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Scientific Production of Patient's Electronic Health Record in Online Journals from Brazilian Scenario

REVIEW

Ana Aline Lacet Zaccara[1], Maria Eliane Moreira Freire[1], Gilvânia Smith Carneiro Morais[2], Márcia Adriana Meireles Moreira[1], Renata Maria Chaves Guedes Rolim[1], Caliandra Maria Bezerra Luna Lima[1], Ângelo Brito Pereira de Melo[1], Jael Rúbia Figueiredo de França[1], Jaqueline Vital Brito Batista[1], Fernando André Costa de Souza[3]

1 Universidade Federal da Paraíba.
2 Universidade Federal de Campina Grande.
3 Faculdade de Medicina Nova Esperança.

Contact information:

Ana Zaccara.

Address: Cidade Universitária.
Tel: 083 32167735

anazaccara@hotmail.com

Abstract

The study aims to analyse the scientific production about patient's Electronic Health Record (EHR) available in online journals from 2006 to 2015. This is an integrative review. The search was conducted in the Virtual Health Library and Portal Capes, considering only studies in Portuguese. The sample consisted of 17 articles. It was observed that from 2011 to 2012 is the period with the highest number of publications about the investigated issue. The majority of papers were published in journals in the area of computer science and the most common modality of publication was original article. It was found that scientific productions involving Electronic Health Record discussed about its importance and implementation in health services, as well as perceptions of health professionals about its utilization. The research evidenced the relevance of EHR in health services, emphasizing necessity for improved regulations of ethical and legal issues and creation of legal provision to concede judicial validity in Brazil.

Keywords
Health. Patient; Health Record; Research.

Introduction

The patient's health record is an administrative and technological tool of health care with numerous purposes: access services, therapeutic monitoring, communication of those involved in the health care process, decision-making and legal security of user rights. Moreover, it is an essential component able to support education and research [1].

The health records in paper format is the most traditional form of data logging about the health history of an individual. However,

this type of document is vulnerable to repetition of information obtained by the various professionals involved in health care, breach of privacy and loss, becoming rather difficult to retrieve information [2].

The use of medical records in the handwritten mode has its disadvantages related to the difficulty in interpreting records due to the illegibility of letters of some of the professionals involved in health care, as well as the repeated handling and aging of this document. In addition, over time, there may be a considerable amount of information about the patient, becoming complex searching for specific data and filing documents, which could create problems related to content, format, access and availability of records [3].

Thus, patient's Electronic Health Record (EHR) emerges as an important tool that can subsidize and guide activities of professionals who use it. The electronic format of records is an agile and practical data storage system, which facilitates the dynamic of care implemented by professionals, and can be available in various sectors such as health care units, hospitals and laboratories [4].

The electronic data recording is a technological innovation associated with the contemporary advancement of the information society, which has contributed to the growing use of this resource in health, recognized by the Federal Council of Medicine, in the Resolution No. 1.639/2002, that approves the "Technical Standards for the Use of Computerized Systems for Medical Health Record Handling", enabling preparation and filing of medical records electronically [5].

The search for studies that discuss about electronic medical record, has an undeniable contribution, because it share results and experiences about the use of this technological tool, expand and enhance the comprehension of the registration of assistance care in electronic format, as well discuss its effectiveness, modes of use and application possibilities.

In light of these considerations, this study aims to analyse the national scientific production about electronic health records available in online journals in the period from 2006 to 2015.

Method

This is an integrative review, a research method that can produce a wide range of results, such as: new knowledge from the synthesis of selected studies, conceptual and theoretical elaborations; identification of connections between different areas of knowledge and central issues of a specific area; identification of theoretical and methodological approaches with greater explanatory and understanding potential; misconceptions in the studies and the need for future research [8].

The research was conducted in six stages based on the principles proposed by Ganong [9]. The first stage consisted in selecting the guiding question of the study, which was developed from the theme "Electronic Health Record". Thus, it was defined for this study the following question: what is the scientific literature about electronic health record in the national scenario available in online journals from 2006 to 2015.

