Fixing the Electronic Health Record: What's wrong, what needs to be done, and how do we do it?

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Abstract— **The rate at which electronic health records (EHRs) are being adopted seems to be exceeded by the rate at which complaints are published in the medical and lay literature. Problems include burden of documentation, information overload, alert fatigue and difficulty with re-use of data. Extensive resources and great minds are being applied to improving EHRs, with special focus on user interface design and interoperability. While strides are being made, the aforementioned shortcomings seem no less prevalent. Applying lessons learned in the successes to date, the author proposes a fundamental change to EHRs that may provide a path forward.**

I. Introduction

Electronic health records (EHRs) have enjoyed extensive adoption since the passage of the Affordable Care Act in 2010. Mandatory use of EHRs has improved some health care processes but has added significant burdens to their frontline users, notably nurses and physicians.

Great efforts are being expended by software system vendors and academic researchers to effect changes that will reduce these burdens, but progress has been slow, with complaints frequently appearing as opinion pieces in leading medical journals.

The situation of insufficient progress despite concerted efforts suggest that it is time to step back and try to look for fundamental issues that need to be addressed before progress can resume anew. It is instructive to examine some of the capabilities of current ERHs to understand what is working and why, with the hope that the answers will inform work on improving the next generation of EHRs.

II. What's Working

Although the paradigm of the EHR has evolved directly from the functionality (or lack thereof) of the preceding paper-based health record, EHRs today successfully support some functions that go beyond simply an electronic diary of patient data. Examples include laboratory summary reports, clinical decision support (in the form of alerts and reminders), and the re-use of EHR data for purposes such as billing and reuse in research.

It is worth noting that these functions all succeed because EHRs are designed to capture some data (such as laboratory test results, medication orders, and problem lists) in structured form using controlled terminologies. The advantages of this format go beyond improved indexing and retrieval; they support symbolic manipulation and reasoning. For example, alerts and reminders can be based on the classes of drugs and conditions, rather than explicit hard-to-maintain lists of terms, while laboratory results can be grouped based on the substance measured by the test procedure, rather than simply the procedure names. The lessons of structured, controlled data should not be overlooked as we move forward with new solutions.

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III. What's Missing

Space limitations do not permit a full exploration of current shortcomings in this abstract. However, the inability of EHRs to suppress information overload and less-than-useless alerts stems in part from the fact that the EHR does not know enough about what is "going on" with the patient to be helpful. A clinician with such knowledge can comb laboriously through a patient's record to extract data relevant to a clinical decision at hand or to know when to override an alert. It is this knowledge, in coded structured form that must be added to the EHR to enable smarter decision support tools, whether they be better user interfaces or more intelligent alert logic.

IV. How To Get There

The evolution to a smarter EHR will require informatics research to answer some fundamental questions, such as:

- What conceptual elements of clinicians' reasoning must be added to the record?
- How can the data be captured with a minimum of burden added to the clinicians' already onerous documentation tasks?
- How can EHRs take advantage of this new information to reduce the workload on the users, while improving the quality and efficiency of care of their patients?
- How will we educate the workforce to participate in this new paradigm?

The presentation of this abstract will examine these questions.

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