

# Barriers for Adopting Electronic Health Records (EHRs) by Physicians

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## Professional paper

### ABSTRACT

**Introduction:** Electronic Medical Records (EMRs) are computerized medical information systems that collect, store and display patient information. They are means to create legible and organized recordings and to access clinical information about individual patients. Despite the positive effects of the EMRs usage in medical practices, the adoption rate of such systems is still low and meets resistance from physicians. The EHRs represent an essential tool for improving both in the safety and quality of health care, though physicians

must actively use these systems to accrue the benefits. This study was unsystematic-review.

**Aim:** The aim of this study was to express barriers perceived by physicians to the adoption of the EHRs. **Method of the study:** This study was non-systematic reviewed which the literature was searched on barriers perceived by physicians to the adoption of Electronic Health Records (EHRs) with the help of library, books, conference proceedings, data bank, and also searches engines available at Google, Google scholar. **Discussion:** For our searches, we employed the following keywords and their combinations: physicians, electronic medi-

cal record, electronic health record, barrier, and adoption in the searching areas of title, keywords, abstract, and full text. In this study, more than 100 articles and reports were collected and 27 of them were selected based on their relevancy. Electronic health record use requires the presence of certain user and system attributes, support from others, and numerous organizational and environment facilitators.

**Key words:** physicians; electronic health record; barrier; adoption

## 1. INTRODUCTION

The Institute of Medicine reported to Err is Human that building a Safer Health System cites one of the most extensive adverse drug event studies, the Harvard Medical Practice Study, and notes that 58 percent of adverse events due to errors in the study were preventable, 27.6 percent were due to negligence, and 19 percent were due to drug complications which were the most common adverse event. In order to: 1) reduce medical errors, 2) provide more effective methods of communicating and sharing information among clinicians, and 3) better manage patient medical records, we need to embrace information technology in healthcare. Since medical errors are a leading cause of death in the United States and since paper records can be easily lost, misplaced, or are often illegible, the use of electronic health record technology would eliminate many of these issues and lead to major improvements in the health and safety of patient care (1).

Electronic Medical Records (EMRs) are computerized medical information systems that collect, store and display patient information. They are means to create legible and organized recordings and to access clinical information about individual patients. The EMRs and Electronic Health Records (EHRs) are viewed as interchangeable synonyms in most health informatics. Other similar expressions exist albeit with a sometimes slightly restricted focus (2).

The Institute of Medicine and others have suggested that the wide-scale adoption of the EHRs could be pivotal for improving patient safety and health care quality. EHRs may also reduce the costs of providing ambulatory care. However, despite emerging evidence about the benefits of EHRs, there are considerable barriers to adoption (3).

The health care sector is an area of social and economic interest in several countries; therefore, there have been lots of efforts in the use

of electronic health records. Nevertheless, there is evidence suggesting that these systems have not been adopted. Physicians have a central role in the use of the EHRs, as they are who provide much of the information that the systems handle in their automated processes (4).

Despite broad agreement on the benefits of electronic health records and other forms of health information technology, health care providers have moved so slowly to adopt these technologies. Lack of readiness causes weakness of organization to undergo transformation during the implementation of the EHRs (5). According to Meinert, the slow rate of adoption suggests that resistance among physicians must be strong because physicians are the main front-line user-group of EMRs. Whether or not they support and use EMRs will have a great influence on other user-groups in a medical practice, such as nurses and administrative staff. As a result, physicians have a great impact

on the overall adoption level of EMRs (6).

Mille and Sim stated that based on a qualitative study of physician practices that had implemented an EMR, quality improvement depends heavily on physicians' use of the EMR and not paper for most of their daily tasks (7). The adoption and meaningful use of electronic health records (EHRs) is a major US national policy priority for improving the quality and efficiency of the healthcare system. This topic has received bipartisan support and led to the US Congress allocating close to \$30 billion in 2009 to promote adoption of interoperable, certified the EHRs (8).