In the second stage, it was selected the bibliographic material that integrates the sample group of this research. Therefore, the following inclusion criteria were defined: publication type of "scientific article", published in Brazil between 2006 and 2015; and with abstracts available and indexed in databases established for this study. It was excluded reviews and studies available in the dissertation or thesis format.

The search for articles was conducted over the Internet, in the Virtual Health Library and Capes Journal Portal, during January of 2016. For the survey of researches, it was selected the Health Sciences Descriptor (DeCS) "electronic health record".

In the third stage, it was verified the information extracted from the selected studies that were ca-

talogued by the authors considering the following topics: article title, paper publication year, journal that the research was published, journal qualification, study modality, formation area of researchers and identify the main results and conclusions presented by the authors.

The fourth step consisted in analytically read the selected studies, observing the approaches covered in these studies, which established two thematic categories: 1. Importance, implementation and use of EHR in health services; 2. Health professionals' perceptions about EHR. The discussion and interpretation of results, which was the fifth stage of this review, linked the findings from the reviews of each author, as well as provided suggestions for further researches through the identification of gaps in studies of this investigation. In the sixth and final stage, the integrative review was expressed completely and clearly, which allows the reader to critically question the results of this study.

Results

The sample was composed by 17 articles published from 2006 to 2015. The years 2011 and 2012 refer to the period with the highest number of publications about the studied issue, with four productions each, and followed by the years 2010, 2013 and 2014 each one with two publications. The years 2006, 2009 and 2015 obtained one publication each, as shown in **Figure 1**.

Figure 1: Distribution of articles according to the year of publication. João Pessoa-PB, Brazil, 2016.

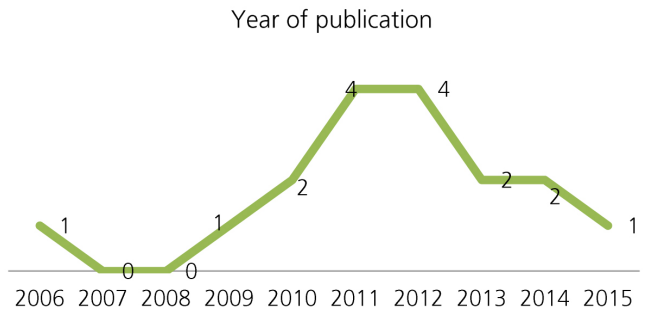

Table 1. Distribution of articles according to the title of the journal, qualis and quantity of publications. João Pessoa-PB, Brazil, 2016.

Journal Title	Qualis	Quantity of publications
Revista de Administração Pública	A2	1
Revista de Administração Mackenzie	B1	1
Revista Brasileira de Terapia Intensiva	B1	1
Saúde em Debate	B1	1
Journal of Health Informatics	B2	7
Revista de Enfermagem Referência	B2	1
Cogitare Enfermagem	B3	1
Meta: Avaliação	B3	1
Revista Brasileira de Odontologia	B3	1
Revista Eletrônica de Sistemas de Informação	B3	1
Scientia Medica	B3	1

The studies about EHR increased emphasis over the past five years, showing the topicality of the theme. On the other hand, the chart above shows a gradual increase of annual publications in the period 2008 to 2011, stabilizing in the period between 2011 and 2012, followed by a decrease between 2013 and 2015, reaching the lowest point in only one publication.

As for the analysis of the journals, the data indicate that the Journal of Health Informatics concentrated the majority of scientific productions, discussing about registration of health care data in electronic format. In addition, it was found that journals with qualification B2 (Qualis/CAPES) in the interdisciplinary area showed higher number of researches and one study published in journal with qualification A2 (Qualis/CAPES), as shown in **Table 1**.

Based on the information highlighted in Table I, there is a predominance of publications involving the Electronic Health Record in journals in the field of computer science.

Regarding the publication mode, the articles were divided in three categories: original article, with 12

publications; review, with four studies; and opinion, with one publication. This distribution demonstrates the efforts of the scientific community to produce never published studies about electronic health records and collaborate with its implementation in health care services.

