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Electronic health record in the internal medicine clinic of a Brazilian university hospital: Expectations and satisfaction of physicians and patients

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ABSTRACT

Purpose: To evaluate the satisfaction and expectations of patients and physicians before and after the implementation of an electronic health record (EHR) in the outpatient clinic of a university hospital.
Methods: We conducted 389 interviews with patients and 151 with physicians before and after the implementation of a commercial EHR at the internal medicine clinic of Hospital das Clínicas of the Faculty of Medicine of the University of São Paulo (HC-FMUSP), Brazil. The physicians were identified by their connection to the outpatient clinic and categorized by their years since graduation: residents and preceptors (with 10 years or less of graduation) or assistants (with more than 10 years of graduation). The answers to the questionnaire given by the physicians were classified as favorable or against the use of EHR, before and after the implementation of this system in this clinic, receiving 1 or 0 points, respectively. The sum of these points generated a multiple regression score to determine which factors contribute to the acceptance of EHR by physicians. We also did a third survey, after the EHR was routinely established in the outpatient clinic.
Results: The degree of patient satisfaction was the same before and after implementation, with more than 90% positive evaluations. They noted the use of the computer during the consultation and valued such use. Resident (younger) physicians had more positive expectations than assistants (older physicians) before EHR implementation. This optimism was reduced after implementation. In the third evaluation the use of EHR was higher among resident physicians. Resident physicians perceived and valued the EHR more and used it more. In 28 of the 57 questions on performance of clinical tasks, resident physicians found it easier to use EHR than assistant physicians with significant differences ($p < 0.05$). When questioned specifically about EHR satisfaction, resident physicians responded "good" and "excellent" to a greater extent than assistant physicians ($p = 0.002$).
Conclusions: Our results reinforce the idea that the EHR introduction in a clinical setting should be preceded by careful planning to improve physician's adherence to the use of EHR. Patients do not seem to notice much difference to the quality of the consultation done using paper or EHR. It became clear after the third evaluation with the physicians that the younger (residents and some preceptors) perceived the advantages of the EHR more than the older physicians. Resident physicians use the EHR more and are more satisfied with it.

1. Introduction

Previous studies evaluating the satisfaction of patients and health professionals with the electronic health record (EHR) and the physician-patient interaction during a visit indicate that the implementation of the EHR was well received, both by health professionals and patients [1]. The process of computerization must take into account the different groups that should use it and the planning of the various phases is fundamental to reach a high degree of success [2–4]. The success of EHR implementation can be attributed to the characteristics of groups of physicians, such as sex, age, specialty, workplace, physician's office or hospital, and geographical, urban or rural location [5].

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The implementation of EHR is a slow process, with successive steps that must be well planned [6]. The task must be shared by the team, and the leadership role is very important [7,8]. Each health service has particularities that must be taken into account to facilitate adoption [9]. Because it involves diverse changes in the different phases of the work of health professionals, a detailed planning of the process of EHR implementation is necessary [10].

The EHR can be a very important means for carrying out clinical research work. However, this expectation is not always achieved due to technological barriers, infrastructure, and other factors [11]. We must still consider that even once implemented the EHR is not a finalized product, it is a process that is always evolving [12].

HC-FMUSP is a tertiary hospital, integrated into the Unified Health System (SUS). It is one of the largest hospitals in Latin America, with a built area of 378,545.32 m^2, with more than 2000 beds, 20,000 employees of various professions, 8 institutes, 2 Auxiliary Hospitals and 62 medical research laboratories. In this hospital the computerization of patient systems began in 1989 with the Diagnostic and Therapeutic Support Service, making the results of the laboratory tests accessible to all Institutes of the HC Complex (Institutes: Central, Orthopedics and Traumatology, Psychiatry, Pediatrics, Heart, Radiology, Physical Medicine and Rehabilitation and Cancer) [13].