According to Randeree, as technology continues its impact in healthcare, the adoption of new IT options has been able to reduce costs and increase efficiencies. Health care professionals now turn to various patient-centric technologies, including computerized patient records (CPR), document management systems, data warehouses, point-of-care applications, distributed networks, and telematics (Telematics typically is any integrated use of telecommunications and informatics, also known as ICT (Information and Communications Technology), to provide the information they need when they need it (9).

Simon et al. argued that physicians who had adopted an EHR consistently reported more positive views of the potential effect of computers on health care than physicians who did not yet (3).

Miscommunication, misinformation and misinterpretation between vendors, clinic executives, IS leaders, and end-users (physicians and staff) has contributed to a myriad of problems in the marketing, selection, implementation and utilization of the EMRs (5).

The aim of this study was, to identify and discuss about barriers for adopting Electronic Health Records (EHRs) by physicians.

## 2. METHODS

This study was un-systematic review which the literature on physicians' resistance in adoption of Electronic Health Records on a formal re-

Title	Author	Expected or experienced barriers
What factors affect the use of electronic patient records by Irish GPs?	Meade B et al. (10)	Lack of time; Lack of financial resources; Absence of computer skills;
Results of a survey of an online physician community regarding use of the EMRs in office practices.	Ross (11)	High cost; Loss of autonomy; Workflow disruption.
Correlates of EHRs Adoption in Office Practices: A Statewide Survey	Simon et al. (3)	Start-up financial costs; Ongoing financial costs; Loss of productivity.
Doctors' use of the EMRs systems in hospitals: cross sectional survey	Lærum et al. (12)	Access to computers and computer literacy; Flexibility of paper records; Traditional work routines.
A knowledge-based taxonomy of critical factors for adopting EHR systems by physicians: a systematic literature review	Castillo et al. (4)	User attitude towards; information systems Workflow impact; Interoperability; Technical support; Communication among users; Expert support.
If the EMRs are so great, Why family physicians don't use them?	Loomis et al. (13)	Data entry; Less confidence in the security and confidentiality; Concern about the cost for installation and ongoing usage of EMRs.
Primary Care Physicians' Experience with EMRs: Barriers to Implementation in a Fee-for-Service Environment	Ludwick et al. (14)	Training and after-sales experience with the vendor; Technical support from the vendor; Extra time needed for data entry; Time constraint in procurement and implementation; Computer skills of the physicians; Disruption of the flow of information.
Use of EMRs in Oman and Physician Satisfaction	Farsi (15)	Malfunction; Concern about privacy; Cost.
An organizational learning perspective on the assimilation of the EMRs among small physician practices	Reardon et al. (16)	Investment cost; Productivity loss; Lack of financial incentives.
Adoption of EHRs in Primary Care Pediatric Practices	Kemper et al. (17)	System downtime; Increase in physician workload; Providers have inadequate computer skills; Increase in staff workload; Staff have inadequate computer skills; Patient confidentiality; Expense of implementation; Lack of clear return on investment; No improvement in patient care or clinical outcomes; Interference with doctor-patient relationship; Inability to find an EHRs that meets the pediatric practice's requirements; Inability to interface with existing practice systems; Transience of vendors 70.1; Bad previous experience with EHRs.
EHRs in small physician practices: Availability, use, and perceived benefits.	Rao et al. (7)	Capital needed to acquire and implement; Uncertainty about return on investment; Resistance to adoption from practice physicians; Capacity to select, contract and install the EHR; Concern about loss of productivity during transition; Concern about inappropriate disclosure of patient information; Concern about illegal record tampering/hacking; Concern about the legality of accepting the EHR from a hospital; Concern about physician's legal liability Finding an EHR that meets your needs; Concern that the system will become obsolete;
EHRs: Use, barriers and satisfaction among physicians who care for black and Hispanic patients	Jha et al. (18)	Computer skills of you and/or colleagues/staff; Computer technical support; Lack of time to acquire knowledge about system; Start-up financial costs; Ongoing financial costs Training and productivity loss; Physician skepticism; Privacy or security concerns;

search framework. We used a sub-systematic method, which was divided into three phases: literature collection, assessing, and selection. The literature search was conducted. The literature was searched on barriers perceived by physicians to the adoption of the EHRs with the help of library, books, conference proceedings, data bank, and also searches engines available at Google, Google scholar. For our searches, we employed the following keywords and their combinations: Physicians, electronic medical record, electronic health record, barrier, adoption in the searching areas of title, abstract and full text.