The profile of the academic formation of the authors, was obtained from information contained in the selected articles. The analysis revealed that the health professionals who most contributed to the publications, were nurses, doctors and dentists, with six, four and two articles, respectively, while the authors with academic formation in physiotherapy and psychology published only one article.

A diverse profile of other professionals exercising their activities in the areas of computer science, engineering and in the administrative area contributed with only one publication on the topic related to electronic health records.

Health professionals were the ones who most produced scientific articles about the subject, due to the proximity and daily use of these professionals with health record and better understanding about the needs and operational problems of health record systems.

With regard to the information included in the results and conclusions of the analysed scientific production, it was possible to separate the studies in two thematic categories: 1 - Importance and implementation of the patient's electronic health record in health services; 2 - health professionals perception about the adoption and use of the patient's electronic health record.

The first category: Importance and implementation of the Patient's Electronic Health Record in health services emphasizes the need for the use of EHR for the health care team, for the organization of work in the health service and for the health care dynamics of patient and family, as illustrated in **Table 2**.

The studies referred in Table II report the importance of using electronic health records because it

Table 2. Distribution of studies focusing on the importance and implementation of patient's Electronic Health Record in health services, according to title, author, purpose and conclusions.

Article	Title	Author	Year	Purpose	Method	Final Considerations/Conclusions
E1	Electronic Patient Record - The Importance in the Clarity of Information	Thofehrn; Lima	2006	To report a case about legible writing showing its consequences.	Case report	The use of computer tools and instruments in the patient care helps all health professionals in the practice of their occupation, facilitating the collection and storage of information, decision-making, the search for more appropriate therapies, exchange of information among professionals, institutions and patients
E2	The electronic patient record in the Brazilian health system: is it a reality for the physicians?	Patrício	2011	To conceptualize Electronic Health Record and to discuss its advantages and disadvantages, the importance of its implementation in medical and hospital services, the ethical aspects involved and challenges	Theoretical and reflexive study elaborated from literature review	To conclude, it is extremely important to create information systems that include patient's Electronic Health Records in the Brazilian health system in order to identify users, facilitate the management of services and communication, sharing information and, more importantly, to improve the quality of care provided to the population

Article	Title	Author	Year	Purpose	Method	Final Considerations/Conclusions
E3	Electronic Assessment as a tool of management in dentist office	Oliveira; Mello	2010	To describe the importance of electronic health record of patients	Literature review.	The paper health records are of free content, often illegible and incomplete, and contain ambiguous information. While electronic medical records contain all patient the information in an organized manner, fast and accurate, and can be accessed at the same time from different sectors of a health facility.
E4	Challenge of the implementation of Electronic Health Record for patients	Jenal; Évora	2012a	To describe the implementation process of Electronic Health Record of patients.	Case study conducted in a hospital.	The implementation of EHRs changed the form of work in hospitals. It was noted that in these years the team that participated in the implementation acquired an excellent knowledge, resulting in improved quality of information and patient care.
E5	Application of the education plan in electronic medical records for patients and families	Ruiz; Laurino; Roma	2012	To develop and implement educational plans of medical release in EHR conducted in patients and their families by the multidisciplinary team, as well as stimulate the systematic record of educational activities.	Experience report conducted in a private hospital in São Paulo.	The implementation of the educational plan in EHR was successful, since the goals were achieved such as to stimulate the systematic registration of educational actions.
E6	Electronic Health Record: Knowing the experiences of its implementation	Canêo; Rondina	2014	To evaluate the main advantages and disadvantages of the adoption of a system of electronic health records	Bibliographical study, using as source of data articles published in journals and national scientific events.	The main advantages of adopting a computerized record system: quick access to patient health history, easiness in accessing the data on future visits, reduction in service time, improved hospital control and planning and improvements in the quality of service. On the other hand, the only disadvantage cited by more than 50% of the selected studies was the resistance of health professionals on the use of new technologies, due to the lack of computer skills.
E7	Literature Review: implementation of eletronic patient	Jenal; Évora	2012b	To identify in national journals, knowledge about the theme of implementation of patient's electronic medical records.	Narrative review of the literature in national journals.	The lack of preparation of health professionals in relation to the implementation of electronic medical records interfere directly in the acceptance of required changes. Also draws attention to the concern that the use of technology should not diminish contact with the patient.

