Electronic Health Records: Improving Patient Safety and Quality of Care in Texas Acute Care Hospitals

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ABSTRACT

Electronic health records (EHRs) have been proposed as a sustainable solution for improving the quality of medical care. This study investigates how EHR use, as implemented and utilized, impacts patient safety and quality performance. Data in this paper include nonfederal acute care hospitals in the state of Texas, and the data sources include the American Hospital Association, the Dallas Fort Worth Hospital Council, and the American Hospital Directory. The authors use partial least squares modeling to assess the relationship between hospital EHR use, patient safety, and quality of care. Patient safety is measured using 11 indicators as identified by the Agency for Healthcare Research and Quality (AHRQ) and quality performance is measured by 11 mortality indicators as related to 2 constructs, that is, conditions and surgical procedures. Results identify positive significant relationships between EHR use, patient safety, and quality of care with respect to procedures. The authors conclude that there is sufficient evidence of the relationship between hospital EHR use and patient safety, and that sufficient evidence exists for the support of EHR use with hospital surgical procedures.

Keywords: Electronic Healthcare Records, Healthcare Informatics, Partial Least Squares, Patient Safety, Quality

1. INTRODUCTION

Hospitals invest in information technology to lower costs and to improve quality of care. However, it is unclear whether these expectations for information technology are being met. Current literature asserts the imperative need to improve quality of care and patient safety in the United States (Kohn et al., 2000; Bloom, 2002; Case et al., 2002a). The death toll of patients due to preventable medical errors ranks as the sixth leading cause of death in America with approximately 100,000 patients dying of these courses each year (Kohn et al., 2000; Zhan & Miller, 2003). This puts the mortality rate due to medical errors ahead of diabetes, liver disease and pneumonia. Additionally, there are 1.4 million hospitalizations a year that result in a medication-related injury (Kohn et al., 2000; Case et al., 2002b). Several studies have recognized the tremendous room for growth in the use of health information technology (HIT) to enhance patient care quality and safety (Ammenwerth et al., 2002; Bates, 2002; Brooks et al., 2005; Plebani, 2007). Specifically, the availability of information technology (IT)
applications in hospitals has been identified as a means of improving patient safety and reducing the number of adverse events (Birkmeyer et al., 2000; Gaba, 2000; Institute of Medicine, 2001; Remus & Fraser, 2004). In particular, electronic health records (EHR) have been touted as having significant benefits, such as productivity and efficiency gains, and the ability to improve patient safety and quality of care (Baron, 2007; Connors, 2007; Berk et al., 2008; Crane & Crane, 2008; Eden et al., 2008; Ketchum, 2008; Smith & Kalra, 2008).

In that spirit, our study investigates the impact of EHR usage and utilization on quality performance and patient safety. There is currently an absence of empirical evidence showing EHRs impact on quality performance and patient safety. In addition, the findings of this research can inform healthcare administrators about the economic returns of usage and utilization of costly HIT investments. Finally, provisions for subsidies provided by government for capital investments can be influenced by the impact of EHR usage on healthcare quality.

2. EHRS IN HEALTHCARE

Electronic health records are defined as a longitudinal collection of electronic health information about individual patients and populations. It is ‘a mechanism for integrating health care information currently collected in both paper and electronic medical records (EMR) for the purpose of improving quality of care’ (Gunter & Terry, 2005). This may include information regarding a patient’s medical history of illnesses, digital radiology images, list of allergies, billing records, etc. Keeping medical records electronically has noted advantages over paper records, such as increased accuracy, decreased medical errors (e.g., diagnosis and prescription related fatal errors) and mortality rates, improved efficiency and productivity, lowered costs and better, safer, more equitable care by improving the exchange of health information among providers and care teams to support coordination and providing better information for joint consumer-clinician decision-making at the point of care (Baron et al., 2005; Basch, 2005; Leipold, 2007). The anticipated benefits of EHR are so vast that policy makers have called for universal EHR adoption by 2014, and current scholarly literature has given much attention to the potential improvements in quality of care by EHR implementation. Studies have predicted that EHR will help in the reduction of medication errors (Shortliffe, 1999; Thompson & Brailer, 2004; Linder et al., 2007) and in the improvement of quality of health care services (Miller & Sim, 2004; Fonkych & Taylor, 2005).

While literature recognizes the potential life-saving benefits of EHR in healthcare, their actual impact on and relationship to patient outcomes is still unclear. The majority of EHR literature available takes a management perspective and concentrates mainly on adoption, implementation, acceptance and barriers (Overhage et al., 2001; Ash & Bates, 2004; Miller & Sim, 2004; Chiang et al., 2008; Withrow, 2008; Zandieh et al., 2008). However, research that examines the actual impact that EHRs have on the healthcare system is sparse. While some previous research examined the relationship between EHRs and quality (Spencer et al., 1999; Kinn et al., 2001; Asch et al., 2004; Linder et al., 2007; Kazley & Ozcan, 2008), the most common examples of empirical analysis have been case studies that examine specialized sample populations of healthcare (i.e., VHA, ambulatory, labor and delivery, etc.), or utilize small sample sizes and qualitative evidence with limited generalizability (Kinn et al., 2001; Asch et al., 2004; Miller et al., 2005; DesRoches et al., 2008; Eden et al., 2008; Edwards et al., 2008; Smith & Kalra, 2008). Furthermore, the outcomes of interest vary using limited measures of quality (i.e., medication error rate, adherence to protocol, specified illnesses).

This study advances research by expanding EHR investigation to include operational outcomes of acute care hospitals. A conceptual model showing the relationships between the constructs used and other components is given in Figure 1. Specifically, the inclusion of quality and patient safety metrics that have
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