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The Impact of EHR on the Quality of Care

Arshia Khan

Computer Science Department,
University of Minnesota Duluth,
Email: akhan@d.umn.edu

Abstract. Provision of consistent, high quality health care is lacking in the United States. There is significant evidence identifying the need for improvement in health care. The implementation of health information technology has been proposed as a strategy to reduce costs and improve the quality of care. Researchers have found health information technology implementation benefits the healthcare management of patients by improving the quality of care provided. Additionally there is evidence that critical access hospitals are lacking in quality of care and have higher mortality (i.e., death) rates in comparison to urban hospitals. A study identified a gap in the knowledge of quality of care with respect to critical access hospitals.

Keywords: Electroni health records(EHR); Quality of care; 30 Day mortality rate

1. Background of the Study

1.1. Health Care in United States

Although the United States has the largest and most expensive healthcare system in the world, it is deficient in providing high quality care, as reported by the Institute of Medicine researchers [9] [14] [19] [22] [24] [35] [41]. Medical errors are responsible for 44,000 deaths [27] and cost $29 billion annually in the United States [35]. [24] indicated some patients do not receive care reflecting the latest scientific best practices. For example, only 50% of individuals in the United States receive medical care recommended by the Institute of Medicine [28]. [9] reported the healthcare system in the United States is in fragments and needs to be fixed. These shortcomings provoked policy makers, healthcare providers, and consumers to assess, scrutinize, and investigate the quality of care in the United States [24]. The rising number of chronic health conditions along with the need to provide a comprehensive view of the patient's health information is driving the need to integrate technology with health care [33].

1.2. Electronic Health Records (EHR)

One type of information technology used in contemporary healthcare organizations is an electronic health record (EHR) system. This system facilitates the exchange of patient information across all entities within a healthcare organization and has the potential to improve patient care, reduce medical errors, reduce patient recovery time, reduce costs, and provide better care [3] [6] [10] [12] [25].

1.3. *EHR implementation and its meaningful use.*

According to [6] and a study conducted by the Stanford Prevention Research Center, the use of an EHR alone is not sufficient to improve the quality of health care. In addition, it has to be accepted and implemented by all clinicians, indicating a *meaningful use* of the EHR ("Electronic Health Records," 2007; Institute of Medicine, 2007). Researchers indicated mixed results from the use of an EHR system (Han, Carcillo, Venkataraman, Robert, & Clark, 2005; [23].The benefits of an EHR system can only be realized by its meaningful use and not just in implementation [32].

The federal government has proposed several incentives to improve the meaningful use of an EHR system. In order to receive federal funding, hospitals must demonstrate meaningful use of an EHR system. In July 2010, the Department of Health and Human Services defined the criteria for meaningful use as prescribing medication

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electronically, exchanging clinical data, reporting *quality measures*, maintaining demographic information of the patient, maintaining medication lists, maintaining allergy lists, charting vital signs, documenting care summary, and charting smoking status [16]. Each criterion is translated into components (i.e., functions) of the EHR.

1.4. Quality of Care and EHR

The purpose of implementing an EHR system is to enhance quality of care by reducing errors, improving efficiency and access to care, and reducing costs. Federal policy makers are focused on healthcare quality improvement [3] [10] [25]. [6] stated it is essential to study the quality improvements in health care, with the adoption of an EHR system, for efficient distribution of federal funding proposed by the American Recovery and Reinvestment Act of 2009.

Thus, it is imperative to determine if a relationship exists between the meaningful use of an EHR system in critical access hospitals and the quality of care provided. According to [6], comparing the meaningful use of an EHR system to quality of health care is essential, especially in critical access hospitals where there is a dearth of prior research [29].

The Agency for Healthcare Research and Quality has devised various tools helpful for measuring quality of care. These measures are used at the federal, state, and local levels and have been endorsed by The National Quality Forum. The use of quality measures has been found to be helpful in the improvement of the quality of health care (Casey et al., 2006). The purpose of achieving meaningful use of an EHR system is to attain quality improvement.

Researchers found the deaths caused by clinical errors to be 44,000 [27]. [37] attributed the variation in mortality rates in hospitals to the quality of care provided. Lower death (i.e., mortality) rates generally reflect better patient care. Researchers at The Center for Medicare and Medicaid services have also recognized *30-day mortality rates* as a quality measure. These rates are recorded in the *Hospital Compare* database [5].

1.5. 30-day mortality rate as the quality measure.

Several studies have used 30-day mortality rates as a quality measure [7] [20] [38]. Casey et al. (2010) recognized the existence of challenges in the measuring of quality of care in spite of its everyday use by clinicians whose principal activity is to monitor quality of care. [1] indicated mortality measures are prominent quality measures that can be derived from the hospital discharge information.