Article	Title	Author	Year	Purpose	Method	Final Considerations/Conclusions
E8	Electronic Health Record: a tool to improve the quality of health services	Bezerra	2009	To promote a discussion about patient's Electronic Health Record (EHR).	Bibliographic study	The implementation of EHR and other devices such as a personalized card, which allow real-time access to patient information, are examples of actions that can improve the quality of patient's health care.
E9	Electronic Health Record: a tool that can contribute to the integration of Health Care Networks	Gonçalves	2013	To investigate the existence and accessibility to electronic health records in primary health care.	Exploratory, descriptive and quantitative study conducted in Montes Claros - Minas Gerais.	The electronic health record is not used as a management tool in the Basic Health Units of Montes Claros (MG). However, the use of this record model in primary health care is essential, since it provides an improved quality service and public administration.

Source: Research data, João Pessoa-PB, Brasil, 2016.

promotes greater accessibility to information, improving the process of care, thus contributing to the enhancement of assistance provided to users of the health network in the primary and specialized care context.

It was also shown the importance of implementing information systems that include EHR in health institutions with adequate tools and instruments to search and storage all data about patients in order to select the most appropriate therapy to address the needs and improve the quality of the health of patients.

The advantages and disadvantages of using a computerized record system and the comparison between the use of paper and electronic records were also emphasized in studies.

Other analysed articles emphasize transparently the perception of health professionals about the adoption and use of electronic health records in health services, establishing the second category of the analysis, as shown in **Table 3**.

The studies that composed the empirical material provided in **Table 3**, argue that the adhesion and implementation of the EHR systems include, among

Table 3. Distribution of studies focusing on health professionals' perceptions about the adoption and use of Electronic Health Record, according to title, author, purpose, method and conclusions.

Article	Title	Author	Year	Purpose	Method	Final Considerarions/Conclusions
E10	Determinant factors of information systems adoption in the health area: a study of the electronic patient record	Perez e Zwicker	2010	To identify the main characteristics and factors perceived in a technological innovation of systems of information that most influence its adoption.	Quantitative field study with an application of questionnaire to users of an electronic medical record system.	The study revealed that the use of information systems by its users results in perceptions that may have important effects in the tasks and work of organizations. In the conducted study, it was highlighted the variables represented by the perceived characteristics: relative advantage, compatibility and demonstration of results.

