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Patient satisfaction with electronic medical/health record: a systematic review

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Patient satisfaction with electronic medical/health record: a systematic review

Rationale and aim: Facilitators and barriers to satisfaction after implementation of the electronic medical/health record (EMR/EHR) are important to understand as patient satisfaction is linked with improvement in health care and meaningful use of EMR/EHR. The objectives of this systematic review were to evaluate patient satisfaction after implementation and to synthesize available factors regarding the estimates of the patient satisfaction with EMR/EHR. These factors may help vendors to better design EMR/EHR and to assist in providing direction for progression of research in this field.
Methods: Data sources for the study included reports of studies from the Medline, Ovid, Springerlink, EBSCOhost, Embase and Wiley Online Library, and searching of bibliographies of review and other articles. Our inclusion criteria were the descriptions of patient satisfaction after implementation of EMR/EHR.
Results: Searching the online database resulted in 1425 articles and 58 articles from reference lists. After removing duplicates and assessing against the selection criteria, 41 articles were for further full-text review. After careful analysis, 33 articles were excluded. Eventually, a total of eight articles met inclusion criteria and were assessed.
Conclusions: These studies showed a positive patient satisfaction with EMR/EHR, but more rigorous studies should be carried out to more precisely quantify and describe the impact of EMR/EHR on patient satisfaction. Due to many factors influencing patient satisfaction with EMR/EHR, more research is needed to understand these factors before more concrete measurements of satisfaction can be developed to help researchers develop effective evaluation satisfaction.

Keywords: patient, satisfaction, electronic medical record, electronic health record, systematic review.

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Background

Use of electronic health record (EHR) is becoming more and more common. It is anticipated that their use will improve patient care, decrease practice costs, and increase provider productivity and revenue (1). Electronic medical record (EMR) will become an essential tool across many hospitals (2, 3). Many clinicians and policy-makers believe that increasing the use of EHR will improve the quality of medical care (4, 5), through reductions in medical errors (6), increased availability of real-time information and decision support (7). There is evidence that EMR/EHR can reduce duplicate or inappropriate diagnostic tests (8). EHR helps dramatically with data collection and access and use during an outpatient visit can improve overall satisfaction (9, 10). This could be due to a number of reasons such as increased individualized treatment because of more quickly accessible and accurate patient information or by providing physicians reminders and alerts (11). The EMR supports outcomes of patients' care. With EMR, there is less potential for medical errors as well as improved quality and safety in patient care (12). The EMR/EHR may improve healthcare delivery by facilitating physician communication about medications, enhancing documentation, increasing efficiency, and fostering information sharing and responsibility with patients (13–16). EMR/EHR provides an obvious advantage over paper-based records because it allows providers to access patient records anytime and anywhere as long as they are able to log into the system. It completely changes the manner of information collection as well as the medical office paradigm. Both the physician and the patient are affected by an EMR/EHR.

Information technology can be used to facilitate and augment strategies for improving patients satisfaction.

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However, some physicians worry about the way in which computers will affect their role as the care provider, and have expressed concerns that using a computer system negatively affects the interaction between doctor and patient (17–20). Some physicians are concerned about the effect of less eye contact with the patient with the use of EMR (21). Physicians may worry about the need to attend to the computer rather than the patient or may find the challenge of adapting to the new technology daunting (22). Perhaps one of the greatest concerns surrounding EMR/EHR is whether they will positively or negatively affect patient satisfaction. Similarly, patients fear concerning data confidentiality (23). However, formal evaluations of EMR/EHR rarely address patients' views of quality of care after implementation of such system. This missing information could greatly enhance the viability of existing EMR/EHR (24). The measurement of patient satisfaction is an important tool for research, administration and planning of EMR/EHR.

Aim

Our objectives of this systematic review were to evaluate patient satisfaction after implementation of the EMR/EHR and to analyse the impact of patient satisfaction. These factors influencing patient satisfaction may help vendors to better design EMR/EHR and to assist in providing direction for progression of research in this field.