More than 100 articles were collected. After exclude duplicated articles, some articles were excluded based on the following criteria: 1) article related to barriers linked to physicians no to other medical staff, 2) article focused on EHR, not involving other electronic systems. After filtering 27 articles were selected. We investigated all of them to identified barriers to the acceptance of EHRs by physicians. Then we studied how these barriers affect on physicians' resistance using EHR. Finally we proposed some useful interventions that can act as references for implementers of Electronic Health Records.

### 3. RESULTS

All of the barriers that have mentioned in the 20 articles have showed in the following Table 1.

Information is enough valuable and it must be well documented, maintained, retrieved and analyzed. In health management systems, information has a special role in planning, evaluation, training, legal aspects and research (24). In fact, the first distinction between developed and developing countries, are the production, application and utilization of information (25, 26, 27).

Some articles had similar barriers. Most barriers were mentioned in articles are discussed below:

#### 3.1. Time

Physicians do not take the time to properly become familiar with the available products, select an EMR, implement it, and then train to use it even though colleagues have invested time and realized great benefit (13).

Exploring Physician Adoption of EMRs: A Multi-Case Analysis	Randeree (8)	1) Cost; 2) Increase in staff workload; 2) Supplier presence; 3) Vendor trust; 4) Customizability; 5) Reliability.
Physicians and EHRs A Statewide Survey	Simon et al. (19)	Costs; Quality of health care; Interactions with the health care team; Patient-physician communication; Patient privacy
Adopting EMRs primary care: Lessons learned from health information systems implementation experience in seven countries	Ludwick et al. (20)	Privacy; Patient safety; Provider/patient relations; Staff anxiety; Time factors ; Quality of care; Finances; Efficiency; Liability.
Physicians In Non-primary Care And Small Practices And Those Age 55 And Older Lag In Adopting EHR Systems	Decker et al. (21)	Practice size; Physician age; Ownership status;
Physicians' Use Of EMRs: Barriers And Solutions	Miller et al. (6)	High initial financial costs; Slow and uncertain financial payoffs; High initial physician time costs; Difficulties with technology; Complementary changes and support; Electronic data exchange; Financial incentives.
Resistance Is Futile: But It Is Slowing the Pace of EHR Adoption Nonetheless	Ford et al. (22)	Uncertainty about implementation costs, causes and effects; Uncertainty about shifting standards; Uncertainty about potential policy interventions.
Resistance to EMRs: A Barrier to Improved Quality of Care	Meinert (5)	Learning curve; Impact on productivity; Response time; Cost; Security; Patient acceptance; Privacy; Complexity; Training needs.
What Stands in the Way of Technology-Mediated Patient Safety Improvements? A Study of Facilitators and Barriers to Physicians' Use of EHRs	Holden (23)	Learning; Typing proficiency; Understanding the EHR system; Motivation/initiative; Strategies/workarounds; Supporting hardware/software system ; Speed; Functionality; Usability; Formal technical support; Formal training; Informal support from colleagues; Time allowance; Inter-institutional integration; Physical space; Electricity; Wireless connectivity; Social environment.

**Table 1.** Some experienced barriers to Adopt EHRs by physicians

Taking extra time to use EHR and not being compensated for taking a lighter load were perceived barriers. Physicians reported that they needed but did not always have time to use the system fully, to participate in further training, or to learn new features (22).

#### 3.2. Cost

Physicians have to weigh the costs of creating and supporting their own IT structure and applications, or

using external vendors to provide the services. These costs may include purchase price, coordination costs, monitoring costs, and negotiating costs, upgrade costs, and governance costs. These costs act contrary to the benefits provided by the EMR. For small to medium sized practices without large IT budgets, costs remain the biggest barrier to adoption (8). The high up-front financial costs of implementing EMRs are a primary bar-

rier to their adoption. This barrier is compounded by uncertainty over the size of any financial benefits that may accrue over time (6).