Article	Title	Author	Year	Purpose	Method	Final Considerarions/Conclusions
E11	Adoption of electronic patient record in teaching hospitals in Brazil and Spain: The perception of health professionals	Farias	2011	To identify the perception of health professionals working in two public university hospitals, one in Brazil and one in Spain, about the meaning of EHR and how it affects the work of these professionals.	Field study conducted in three hospitals with a phase of interviews and an application of questionnaires.	The results obtained suggest that there are differences in the perception of EHRs and that these are from the specificities of the users profile in different hospitals. It is necessary that health professionals agree in some aspects with the hospital manager in the way both realize the significance and importance of EHR.
E12	Is the ICU staff satisfied with the computerized physician order entry? A cross-sectional survey study	Fumis	2014	To evaluate the satisfaction of the intensive care unit staff with a computerized physician order entry and to compare the concept of the computerized physician order entry relevance among intensive care unit healthcare workers.	Transversal field study conducted with 250 health professionals.	The overall users' satisfaction with computerized physician order entry was lower among physicians compared to other healthcare professionals. The factors associated with satisfaction included the belief that digitalization decreased the workload and contributed to the intensive care unit quality.
E13	Sistema de informação em saúde: concepções e perspectivas dos enfermeiros sobre o prontuário eletrônico do paciente	Lima	2011	To identify nurses views about EHR and describe the perspectives of these professionals regarding the implementation of this tool in the institution	Descriptive, qualitative and exploratory study conducted through interviews with 10 nurses of a university hospital.	The conceptions of nurses about the EHR reveal that it is a facilitator system in order to improve access, availability of information, speed, convenience, clarity and optimization of physical space.
E14	The use of electronic health record by doctors at the Dr. Munir Rafful Municipal Hospital: a case study	Namorato	2013	To characterize the use of the Electronic Health Record (EHR) at Dr. Munir Rafful Municipal Hospital in the city of Volta Redonda	Applied research. By random sampling 60 Questionnaires were applied to doctors at Dr. Munir Rafful Municipal Hospital	The knowledge about EHR, its operation and potential, are still doubtful for most of the doctors of the Municipal Hospital Dr. Munir Rafful. This study indicates the need for further discussion and dissemination of information about EHRs with health professionals, thus assisting in the implementation of such system in health institutions.
E15	Indicators of use electronic health record	Pompilio Junior; Ermetice	2011	To demonstrate how doctors use EHR and if there are proactive actions in searching for registered information about the history of the patients to improve the quality of care.	Pilot study	It concludes that if the system adjust to the doctor's workflow in the clinic and offers something in return such as mobility, "technical simplicity" safety and other benefits, doctors use the system properly to improve the quality of patient care.

Article	Title	Author	Year	Purpose	Method	Final Considerarions/ Conclusions
E16	The use of electronic health records by nurses in Primary Health Units in Brazil.	Godoi	2012	To identify the perception of nurses about the use of electronic health record (e-handbook), in their professional practice in health care units of a large municipality in southern Brazil	Descriptive and qualitative study conducted through systematic observation of institutional documents, process of work of nurses and the flow of information.	The differences between the modelled service flow on the system and the actual service flow, as well as system slowdowns, are presented as complicating factors in the nursing work process in health facilities.
E17	Electronic Health Records: Evaluation of Usability by the Nursing team	Lahm e Carvalho	2015	To evaluate the usability and the difficulties met by nursing professionals using electronic health records.	Descriptive, exploratory and quantitative paper with the objective to study the use of specific EHR module by the nursing team.	The evaluated system, despite the advances, is still complex for the user who has not received training, despite having a consistent and interactive interface.

Source: Research data, João Pessoa-PB, Brasil, 2016.

other factors, the commitment of managers and health professionals. In addition, they focus attention to the need for training of staff. The papers also warn about the costs related to its implementation, possible errors that may interfere in accessing electronic medical records and the confidentiality of information.

According to the analysis of the articles, the degree of satisfaction in the use of EHRs is higher among nurses than among doctors and other health professionals, thus requiring further discussion about the dissemination of information among professionals who fill in medical records.

Discussion

There are several contributions from the cited studies in this investigation [10-12] to justify the use of EHRs by health professionals which are: the reduction in quantity of archived papers, the reduction of behavioural mistakes, greater longevity of information, prevention of repetitive procedures, greater efficiency of the health services, customer satisfaction, mobility, easiness of manipulation, safety and simultaneous access of patient's information by the health team.

As electronic health records are simple information systems and with significant degree of accuracy, this review also showed that the digitalization of medical records is essential for professionals to plan health actions [13], consequently decreasing the amount of workload in professional units by obtaining succinct data in a reasonable period of time [14].

The use of electronic health records in health facilities benefits the practice of the involved professionals, because it facilitates the access to patient information, produces faster prescriptions and controls strictly and appropriately the use of materials and medicines by patients [1].

Other studies also emphasize that the implementation of health records in electronic format, which allows the sharing and integration of information with real-time access, improves the quality of care, supports decision-making and implements more adequate therapies [10, 15-16].

Studies also stress that patient's health records in electronic format provide to health professionals

easiness, flexibility and safety in prescribing and planning their actions and enhance health services [1-2,10). In addition, legibility and constant updating of data are both advantages regarding the use of EHR [11, 17].