Methods

Data sources and search strategy

A systematic search of the literature from January 1995 to August 2011 was performed using Medline, Ovid, Springerlink, EBSCOhost, Embase and Wiley Online Library. We have searched for relevant English-language papers based on keywords. Reference lists of relevant articles were hand searched to supplement this process. The search strategy included the following terms: EMR or EHR, electronic patient record (EPR), computerized patient record (CPR), patient, satisfaction and clinical information systems. Only English full-text papers published in peer-reviewed journals and proceedings were selected for further review. Abstracts of all papers identified from the search strategy were read and assessed by two of the reviewers independently. Abstracts that were rated as relevant to the research question were kept, and full-text papers were retrieved for further review. In the absence of an abstract, full-text papers were retrieved and reviewed. Reference lists of selected papers were examined to identify other relevant articles. The quality of selected papers was assessed independently by two reviewers using a standardized evaluation process. A third reviewer reviewed by adjudication, in cases of disagreement.

Inclusion criteria

In selecting studies for inclusion in this review, we required that studies use patient satisfaction with EMR/EHR, EPR, CPR and personal health record.

Data extraction

Abstracts needed to appear potentially relevant to the study area. Two investigators then independently assessed each article to determine its appropriateness for inclusion. We searched the bibliographies of all studies retrieved from our original search for additional relevant work, also including articles suggested by experts in the field. They describe critical factors of patients satisfaction with EMR/EHR; if they focused on physician and/or others, the papers were excluded. Although it is important to analyse the adoption of EMR/EHR by other stakeholders in the medical domain, as we stated before, patient satisfaction in the physician–patient relationship is the cornerstone of health care.

Results

Literature selection overview

Searching the online database resulted in 1425 articles from Medline, Ovid, Springerlink, EBSCOhost, Embase and Wiley Online Library, and 58 articles from reference lists. From the initial screening of the titles, we rejected 1368 articles. Of the remaining 115 articles, we excluded 74 articles during the screening of the abstracts. Forty-one articles that appeared to be relevant to the objectives of the research were identified, and their full texts were retrieved for further examination. Two reviewers independently read and judged those 41 articles against our inclusion criteria, resulting in our final list of 8 articles to include in the analysis (Fig 1).

Study designs

Several study designs were used: one was RCT, four were cross-sectional studies, and three were before–after studies (Table 1).

Study characteristics

The RCT found positive results of patient satisfaction with EHR. There was difference in overall satisfaction between the two groups; the intervention significantly increased patient satisfaction with test results communication (odds ratio, 2.35; 95% confidence interval, 1.05–5.25; p = 0.03)

(25). One of the cross-sectional studies showed the mean overall satisfaction per cent score as reported by subjects was 85.6% (SD 4.9). There were statistically significant associations between mean per cent satisfaction score of the participants (26). The others found 94%; 83.5% patients were satisfied (satisfied or very satisfied) with the EMR overall (27, 28). Among all reviewed papers, three papers conducted their evaluation process after 6 months (6–36 months) of the implementation of EMR/EHR (26, 29, 30). These studies found a positive effect of patient satisfaction after implementation of EMR/EHR.

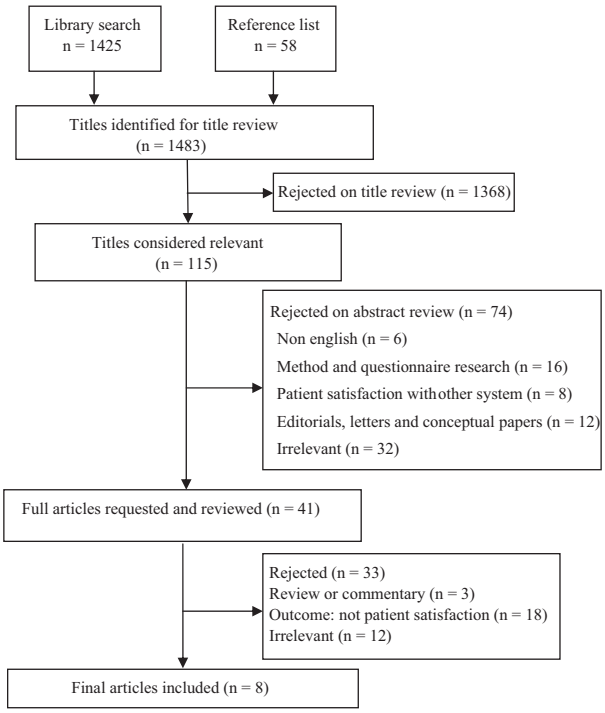

Figure 1 Flow diagram of included and excluded studies.

Instrument design

All studies developed the survey instrument to measure patient satisfaction with EMR/EHR. Six papers reported the validity and reliability of the instrument (25–28, 31, 32). Two papers did not report on validity or reliability (29, 30). Of the eight studies that provided this information, three studies used Likert-type questions in which the patient responds to statements about EMR using a scale of strong agreement or strong disagreement (26, 27, 32). The number of items used to assess satisfaction with EMR/EHR was reported in all studies.