### 3.3. Absence of computer skill

The skills needed to listen to patients' complaints, assess medical relevance, contemplate interventions as well as type notes all at the same time would require a significant level of concentration, typing skills, and familiarity with the application's user interface, not normally found in the most adept computer users (13).

EMR providers appear to underestimate the level of computer skills required from physicians, while the system is not only seen as but in practice actually is very complex to use by these physicians. Further, good typing skills are needed to enter patient medical information, notes and prescriptions into the EMRs, and some physicians lack them (2).

### 3.4. Workflow disruption

Physicians do not take the time to properly become familiar with the available products, select an EMR, implement it, and then train to use it even though colleagues have invested time and realized great benefit. The skills needed to listen to patients' complaints, assess medical relevance, contemplate interventions as well as type notes all at the same time would require a significant level of concentration, typing skills, and familiarity with the application's user interface, not normally found in the most adept computer users (4).

### 3.5. Concern about security and privacy

Despite of evidence to the contrary, nonusers believe that there are more security and confidentiality risks involved with EMRs than paper records (12). There is added concern for privacy, confidentiality, and security for computerized patient information (14).

### 3.6. Communication among users

Communication among users refers to the act of interchanging thoughts, opinions, or information by speech, or writing. Communication among users is as a very important factor contributing to the user acceptance of these systems. The communication among users might be encouraged through social net-

works to help innovation users promote social interaction, which assists them to adopt innovations (4).

### 3.7. Interfaces with doctor-patient relationship

A few researchers have considered the possibility of interaction problems between doctors and patients when using EMRs. Patient eye contact is and, therefore, the more complete the interpersonal communication, possibly leading to higher quality of care. In the research by Ludwick et al. some physicians reported that they sometimes stop using EMRs because hunting for menus and buttons disrupts the clinical encounter (13).

### 3.8. Lack of incentives

The EMRs use could be increased through financial rewards for quality improvement and for public reporting of multiple measures of quality performance (6).

### 3.9. Complexity

The multidisciplinary of screens, options, and navigational aid Problems with EMR usability especially for documenting progress notes caused physicians to spend extra work time to learn effective ways to use the EMR. These substantial initial time costs are an important barrier to obtaining benefits, as greater burdens on physicians' time decrease their use of EMRs, which lowers the potential for achieving quality improvement (6).

### 3.10. Physical space

Barriers included cluttered workspaces, insufficient space for a paper chart when using EHR, not enough private rooms for computer use, computer stations ill-suited to tall users, and physicians not being physically located at a computer station (e.g., when commuting (22).

### 3.11. Concern about the ability to select an effectively install HER system

Physicians were far more worried about finding a system that met their needs or the future obsolescence of their EHR systems (7).

### 3.12. Technical support

Technical support facilitated use both in the initial days and weeks of EHR and afterward. Support staff was generally perceived as knowledgeable and helpful, although some physicians noted that support staff was un-

available sometimes (off hours; holidays) (22).

### 3.13 Interoperability

Interoperability as a determinant factor for adopting these systems that interoperability could reduce rework by care providers; improve dissemination and movement of new medical knowledge among physicians. Interoperability is important because it decreases the cost of electronic health records and makes it feasible for an individual or small group of physicians to acquire and adopt these systems (4).

### 3.14. Access to computers and computer literacy

The low level of electronic medical records system use could be explained by a lack of available computers. This would, however, affect the use for all clinical tasks in a uniform manner (11).

### 3.15. Vendor trust

Lack of technical training and support from vendors has been reported as a barrier to the adoption of EMRs by physicians. Therefore, the quality of vendors of EMR systems is crucial for the acceptance of EMRs. EMR systems are still relatively new in the marketplace. The lack of suitable vendors reflects an immature industry, without sufficient viable products or competitors able to offer better services, and without enough information on vendors to enable an informed decision. Physicians are concerned that vendors are not qualified to provide a proper service, or will go out of business and disappear from the market, leading to a lack of technical support and a large financial loss (2).