Thus, implementing electronic health records in Brazilian health services contributes to the work of the health care team and the quality of care. A successful implementation consists in the continuous participation of health professionals in all stages, from planning to the inclusion of this technology in health services.

However, some users have refuted the acceptance of electronic health records as a defensive, blocking or resistance attitude [18]. Thereby, to remedy this objection and demonstrate the potential of EHRs is needed further discussion and dissemination of information among professionals to subsidize and assist in the implementation of this system in health institutions [19].

The adoption of electronic medical records in health services as an innovative technological tool requires improvement and enhancement in order to provide adequate and promising utilization, since individuals with better computer skills manipulate more easily technologies of information and communication, which is imperative for adequate training of the health staff [20].

Therefore, to establish EHR as a flexible and profitable technological resource, it should be object of intensive training. In addition to stimulate more accessible and successful utilization of EHRs, its use should be simple, clear, practical, and uncomplicated [21].

Besides the control in computing and familiarity of the team with the system, the success or failure of a system is closely related to the involvement of users in planning its various implementation stages [1]. In these terms, it is inferred that technological systems can become obsolete if there is no support of professionals in large scale. In this way, the study confirms that enthusiasm and dedication of professionals are powerful components for the adequate deployment and operation of these systems [22].

The intense and adequate training of staff, added to an uncomplicated system for health professionals, the broad adhesion of these professionals, the support and the harmony of the working group, determine the success or failure in adopting and implementing an EHR system. However, some questions have to be addressed to determine whether the wide use of electronic health record is a reality. In this regard, regulatory institutions of health professionals have been concerned with the ethical and legal issues of patient's health records. A great advance was the digital certification, conferred by registry offices and instituted by the Provisional Measure 2200-2 from 2001 [23].

The study suggests that the Department of Health, as well as regulatory agencies and standard-setting organizations should allocate greater budget resources in order to strengthen the computerization policy of hospitals units and complement the Brazilian public health system [10, 15].

The process of implementing a computerized record system is complex, which involves high costs and significant demand and commitment from the workforce [24]. Therefore, in order to successfully deploy computerized clinical and administrative health records, it is necessary motivation, force, impetus, dynamism and responsibility of every group.

Conclusions

The implementation of EHR in hospitals may benefit greatly patients, health care professionals and institution in planning health care actions, because it improves the quality of information and patient care in order to collaborate with professionals in obtaining data about the conditions of patients providing better and more effective treatments.

In order to successfully implement an electronic health record system is crucial the participation of

the health team in the stages prior to its implementation and qualification of the entire team, clarifying that the contact with the patient remains the foundation of good health care.

Electronic health record systems greatly contribute for the healthcare practice of health professionals such as: clarity, sharing and speed of information, optimization of physical space, since the file is digital and not on paper creating easeness in managing services, culminating in the improvement in the quality of care provided to the population. Nevertheless, the deployment costs related to the acquisition of equipment and computer systems and training of professionals are notable barriers. In this way, the benefits generated by the use of EHR in health institutions outweigh the listed difficulties, which can be alleviated over time.

As for the ethical and legal issues about the implementation of EHR, councils responsible for the regulation of health professionals ensure the implementation and operation of EHR by these professionals in an ethical manner. Due to the computerization of this device and the possible risk of leaking personal patient information, it is necessary to discuss and analyse the laws of ethics codes and other legislations and regulations related to ethical and legal issues of the use electronic patient record.

It is important to emphasize that this integrative review has limitations, since it consisted of a small sample of studies in the investigated period interfering in the generalization of results. Moreover, the study only analysed publications in Portuguese. Thus, it is expected that this study can create further researches and thematic discussions covering both national and international scenarios.

In general, it can be stated that this study contributed in evidencing the importance of EHR in health care units, stressing the need for better regulation of ethical and legal issues, as well as creating legal provision that concede judicial validation in Brazil. In this perspective, the theme emphasizing the Brazilian reality requires more debates regarding the appropriate advancement of electronic medical records.

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