Questionnaire content

Instruments focused on various aspects of patient satisfaction with EMR/EHR. These included user/system interaction (access, ease of use), the system's basic characteristics (efficiency, reliability), security (confidentiality, privacy, secure messaging), information (information about treatment and condition, accurate, complete, understandability, track information), quality of the care (healthwise knowledge base, overall care, technical quality, interpersonal care, outcome, provider selection decisions, physician–patient relationship, quality of their care), communication (physician listening skills, general physician communication, communication preferences, learning of abnormal, test results), favour of EMR, computer intrusion (Table 2).

Table 1 Patient satisfaction with EMR/EHR

Authors	*Name of system*	*Domain*	*Time period from Implementation to evaluation*	*Study design*	*Results*
Matheny et al. (25)	EMR	Outpatient primary care 570/768 (USA)	>12 months	RCT	Significantly increased satisfaction
Al-Azmi et al. (31)	EHR	Primary care 200/215 (Kuwait)	N/A	Cross-sectional	85.6% overall satisfaction
Ralston et al. (27)	EMR	My Group Health 921/2000 (USA)	>36 months	Cross-sectional	94% satisfied or very satisfied
Hassol et al. (29)	EHR	Primary care 1421/4282 (USA)	>12 months	Before–after	Mostly positive satisfaction
Arora et al. (30)	EMR	Emergency department 173 (USA)	>12 months	Before–after	Strongly positive
Freeman et al. (32)	EMR	Headache specialty 394 (USA)	N/A	Cross-sectional	High satisfaction
Gadd et al. (26)	EMR	Outpatient 165/200 (USA)	>6 months	Before–after	4.59 (1–5) satisfaction
Garrison et al. (28)	EMR	Family Medical 304/478 (USA)	N/A	Cross-sectional	83.5% excellent/very good

Responses ranged from 1 ('strongly disagree') to 5 ('strongly agree').
N/A, not available.

Table 2 The items of patient satisfaction with EMR/EHR

Authors	*Name of system*	*Items*
Matheny et al. (25)	EMR	Test result communication
		Information given about treatment and condition
		Physician listening skills
		General physician communication
Al-Azmi et al. (31)	EMR	Overall care
		Access to care
		Technical quality
		Communication
		Choice and continuity
		Interpersonal care
		Outcome
Ralston et al. (27)	EMR	Medication refills
		Secure messaging
		Test results
		Appointments
		Provider directory
		Healthwise knowledge base
Hassol et al. (29)	EHR	Easy use
		Information complete, accurate and understandability
		Provider selection decisions
		Communication preferences
		Confidentiality and privacy
		Learning of abnormal test results
Arora et al. (30)	EMR	Easy use
		Describe their condition
		Communication
		Quality of their care
Freeman et al. (32)	EMR	Health care
		Access, efficiency and reliability
		Computer intrusion
		Favour of EMR
Gadd et al. (26)	EMR	Efficiency
		Communication
		Easy
		Security
		Track information
Garrison et al. (28)	EMR	Satisfaction with health care
		Physician patient relationship
		Comfort with computers

Discussion

This systematic review of published research results arrives at the conclusion that patients are satisfied with EMR/EHR, but more rigorous studies should be carried out to more precisely quantify and describe the impact of EMR/EHR on patients satisfaction. We identified several problems with the studies that affect their reliability and validity. Two studies had low response rates, as low as 33% and 46% (27, 29). Two studies were not clearly specified in response rates (30, 32). The low response rates could suggest the existence of selection bias. These studies were subject to potential problems of response bias. It is possible that patients who responded to the survey had a greater interest than did nonresponders in the subject of EMR/EHR. Thus, the results could be biased in reflecting the opinion of these very few respondents. And patient selection criteria were often not clearly specified, or there were no formal selection criteria. Methodologies used for assessing satisfaction were not clearly specified in many studies, making interpretation and comparison of results problematic. Few studies defined what satisfaction meant, and not all evaluation criteria were found in any study. These studies were conducted as a retrospective descriptive study, which may have limited the accuracy of some survey responses.

