Electronic medical records: a critical evaluation of the ALERT system

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Abstract

Background: electronic medical records (EMR) are computerized systems with a potential beneficial effect in health care, in terms of improving quality and minimizing error. The ALERT system is a rapidly growing EMR in the whole world, and is the most used EMR in public hospitals in Portugal.

Methods: we reviewed current articles on information technology benefits to health care carrying out a critical evaluation of our ongoing experience with the ALERT system.

Results: among the several functionalities proven to be beneficial on an EMR, the ALERT systems have two: recording and conveying information as well as therapy and additional tests prescriptions. There are several dysfunctions on these two functionalities, as well as on other areas of the system.

Conclusions: the ALERT system is an EMR in need of improvement on three main areas: the user interface, its function on therapy guidance and the ability to respond to the user's demands.

Key words: computerized medical records systems, medical order entry systems, database management systems, clinical decisions support systems.

INTRODUCTION

At present there is a conviction that setting up electronic medical records in organizations delivering healthcare will enable to get several benefits, namely reducing mistakes and increasing the patients' safety and quality of the healthcare delivered. However a number of authors have pointed out some problems associated with this kind of medical records, problems that should be solved, so that potential benefits would be fully achieved. [2,3,4]

The ALERT software is an electronic medical record (EMR) developed by a Portuguese company, ALERT Life Sciences Computing, S.A.

Espírito Santo Hospital - Évora has started setting up the most developed form of the ALERT application, consisting in software to the Emergency Service, both for outpatients as inpatients, which effectively enables hospitals to work without paper. In a first stage it was installed the application in the Emergency Service, during 2007. In a second stage, it was set up the application in the Outpatients Clinic. The third stage, implementing an admission module is in waiting.

Setting up the two current modules, Emergency and Outpatients Clinic, has enabled to evaluate positive aspects and aspects to be improved in the ALERT system. The goal of this paper is, considering the current scientific literature in the area of information technology in healthcare, to provide an objective evaluation.

INTERFACE

The ALERT application interface (i.e., what we see on the computer screen) has no similarities to the usual emergency form, the medical appointment form or a sheet in the clinical diary.

However, this question (the differences between how computing applications in health look like and their aspect in hard copies) had already been assessed, and it has been suggested by other authors that such kind of applications should not be strange to the medical concept of clinical record. [3]

One usual emergency form, whether in Portugal or in United States, has commonly an area to identify the patient, an area to the current complaint and anamnesis, an area for the objective examination, an area for additional tests, an area for therapy and another other area for the final diagnosis. Such layout is not hypothetical, instead it reflects the flow of thought and processes of approaching the patient in an emergency service.

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The ALERT interface also has an area to identify the patient, but then it has multiple tabs giving access to multiple areas which in number are much higher and offer a different layout of those described above. Many of such *buttons* and functions end up seldom being used and its elimination would enable to simplify not only the application interface but more likely the application itself.

The system seldom enables the entry of free text, preferring by default to fill up fields previously determined – templates. The importance of a free text record has been assessed,[4] and we considered that the process of describing something in our own words implies a critical reflection on what we are describing, an analysis and the subsequent synthesis of the patient's general data, previously gathered.

Also to be considered is that filling up such templates makes difficult the contact between the patient and the physician, encouraging a situation where the physician looks to the computer screen, answering the patient small questions with a yes or no answer. [4] This kind of interview is an antagonism for what it is believed to be the right way of gathering the patient's anamnesis.

Apart of this, it is not possible to see on the computer screen simultaneously the complaint, the current history the personal backgrounds (i.e. anamnesis), even less in simultaneous the objective exam and the additional tests. Notwithstanding its illegibility, the usual emergency hardcopy form enables to see simultaneously all these items.

I find essential to improve in the one aspect in the ALERT software with a deep remodeling of the user interface layout. Functionalities seldom or never used should be abolished. The screen layout should be as similar as possible to the usual emergency forms, appointment forms, or sheets of the admission clinical process, enabling to visualize simultaneously, at least, the whole anamnesis.

PREVENTING ERRORS RELATED WITH THE THERAPY

This is the area with more evidence of the benefits of electronic medical records. Several studies have shown that using certain software to prescribe electronically drugs enable to improve the practice of antibiotic prescription, [5] increasing the rates of prescriptions for prevention therapies, [6] avoiding and/or detecting adverse events to drugs [7,8] and reducing medication errors. [9,10]

At present, the ALERT software only enables to prescribe therapies for outpatients, printing the usual medical prescriptions. The software helps to avoid errors related with physicians' handwriting illegibility, giving the prescribing physician information on drugs, brands, dosages and packages available in the market. The application does not have any functionality which enables to evaluate possible drugs interaction among the prescribed drugs, to alert to a prescription of a previously identified drug as inducer of an allergic reaction in that patient or to correct the dosage according to the patient's kidney or liver function.

Therefore my view is in this area, that ALERT has some positive aspects. However it would be important the system to evolve enabling the remaining potential benefits of electronic prescription described above. This will be even more important in the area of admission where, due to the pathologies multi-organic scope, whether by the frequent polypharmacy, there is a higher probability of drug interaction and adverse events.

