The How and Why of Incident Investigation: Implications for Health Information Technology

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Abstract. The potential of health information technology to effectively support the work of health care providers and reduce the likelihood of errors and incidents has not been realized; however, the manner of investigating incidents can provide information to aid in its realization. Implications of negligible findings from extensive research on provider accountability for errors point to the importance of addressing the nature of error incidents. Consideration of the nature of incidents together with lessons learned from industry error research expands the focus of incident investigations to include how and why the event happened. A model to guide incident investigations and examples of the viability of that model to address issues in using health information technology are described. The wisdom of Sherlock Holmes accompanies this sleuthing for methods to enhance information technology to better support care providers in their daily work.

Keywords: Incident Investigation, Health Information Technology, Error, Behavior, Systems, User Support.

1 Introduction

Health Information Technology (HIT) commonly considered as comprised of the Electronic Medical Record (EMR), Computerized Physician Order Entry (CPOE), and drug administration bar coding has been advocated in the United States as the means to enhance if not ensure patient safety.

Despite all the rhetoric that extols the virtues of HIT there is little evidence that HIT or any aspect of it appreciably supports the work of health care providers across institutions. Indeed, the literature advocating HIT is replete with words such as can, should, has the potential. Possibly due to the lack of clearly demonstrated usefulness for providers of varying degrees of computer savvy and more certainly the initial and maintenance costs for the technology, as well as other reasons, the rates for adopting HIT are low. It is estimated that from 17% to 24% of physicians have access to EMR and 4% to 24% of hospitals have adopted CPOE [1].

2 You See, But You Do Not Observe: Sherlock Holmes in “Scandal In Bohemia”

Difficult to read handwriting has long been an issue in medication errors and misunderstanding orders in patients’ charts. A means to avoid handwriting issues is
provided through the use of technology. Health care specific software often having
the same format as the hardcopy transforms a computer into an electronic chart,
which often is considered an EMR although ideally that term would refer to a
composite of all medical records for a patient. Similarly software was developed for
the provider to enter orders including prescriptions into a hand held computer, CPOE,
transforming that technology into a vehicle for conveying written orders without
subjecting the person receiving them to incomprehensible handwriting. Because the
users of EMR and CPOE may have needs that differ from those of the typical
computer user, special attention is given to the user interface - be it a desktop, laptop,
or mobile computer. Usability is most often defined as the ease of use and
acceptability of a system for a particular class of users carrying out specific tasks in a
specific environment. Exactly, this ease of use affects the users' performance and their
satisfaction. Consequently, it is of great importance that every software practitioner
not only be aware of various usability methods, but be able to quickly determine
which method is best suited to every situation in a software project [2].

Especially, when design and develop mobile systems for health care, it is essential
to obtain empirical insight into the work practice and context in which the proposed
mobile system will be used. Consequently, mobile devices are only useful when
design and software validation aspects have been taken into account [3, 4]. On the
other hand, bar coding for drug administration seems less complex – possibly, what is
effective in the supermarket certainly should be effective in the hospital.

Studies of the actual use of CPOE and bar coding suggest that those technologies
in their present form may not be the silver bullet they are purported to be. A study in a
highly computerized U.S. Veterans Administration hospital found that despite CPOE,
bar coded medication delivery, EMR, automated drug-drug interaction and
computerized allergy alert, of the 937 admissions in a 20 week period 437
experienced adverse drug events (ADEs). Of those ADEs, 36% were an adverse drug
reaction, 33% wrong dose, and 7% inappropriate medication [5]. Errors were
identified in 61% of medication orders, 25% in medication monitoring, 13% in drug
administration, 1% in dispensing, and 0% in transcription. It was concluded that
health care providers “… should not rely on generic CPOE and bar coding”. This does
not bode well for HIT unless the problems are unique to this study – they aren’t.

The impact on error of a commercially sold CPOE software program was studied
by comparing patient demographic, clinical, and mortality data before and after
implementation of CPOE in a regional, academic, tertiary-care children’s hospital. To
assess similarity of the pre and post implementation groups, 18 demographic and
clinical characteristics of the 1394 children admitted during the 13 months prior to the
implementation of CPOE were compared to those of the 548 children admitted during
the 5 months post implementation. Statistical analysis found no significant differences
between the characteristics of the pre and post implementation groups. A difference in
mortality was found, however.

The mortality rate for the 13 months before CPOE was 2.80% whereas the rate was
6.37% for the 5 month study period after implementation. These differences were not
attributed solely to errors in specific drug ordering; rather they reflected several
unintended consequences from the implementation of CPOE. Delays in treatment
occurred that were considered as reflecting the amount of time spent in the physical
process of entering orders using CPOE. With CPOE order entry required an average