The HC-FMUSP Internal Medicine Clinic receives the largest number of undergraduate and resident students. Annually, divided into groups, with about 540 students in the 2nd, 4th and 5th years of undergraduate study. It also provides training to over 150 residents per year, making it the largest residency program in internal medicine in Brazil. The implementation of an EHR system sought to meet the administrative needs of this large contingent of trainees; to better serve patients while providing administrative information for teaching and research [14].

We carried out this study in a Brazilian university hospital to evaluate patients' and physicians' expectations before the introduction of an EHR and to evaluate the satisfaction of both stakeholders after EHR implementation in an outpatient clinic.

2. Materials and methods

2.1. Location of the study

The study was carried out at the HC-FMUSP internal medicine outpatient clinic in Brazil. About 200 physicians work there annually, divided into small internship groups, among assistants, preceptors and residents of 1st, 2nd and 3rd year. Considering fixed physicians and trainees, there are always 25–30 physicians in the clinic daily. Trainees in the 5th year of graduation are also there, divided into groups of 10–12 students each day.

2.2. Patient sample size

Using a technique that considers the number of questions in the questionnaire to calculate the sample [15], we defined the minimum number of interviews with patients using the following formula:

$$n = \frac{\binom{c^E}{2} - \sum_{i=1}^{k} \binom{c_i^E}{2}}{\sum_{i=1}^{k} c_i^O}$$

Where: c^E is the total number of effective alternatives of the questionnaire; $C^E{}_i$ is the number of effective alternatives of each question; K is the number of questions from the collection instrument; $C^o{}_i$ is the number of original alternatives of each question and $\Sigma c^o{}_i$ is the total number of original categories of the questionnaire.

Therefore, the patient sample size (n) was fixed to at least 106 sample individuals for each phase of the study.

2.3. Study design

For the patients we used a convenience sample approaching patients after their regular appointments with doctors and asking them to answer a brief questionnaire. No patient refused to participate.

The study was divided into three phases: in the first phase (EHR Pre-implementation phase), from October 2009 to January 2010, patients were interviewed and from May to August 2010 physicians were interviewed. In the second phase (EHR Immediate Post-implementation phase), between July and August 2012 patients were interviewed, and between July and October 2012 physicians were interviewed. In the third phase (EHR Late Implementation phase), between January and February 2016, we conducted interviews with patients and physicians. As we interviewed all the permanent and temporary physicians who were working in the clinic at the time of the survey, it was not necessary to calculate the sample size. We classify the physicians as effective and temporary, the former being assistants (with more than 10 years of practice since graduation) and the latter residents and some preceptors (with 10 years or less of practice since graduation).

2.4. Research instruments

Patients answered a 10 item questionnaire with simple alternatives such as "yes" or "no" or "good", "regular" or "bad" about the care received and the relationship with the physician. This Brazilian Portuguese questionnaire had been tested in previous surveys to evaluate user satisfaction [16].

We obtained additional personal data as sex, age, marital status, religion and schooling from patients through the medical archive service of the Hospital das Clínicas.

For the physicians, a questionnaire was used with items about the expectations and the use of the EHR, partially based on previously used research instrument [17]. In the third phase of the evaluation, the physicians were interviewed with an instrument developed by Laerum in 2004 to evaluate their experience of using the EHR [18].

2.5. Statistical analysis

The responses obtained from the questionnaires of patients and physicians were transcribed into a database. Then they were exported to spreadsheets where statistics, tables and figures were made. Statistical tests were performed on SPSS ©, version 16.

2.5.1. Fisher's exact test

With the patients responses we made cross tables with the following variables: period of investigation (before or after), gender, age, schooling, marital status and religion for patients. For physicians, we cross the period of research (before or after), sex, graduation time and previous use of any electronic health record. In each of these tables the Fisher's exact test was applied.

2.5.2. Mann-Whitney test

Since the number of visits in the clinic with EHR by physicians from January 2010 to December 2015, did not have a normal distribution, the Mann-Whitney test was applied to compare the median number of consultations by younger and older physicians using the EHR.