INFORMATION RECORDS AND TRANSMISSION

Failure to convey the relevant clinical information, especially on the so-called *patients handover* among physicians is one the most frequent factors contributing to the occurrence of adverse events. [11,12,13] Furthermore, the quick access to a patient's previous clinical records may avoid unnecessary tests and therapy, improving the whole process of providing healthcare. [14]

This is perhaps the area where the ALERT application better corresponds to its expectations. The system enables effectively to access the patient's previous episodes, diagnoses, therapies carried out, so on and so forth. The format and the time to access such information could be eventually improved, but at present is already much better than a hardcopy.

The only setback is related with the access to previous results of lab tests which unreasonably must be seen one by one as the application does not succeed a layout in a single table with the data in abscissa and the different laboratory parameters as ordinate.

I think this application should improve in this area, providing automatically the *tests sheets* with the evolution overtime of the main lab tests, as it already happens in hardcopy. In this area, the improvements previously recommended in the user interface would

have an added benefit, enabling to access simultaneously a wider amount of information.

SUPPORT TO THE CLINICAL DECISION

According to the North American Institute of Medicine, one of the 4 core functionalities of an electronic medical record is the ability to help the clinical decision.[2] Such functionality can be obtained whether through making information available (for instances, when coughing is recorded as the patient's initial complaint, rapidly emerges an algorithm of how to approach a patient with cough),[1] or even through the use of more sophisticated tools, as the neural nets, which usefulness is demonstrated, for instances, in the diagnosis of acute myocardial infarction. [15,16]

The ALERT system does not have at present any of such aspects in such functionality. In spite of the version currently set up having tabs with the designation *guidelines, protocol* and *clinical decision support,* such tabs lead nowhere.

THERAPY AND ADDITIONAL TESTS ORDER AND SIGNALING OF ADVERSE EVENTS

Another of the four core functionalities of an electronic medical records is the ability to prescribe therapy requesting additional tests.[2] Apart of the importance of registering and making information available regarding the prescribed t herapy, and what was already done, to the requested tests and their results, such functionality has as crucial importance the power to enable a whole panoply of interventions in the area of preventing mistakes or adverse events related with the medication.[5,7,9,17-22] This is one of the most frequent iatrogenic sources for patients. So that software can identify and prevent mistakes, it must have specific functionalities, as suggesting dosage and common administration route for the drug in question, the ability to identify possible interactions among the prescribed drugs to the same patient.

At the moment, ALERT enables to prescribe therapy and request additional tests. It does not have however any functionality enabling to identify or preventing mistakes or adverse events related with medication.

EXAMPLES OF DYSFUNCTIONAL SETTINGS AND THE DUE RESPONSE

Such problems existed in the first software version, set up in the hospital at the beginning of 2007. Due to problems in the system which caused frequent breaks and delays (it was estimated that any mouse click would take around 30 seconds in waiting), it was decided not to make any upgrade of the application until June 2008. It was then installed the most recent ALERT version. In this version, all dysfunctional settings we had pointed out throughout the 18 months of using this application would be solved, according to an ALERT manager, in charge of setting up the project in the hospital (Miguel Rocha, personal communication). However we verified that *none* of the main dysfunctional settings had been corrected. Besides, new functionalities were installed that we had never suggested. For instance, on the tab personal background, 11 different tabs were created, called *congenital abnormalities, surgical background, medical background, food history, family history, gynecological history, obstetric history, prenatal, natal and neonatal history, social history, permanent disability and relevant notes*. This last tab, a free text, is the most used where are all the patient's personal background can be written as free text.

New dysfunctional settings have also emerged. For instances, several laboratorial parameters were no longer in the list of tests to request, therefore they must be again requested in hardcopy. The printed prescriptions in a previous consultation, cannot be reprinted in subsequent visits with a single mouse click, rather all the drugs must be requested, one by one. It is not possible to write drugs posology in free text, preventing the prescription of increasing dosages or weaning off.

Dysfunctional settings moving from one to the other version, as well as those emerging again in the newest version are endless and impossible to describe in full in this paper. It was not possible to understand the reason why the users' suggestions were not taken in consideration in the changes made to this new version, which is in fact considered worst than the previous one.

In my view it is necessary a crucial change for this application to be successful, making it more flexible enabling an easier change according to the users requests.

CONCLUSION

The ALERT application is an innovative electronic medical record, expanding in Portugal.

It has several positive points, namely the way as

it enables recording and transmitting information. However there are multiple aspects to improve, and the main ones might prevent potential benefits of this application to become effective. Apart of technical problems that often delay the application and sometimes prevent it from working, special attention should be given to:

The user interface: it is paramount to make such interface more similar to the usual hardcopy; to enable preferentially free text, opposite to templates; to remove hardly used tabs and buttons; to enable a simultaneous general view of a wider amount of clinical information;

Therapy: it is crucial that in this area it becomes possible the use of functionalities of unquestionable benefit, as making available information on drugs, warnings about possible drug interaction, suggesting appropriate dosages, among others;

Answering users: this system is produced by information technology personnel but it is also used by healthcare workers. It is up to the latter, not the former, to evaluate the positive and negative points of the ALERT system, recommending the due changes. If the ALERT software succeeds to promptly accept and incorporate such evaluation and recommendations it can become a tool that effectively delivers on its promises: *"judging from the excited rhetoric of some of its enthusiasts, health information technology has the power to transport us to almost a dream-like world of health care perfection in which the work of doctors and the care of patients proceed with barely imaginable quality and efficiency"*.[2] ■

Conflict of interests

The author states there is no conflict of interests on his authorship of this paper. Namely the author does not have or has had in the past, any connection with the MNI company or with any other company in the area of healthcare information technology.

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