### 3.16. Expert support

Expert support refers to the assistance provided from a physician to another physician. This can be divided in two aspects: 1) a physician with experience in electronic health records usage assists, with information about how to use the system, to another physician; 2) a physician has the knowledge to help another physician accomplish a medical task. Such assistance can be given through personal contact or via documents (4).

### 3.17. Concern about data entry

Practicing family medicine requires varied skills, a fast pace,



treating patients from multiple age groups, diagnosing conditions from a myriad of potentially unrelated complaints, and keeping a comprehensive record from multiple sources. These factors make data entry the largest potential obstacle to the effective use of computers in family medicine (4).

### 3.18. Training and after-sale experiences with their vendor

Our physicians complained about their training and post-sale experience with their vendor. Instead of a training regimen similar to that described in the literature, physicians reported that their vendor simply offered one training session of one half to a full day in duration. Training was often too soon after implementation. Physicians had not developed sufficient experience with their new EMR to ask relevant questions or appreciate the answers. Physicians reported that they could not always access vendor technical support (13).

### 3.19. Reliability

Reliability refers to the dependability of the technology systems that comprise the

EMR. As more vendors enter the lucrative healthcare market, the number of competing systems will increase. Vendors will seek to differentiate themselves from competitors using quality and reliability of their EMR systems as evidence of their superiority (8).

### 3.20. Inadequate data exchange

Another barrier to EMR use was the lack of adequate electronic data exchange between the EMR and other clinical data systems (such as lab, radiology, and referral systems). Having parallel electronic and paper-based systems forced physicians to switch between systems, thereby slowing workflow, requiring more time to manually enter data from external systems, and increasing physicians' resistance to EMR use. To take advantage of these developments and to stimulate additional improvements in clinical data exchange, policies should hasten the creation of community wide data exchange systems that allow clinicians to view all of their patients' data, regardless of provider and care site (6).

### 3.21. Concern about patient acceptance

Physicians would spend more time interacting with the computer than the patient. In these cases it was clear that the respondents did not view the EMR as an opportunity to enhance or improve physician-patient communication (5).

### 3.22. Formal training

Although initial formal training was depicted favorably by some, insufficient training was often identified as a barrier, either because there was not enough training or because classroom training was ill-suited to physicians' clinical needs and learning styles (22).

### 3.23. Speed

System slowness in some units, but not in others, was perceived as a barrier to use (22).

### 3.24. Interinstitutional integration

Physicians could not use patient data from EHRs to which they had no access, having to instead rely on printed documents. Physicians identified having to log in separately to inpatient and outpatient EHR systems as a barrier to "seamless access" (22).

### 3.25. Wireless connectivity

A broadband connection and wireless connectivity facilitated use, but these were not always available (e.g., at nursing home; in some outpatient clinics that a specialist might visit) (22).

## 4. CONCLUSIONS

The review of identified articles shows the wide range of possible barriers to implementing EHRs. Despite the positive effects from using EMRs in medical practices, the adoption rate of such systems is still low and they meet resistance from physicians. Electronic health record use requires the presence of certain user and system attributes, support from others, and numerous organizational and environment facilitators. In addition, difficulty of using EHRs and the non-use of specific functions result from the presence of barrier. For the EHR systems to have a positive impact on patient safety, clinicians must be able to use these systems effectively after they are made available. By considering the factors identified in this study, it should be possible to improve the ability of cli-

nicians to easily and effectively use the EHR. That, in turn, will increase the probability of quality and safety improvements through the EHR. The review showed that implementers can insulate the project from such concerns by establishing strong leadership, using project management techniques, establishing standards and training their staff to ensure such risks do not compromise implementation success. Many medical schools do not employ the EHRs or train students in their use. Training medical students to rely upon EHRs and their decision support tools can only serve to accelerate universal the EHR adoption. The findings of this study can be used as an overview of barriers that physicians might possibly see in the EMR implementation process.

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