Chapter IX
Where do Technology-Induced Errors Come From?
Towards a Model for Conceptualizing and Diagnosing Errors Caused by Technology

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ABSTRACT

Health information technology has the potential to greatly improve healthcare delivery. Indeed, in recent years many have argued that introduction of information technology will be essential in order to decrease medical error and increase healthcare safety. In this chapter we review some of the evidence that has accumulated indicating the positive benefits of health information technology for improving safety in healthcare. However, a number of recent studies have indicated that if systems are not designed and implemented properly health information technology may actual inadvertently result in new types of medical errors—technology-induced errors. In this chapter we discuss where such error may arise and propose a model for conceptualizing and diagnosing technology-induced error so that the benefits of technology can be achieved while the likelihood of the occurrence of technology-induced medical error is reduced.

Every great mistake has a halfway moment, a split second when it can be recalled and perhaps remedied.

Pearl Buck – *U.S. novelist in China (1892 - 1973)*

INTRODUCTION

Today technology permeates almost every aspect of healthcare delivery from clinician to administrator to researcher and policy maker work (Shortliffe & Cimino, 2006; van Bemmel & Musen, 1997). Consequently, many health professionals, administrators, policy makers, and researchers have begun to take technology (i.e., computer software and hardware) for granted, believing that the technology provides information and integrates and executes processes correctly, consistently and accurately in a valid, reliable and useful manner. However, technology is developed, designed, implemented, and used by humans, who we know, are imperfect and prone to making mistakes. These human imperfections lead us to make errors in the design, development, customization, implementation, and use of complex technologies such as health information systems (Kaner, Falk, & Nguyen, 1999; Patton, 2001). These errors may in turn introduce or induce new types of errors into healthcare delivery processes (i.e., technology-induced errors).

Defining Technology-Induced Errors

Technology-induced errors can emerge during the software development lifecycle through to the implementation and operation of health information systems (Kaner et al., 1999; Patton, 2001). The notion of technology-induced errors is not new to the health information systems literature. Over the past several decades there have been many published occurrences involving the attributes of health software and hardware that induce errors. These reports, although infrequent, have led to significant learning's and the redesign and improvement of healthcare technologies, their implementation and user training associated with their use (Koornneef & Voges, 2002; Vicente, 2003). As well, with the rise in the acuity and complexity of patients, health professionals are increasingly becoming more reliant upon technology (i.e., health information system software and hardware) to aid patients in the process of recovering, recuperating and managing severe patient illness and disease (Sandelowski, 2000). As the rate of technology use in healthcare continues to increase in response to changing demographic and healthcare needs of patients so does the potential for technology-induced error. Therefore, technology-induced error as a patient safety issue has become a source of increasing concern for system designers, developers, implementers and users. To better understand technology-induced error one must first understand the notion of medical error and how technology has been used to reduce medical error associated with the management of acutely ill, complex patients. Therefore, the purpose of this chapter will be to: (a) first define and describe traditional sources of medical error, (b) briefly describe the background, and introduction of technology (i.e., software and hardware) into healthcare for the purpose of medical error prevention, (c) define technology-induced error and differentiate this type of error from traditional sources of medical error, (d) review the possible sources of technology induced error across the technology design, development, implementation and operation continuum, and (e) propose a conceptual framework for diagnosing technology-induced errors.

TRADITIONAL SOURCES OF MEDICAL ERROR

As outlined earlier, before one can discuss technology-induced error, one must first understand what