The concept of EMR/EHR

To date, there has been no agreed definition of the EHR at the international level and very few formal EHR definitions even at a national level. Some of these and other similar definitions do not actually use the term 'electronic health record' or its abbreviation 'EHR', but rather a wide range of more or less variant terms such as EMR, EPR, CPR and electronic healthcare record (EHCR) (ISO/TC 215 Technical Report, Draft v0.2 August 03). The concept of EMR/EHR covers a wide range of different information systems from departmental systems to comprehensive EMR/EHR. In systematic literature review, six papers reported EMR/EHR systems (for example, MyGroupHealth, MyChart, EpicCare) (25–30), and other two papers did not descript EMR/EHR systems (31, 32). Only one study offered descriptions of the structure or core function of EMR/EHR (25). These studies did not take into account the different types of EMR/EHR (at least at the basic/advanced level). EMR/EHR may vary in content, function and usability, and experiences with this system may not be representative of other systems. One of the major challenges in identifying the level of EHR and EMR adoption and use is the lack of consensus on their definition, functionalities and capabilities (33).

The concept of patient satisfaction

Pascoe defined patient satisfaction as a healthcare recipient's reaction to salient aspects of the context, process and result of their service experience (34). Patient satisfaction is generally considered as the extent to which the patients feel that their needs and expectations are being met by the services provided (35). Satisfaction is the judgment of the patient on the care that has been provided (36). However, patient satisfaction as an outcome variable is difficult to precisely measure (37). Because no gold standard exists for measuring patient satisfaction after implementation of the EMR/EHR; studies differ not

only in the tools used but also in specifications of thresholds for distinguishing between patient satisfaction levels. Beside items of the patient satisfaction with EMR/EHR, many factors influencing patient satisfaction with implementation of EMR/EHR include:

1. The individual patient characteristics and sociotechnical factors (27,38–41)
   age; gender/sex; race; socioeconomic status; insurance type; education level; health outcomes; attitude of EMR/EHR; intention of EMR/EHR; previous computer experience; level of use of computers, etc.
2. The contextual factors (26, 27, 29, 42, 43)
   EMR/EHR content; waiting time; clinical flow; patient-centred perspective; patient education, etc.
3. The technical issues (26, 28, 30, 32, 44, 45).

Perceived system's usefulness; flexible user interface; usability of EMR/EHR; shared communication functionality; interoperability; system response time; time saved; system speed; sufficient help feature; complicated system navigation; personalised health information; reminder service via email, etc.

These factors may have influenced the patients satisfaction with EMR/EHR. Thus, these factors should be carefully taken into account when choosing the application of the evaluation of patient satisfaction after implementation of EMR/EHR. EMR/EHR cannot be evaluated in isolation from other factors.

Five (5/8) studies described between satisfaction score and sociodemographic characteristics of patients (25, 27–29, 31). However, there were some discrepancies in these results. Larger numbers of patients would need to be surveyed to analyse subgroups accurately. In evaluation of EMR/EHR that employs multiple methods, the data from different sources complement each other to provide a more complete picture. These factors affect satisfactions that are of importance in the design and implementation of EMR/EHR. As successful implementations generally require satisfied users, understanding what factors affect satisfaction can improve chances of a system's success.

Limitations

This systematic review has some limitations. Although undertaken carefully and systematically, the search strategy may not have identified all the relevant literature. We limited our literature search to English publications. There is a possibility that papers reflecting patient satisfaction with EMR/EHR in non-English-speaking countries may have been missed.

Conclusion

Patient satisfaction with EMR/EHR is a complex phenomenon. This systematic review has contributed to a better understanding of patient satisfaction after implementation of EMR/EHR and has aimed to identify recurring themes and to offer preliminary guidelines and future directions for EMR/EHR. Increased satisfaction of patients was noted, which could lead to significant changes in design EMR/EHR and medical practice. Patients' views may be taken into account as EMR/EHR is being developed. Patient satisfaction as an outcome variable is difficult to be measured precisely. There are many factors that influence patient satisfaction with EMR/EHR, and more research is needed to understand these factors. Such research can help to refine theoretical models of patient satisfaction with EMR/EHR and aid in the development of an effective instrument for assessing and understanding such satisfaction.

Author contributions

Jialin Liu was responsible for the study conception and design. Jialin Liu, Li Luo, Rui Zhang and Tingting Huang performed the data collection. Jialin Liu, Li Luo, Rui Zhang and Tingting Huang performed the data analysis. Jialin Liu, Li Luo and Rui Zhang were responsible for the drafting of the manuscript. Rui Zhang and Tingting Huang reviewed the papers included and carried out data extraction.

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