workflow and communication – processes to ensure that patient care is carried out effectively;
- Internal policies and procedures – policies, procedures, physical environment, and culture;
- External rules and regulations – federal or state rules that facilitate or constrain preceding dimensions;
- Measurement and monitoring – processes to evaluate and optimize both intended and unintended consequences of health IT implementation and use.

Once we have established the best attributes for various EHR features, functions, and processes, we must find ways to disseminate knowledge rapidly and accurately so other users around the globe can learn from this work. Only after these attributes have been widely adopted can we expect to experience the transformative power of genuinely EHR-enabled healthcare systems.

Conclusion

Evidence shows that EHR has the potential to benefit physician practice organizations by improving clinical and economic outcomes. Future research should be on a larger scale to test interventions to overcome implementation obstacles in physician groups of varied sizes, specialties, and affiliations. The EHR can improve health care productivity and efficiency to serve public health better. An abundance of health care information can be managed through databases using electronic medical records, making data more easily shared between providers and organizations. As there can never be a perfect spouse, there can never be an ideal EHR. EHRs must evolve, and the potential users synchronously need to retrain themselves and change their mind set until a sweet spot is reached [18].

Future Scope

In the recent review, Sadoughi *et al.* considered 32 studies published between 2005 and 2016 that analyzed the financial or clinical impact of Health Information exchange. Nearly all studies investigating an improvement of quality showed a positive impact and positive effect on cost-effectiveness, with 78% of studies demonstrating an increase in quality of care and 56% demonstrating a reduction of costs [19, 20].

Although EHRs have many problems, there are reasons to believe that they will eventually start living up to their promise. With some changes in technology, regulations and attention to training, EHRs may soon serve as the backbone of an information revolution in health care, one that will transform health care the way digital technologies are changing banking, finance, transportation, navigation, internet search, retail, and other industries.

References

1. Bodenheimer T. Coordinating care—a perilous journey through the health care system. New England Journal of Medicine. 2008;358:1064-1071.
2. Pham HH, Schrag D, O'Malley AS, *et al.* Care patterns in Medicare and their implications for pay for performance. New England Journal of Medicine. 2007;356:1130-1139.
3. CMS.gov. Available from: http://www.cms.gov/ehealthrecords.
4. Goldstein MM, Blumenthal D. Building an information technology infrastructure. The Journal of Law, Medicine and Ethics. 2008;36:709-715.
5. Staroselsky M, Volk LA, Tsurikova R, *et al.* Improving electronic health record (EHR) accuracy and increasing compliance with health maintenance clinical guidelines through patient access and input. International Journal of Medical Informatics. 2006;75:693-700.
6. Martin E. Improving influenza vaccination rates in a pediatric asthma management program by utilization of an electronic medical record. Clinical Pediatrics. 2006;45:2217.
7. Feldstein A, Elmer PJ, Smith DH, *et al.* Electronic medical record reminder improves osteoporosis management after a fracture: a randomized, controlled trial. Journal of the American Geriatrics Society. 2006;54:450-457.
8. Fiks AG, Grundmeier RW, Biggs LM, Localio AR, Alessandrini EA. Impact of clinical alerts within an electronic health record on routine childhood immunization in an urban pediatric population. Pediatrics. 2007;120:707-714.
9. Weber V, White A, McIlvried R. An electronic medical record (EHR)-based intervention to reduce polypharmacy and falls in an ambulatory rural elderly population. Journal of General Internal Medicine. 2008;23:399-404.
10. Bordowitz R, Morland K, Reich D. The use of an electronic medical record to improve documentation and treatment of obesity. Family Medicine. 2007;39:274-279.
11. MacPhail LH, Neuwirth EB, Bellows J. Coordination of diabetes care in four delivery models using an electronic health record. Medical Care. 2009;47:993-999.
12. Linder JA, Rigotti NA, Schneider LI, Kelley JH,

Brawarsky P, Haas JS. An electronic health record-based intervention to improve tobacco treatment in primary care: a cluster-randomized controlled trial. Archives of Internal Medicine. 2009;169:781-787.
13. Boonstra A, Broekhuis M. Barriers to the acceptance of electronic medical records by physicians: from systematic review to taxonomy and interventions. BMC Health Services Research. 2010;10:231.
14. Sittig DE, Singh H. Which electronic health record is better: A or B? Realities of comparing the effectiveness of electronic health records. Journal of Comparative Effectiveness Research. 2014;3(5):447-450.
15. Howarth A, Quesada J, Silva J, *et al.* The impact of digital health interventions on health-related outcomes in the workplace: A systematic review. Digital Health. 2018;4:2055207618770861.
16. Kataria S, Ravindran V. Digital health: a new dimension in rheumatology patient care. Rheumatology International. 2018;38:1949-1957.
17. Kataria S, Ravindran V. Electronic health records: a critical appraisal of strengths and limitations. Journal of the Royal College of Physicians of Edinburgh. 2020;50:262-268.
18. Honavar SG. Electronic medical records – The good, the bad and the ugly. Indian Journal of Ophthalmology. 2020;68:417-418.
19. Uslul A, Stausberg J. Value of the Electronic Medical Record for Hospital Care: Update from the Literature. Journal of Medical Internet Research. 2021;23(12).
20. Sadoughi F, Nasiri S, Ahmadi H. The impact of health information exchange on healthcare quality and cost-effectiveness: A systematic literature review. Computer Methods and Programs in Biomedicine. 2018;161:209-232.