Health care in the United States is suffering and an EHR system is postulated to have the potential to improve the quality of care [41][42]. EHR adoption is lagging, especially in critical access hospitals, which adds to existing issues with quality of care [20]. Although the EHR is theorized to improve the quality of care, researchers have shown that the mere implementation of an EHR system is not sufficient to improve quality. Rather, meaningful use of an EHR system is vital to maximize the benefits of an EHR system.

This research examines the relationship between EHR components [8] [27] and quality of care as measured by 30-day mortality rates [7] [20] in critical access hospitals. Therefore, the purpose of this research is to contribute to the extant literature to support and encourage quality improvement, with consideration to EHR adoption, as proposed by policy makers, clinicians, and healthcare providers.

1. Operational Definitions

The two main constructs in this study are meaningful use of EHR and quality of care. To operationalize and quantify EHR meaningful use, it has been divided into several components. Each component is individually implemented at hospitals. Hospitals vary on the number of components they have implemented [22]. The three most important components of the EHR are used in this study of critical access hospitals: (a) inputting data through Computerized Provider Order Entry, (b) recording and charting changes in vital signs, and (c) maintaining an up-to-date problem list [8] [26].

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To operationalize the quality of care construct, the researcher will use 30-day mortality rates for acute myocardial infarction, congestive heart failure, and pneumonia as an indicator of quality of care. Researchers have indicated 30-day mortality rates are an important indicator in quality of care [20] [38].

2. Research Question

Is there a relationship between the EHR meaningful use criteria and the quality of care in critical access hospitals?

3. Research Design

Based on the nature of the emerging phenomenon of EHR, meaningful adoption, and the definition provided by [11] this research was exploratory and explored the relationship between two constructs, the meaningful use of an EHR system and the quality of care, while allowing for bivariate analysis.

The research design for this study was quantitative, retrospective, correlational, non-experimental, while allowing for bivariate analysis. This study was retrospective in nature [20], because the researcher utilized data collected by the Center for Medicare and Medicaid Services and the Healthcare Information Management Systems Society. Data collected by the Center for Medicare and Medicaid Services and the Healthcare Information Management Systems Society were used.

The choice of the methodological approach for this study was derived from the synthesis of the existing literature on general research methodologies (Astley & Van de Ven, 1983; [4] [13] [30] [34] [36] [39] and the literature on similar studies in health care conducted in assessing the quality of care with the implementation of meaningful use adoption of an EHR system [2] [20] [22] [40]. The theoretical and methodological basis for this study was acquired by the interdisciplinary triangulation of research methods, the healthcare industry, and the information technology adoption phenomenon; this interdisciplinary triangulation added to the existing health information technology knowledge base [4] . The EHR meaningful use adoption is an emerging phenomenon and the lack of research, especially in the evaluation of rural critical access hospitals' quality assessment, forms a strong foundation for this study.

4. Data Analysis

Descriptive statistics such as frequency distribution were computed before the correlation between the variables was examined. Normality was verified using the Kolmogorov-Smirnov test. Skewness and kurtosis for all the variables.

5. Results

The nine hypotheses of this study could be split into three sets of hypothesis with each set examining the relationship between one EHR meaningful use component and 30-day mortality rates in each of the three disease states in critical access hospitals. The three meaningful use components of the EHR considered in this study were (a) inputting data through Computerized Provider Order Entry, (b) recording and charting changes in vital signs, and (c) maintaining an up-to-date problem list in critical access hospitals. The three disease states considered for the quality measure were patients with (a) myocardial infarction, (b) congestive heart failure, and (c) pneumonia. Each of the null hypotheses was accepted in the entire hypothesis. There was found to be no correlation between each of the EHR meaningful use components and the 30-day mortality rates in case of patients with acute myocardial infarction, congestive heart failure, and pneumonia.

6. Implications

The results of this study implied this research does not support any relationship between meaningful use of specific individual EHR components and the quality of care in critical access hospitals as measured in 30-day mortality rates.

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This implication was consistent with studies conducted by [22] and [42]. This result was not surprising from the premise that [3] [21] and [31] identified mixed results from studies examining the relationship between EHR components and quality of care. The lack of correlation between the individual EHR components and the quality of care in critical access hospitals could be attributed to the meagerness in EHR adoption and the financial issues faced by critical access hospitals.

7. Recommendations for Future Research Directions

The research study described above is one of the many approaches that can be taken to understand the correlation between EHR meaningful use and quality of care in critical access hospitals. This study examined inputting data through Computerized Provider Order Entry, recording and charting changes in vital signs, and maintaining an up-to-date problem list in critical access hospitals as the EHR components. There are a total of 15 components or functionalities for meaningful use of an EHR identified by the Institute of Medicine [15]. The remaining 12 components of the EHR should be studied as well.

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