Chapter 6
The Electronic Patient Record:
A Practicing Physician's Perspective

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ABSTRACT

This chapter provides a novel, unique, and reasonably broad set of perspectives on the human resources (HR) and information technology (IT) ramifications of the electronic patient record (EPR) as an integral component of the total hospital information system.

INTRODUCTION

The medical record is one of the cornerstones of medical care, both in the in-patient and out-patient environment, and, ideally will be in the Emergency Medical Services (prehospital) environment as well. The potential of the electronic patient record (EPR), however, as a component of a hospital management information system is enormous, and unfortunately, as yet, only minimally realized.

A contributing factor to the unrealized potential is that the electronic patient record is perceived as only a tiny fraction of the total informatics job at a given hospital. It is therefore marginalized both in terms of capital investment and as a central priority in IT planning. In principle, any IT professional would be able to list the steps in the design, construction, implementation, and optimal operation of a comprehensive and integrated health care information system. In practice, there is an essentially complete disconnect between information technology (IT) objectives, human resources (HR) objectives, and patient care objectives, owing in part to a lack of central strategy and reliance on a plethora of legacy systems and vendors.

Medical care carries the intrinsic risks of death or serious bodily harm. An electronic patient record (EPR), if well done, can help to reduce these risks. The EPR can not only serve as a repository for information from health care providers, it should serve as a decision support system, reminding physicians, nurses, and other health care providers of needed additional tests, medications, or diagnostic criteria, as well as issuing alarms/alerts regarding

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impending or present danger to the patient. For example, an alarm system should notify caretakers of abnormal constellations of symptoms or signs, or when the patient meets the diagnostic criteria for life-threatening conditions such as systemic inflammatory response syndrome (SIRS) or sepsis. Similarly, it should remind caretakers of the criteria to call for a medical emergency team when those criteria are met in an individual patient. The ideal medical record would be similar to modern combat avionics - full-speed, real-time decision support along with appropriate warning and response algorithms, as well as integration with a network-centric information system. End-users are similar to aircraft pilots in the following regard: we don't know how to build the plane, we don't know how to fix the plane, but we become very annoyed when the instruments quit in mid-flight! Also, the medical record should be configured as part of an object oriented database. While the limitations of object oriented database management are recognized, the ability to actually do structured queries as described below is essential to modern quantitative management.

If, however, the electronic patient record materially interferes with the practice of medicine or nursing, the record itself may increase risks. The argument that computerizing the medical record always makes things better is a beautiful hypothesis, but in rare instances has been slain by ugly facts. At the Children's Hospital of Pittsburgh, implementation of computerized physician order entry (CPOE) increased mortality from 2.80% to 6.57% in children referred there for specialized care (Han et al., 2005). While Han's study was not designed to establish causation, the authors speculate that (1) delays in the delivery of time sensitive therapies in critically ill patients (especially vasopressors for shock and antibiotics for sepsis) and (2) significant disruptions of ICU team function caused by superimposition of computer tasks (as detailed in the article) were major contributory factors. While the typical experience is more positive, the presumption of uniform benefit from either an EPR or CPOE is not securely established.

MEDICAL ISSUES

The quality of medical decision making in general is dependent on (1) access to the available information, (2) the quality of the information, and (3) the quantity of relevant information. In any given medical note, specific physicians will want specific information. Thus, optimization of the signal (relevant information) to noise (irrelevant information) is a necessary property of structured notes. Simply because someone (usually not a person who is ever going to try to wade through one of these notes) thinks every item of information available for that day should be included, does not mean that is a good idea. The use of hyperlinks to laboratory and radiographic reports for example would be vastly preferable to automatic inclusion of the text in every single progress note by every service.

Monitoring: Evolution of the 747 Cockpit

Real human systems engineering should be done in a rational rather than on an ad hoc basis. For instance, in the transition from the analog version of the 747 cockpit, the number of lights, gauges and switches changed from 971 to 365. Both programmable displays and careful simplification of procedures also reduced workload, allowing the number of crew members to decrease from three to two (see http://www.boeing.com/news/feature/747evolution/thenvsnow.html).

These same engineering principles need to be applied to the EPR. End-users hypothesize that there is a hyperbolic relationship between total programmer work and end-user work per unit operation. While end-users understand budgetary constraints on programming in general terms, they are not willing to accept increased work for them