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The Impact of Electronic Health Records Meaningful Use on Patient Safety and Satisfaction

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This is to certify that the doctoral study by

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Walden University

November 2022

Abstract

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by

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Master of Physician Assistant [Eastern Virginia Medical School] 2004

Business Administration, BS, [Liberty University], 1999

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The widespread adoption of electronic health records (EHRs) is encouraged because of their potential to improve the quality of care provided. It was unknown to what extent the meaningful use of EHRs would impact patient safety and satisfaction in general and specialty hospitals. The researcher's purpose for this quantitative correlational research was to examine the impact of meaningful EHR use of EHRs on patient safety and satisfaction outcomes in general and specialty hospitals in Philadelphia (PA). The constructs of the institutional theory guided the study. The hypotheses that guided the study included (a) Meaningful EHR use positively influences patient satisfaction scores, (b) Meaningful EHR use positively influences patient safety scores, and (c) Meaningful EHR use positively influences patient recommendation scores. A quantitative methodology with a correlational study design was applied. Purposive sampling was used to sample 131 general and specialty hospitals in PA. The inclusion criteria for the facilities were health care institutions enrolled in the EHR Incentive Program. Simple descriptive statistics and independent *t-tests* were conducted using Statistical Package for Social Sciences (SPSS) version 26. The findings did not reveal a statistically significant correlation between the two variables. However, past research and studies have shown the association of the correlation from a negative and positive perspective. The potential positive changes include improving the patient's safety and satisfaction levels by encouraging training healthcare providers on the meaningful use of EHR will help increase nurses' and healthcare providers' knowledge, resulting in improved patient safety and satisfaction.

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Section 1: Foundation of the Study and Literature Review

The introduction of electronic health records (EHRs) within the United States healthcare system was expected to enrich the quality of patient care, efficiency of care delivery, and overall hospital outcomes (Melnick et al., 2020). In 2009, the United States launched robust digitization campaigns for its healthcare system. The Health Information Technology for Economic and Clinical Health (HITECH) Act provided up to $27 billion in federal incentives to encourage EHRs adoption across hospitals. As a result, 96% of nonfederal acute care hospitals and 86% of physician offices adopted EHRs by 2017 (Melnick et al., 2020; The Office of National Coordinator for Health Information Technology [HealthIT.gov], 2020).

EHRs can improve patient and practice outcomes by facilitating faster access to accurate patient information, enhancing care integration through collaborative communication, and improving documentation, thus raising monitoring efficiency (Yanamadala et al., 2016). Furthermore, hospital information systems can be enhanced using EHRs, for instance, by providing real-time data for patient monitoring or clinical decision support (Melnick et al., 2020). In addition, adopting EHRs promises to improve medical facilities' measurable quality-of-care indicators, such as patient safety, satisfaction, and preventable health events (Staggers et al., 2018).

However, the potential for improved outcomes only applies if EHRs are used meaningfully and appropriately; otherwise, the opposite effects may be achieved (Wani & Malhotra, 2018). For example, research indicated that physicians spend 1-2 hours preparing after EHRs for 1 hour on direct patient care, suggesting a decline in the time

taken to care for patients (Arndt et al., 2017). Conversely, research shows improved patient and clinical outcomes related to EHRs (Wani & Malhotra, 2018).

The far-reaching health information technology (HIT) meaningfully uses certified EHRs as an incentive to reform the healthcare system (Sterling, n.d.). The Centers for Medicare and Medicaid (CMS) established financial-benefits programs for qualified healthcare providers (HCPs) to enhance the quality and efficiency of health care and patient safety as per meaningful use (Sterling, n.d.). Therefore, the project assessed the influence of demonstrated meaningful use of EHRs and patient outcomes such as patient safety and patient satisfaction.

This section covers a discussion of the problem, the purpose, the research questions, and the nature of the study. The theoretical framework guiding the study and the available literature is included. Lastly, the study's significance and summary section defined assumptions, scope, and delimitations.

Problem Statement

It was unknown to what extent the meaningful use of EHRs would impact patient safety and satisfaction in general and specialty hospitals. As conflicting research evidence emerges, the potential for improving patient care outcomes with the widespread adoption of EHRs has been questioned. While some evidence indicates a positive influence on EHRs' adoption, others report the unintended consequences of the system's use (Wani & Malhotra, 2018). Rizvi et al. (2017) presented that adopting EHRs across U.S. hospitals was strongly promoted by the CMS and achieved a 90% adoption rate in primary care facilities.

The widespread employment of EHRs was pushed because of the perceived effectiveness of the system in improving the quality of care (Ndifon et al., 2016). Innovations in health care, such as EHRs, positively impact patients' quality of life and survival rate (Balestra, 2017). In addition, using EHRs improves the interaction efficiency between clinicians and their patients, streamlines the communication between nurses and physicians, enhances healthcare coordination, and reduces waste and redundant tests (Zahabi et al., 2016). Further, empirical evidence has shown that utilizing an EHR system significantly reduces medical mistakes and identifies associated diagnoses (Zahabi et al., 2016).

The widespread adoption of EHR systems across U.S. healthcare facilities has led to identifiable challenges. While the importance of EHRs in patient care is acknowledged, their effect has largely been negative for clinicians. The system's poor usability has negatively impacted clinicians' work-life balance and patient interaction (Melnick et al., 2020). Empirical evidence has associated EHR use in patient care with clinicians' burnout, job dissatisfaction, and depression (Adler et al., 2018; Arndt et al., 2017; Melnick et al., 2020). Usability issues of EHRs may also adversely affect patient safety and quality of care (Arndt et al., 2017; Kruse et al., 2018; Staggers et al., 2018).

Research points out substantial gaps between the high adoption rates of EHRs and their potential usefulness (Rizvi et al., 2017). The HITECH Act of 2009 was envisioned to encourage hospital EHRs adoption and meaningful use. The meaningful use program was titled the interoperability program (Rizvi et al., 2017). The interoperability program was launched in 2010 and implemented in October 2010 (Rizvi et al., 2017). This

intermission was used to encourage hospitals and physicians to adopt and meaningfully use EHRs by leveraging the capability of their information systems and decision-support techniques to improve healthcare outcomes and reduce costs. The meaningful use of EHRs involves the demonstrated adoption and utilization of EHRs in health information exchange to improve efficiency, safety, and overall quality of care (CMS, 2021). The CMS provides incentives to qualified hospitals and physicians demonstrating the meaningful use of EHRs to improve healthcare outcomes.

The interoperability stage is currently in its third stage; however, the hospitals meeting the criteria have not been evaluated and therefore have not received incentives yet (CMS, 2011). The program's first stage involved identifying and incentivizing hospitals to employ EHRs to capture and share patient information. The second stage, the meaningful use, which was examined in the project, was completed in 2018 and involved identifying and rewarding hospitals that used EHRs in advanced clinical processes to improve the quality of care. Although the program is currently in its third stage, the impact of the demonstrated meaningful use of EHRs on patient outcomes, such as safety and satisfaction, is unknown (CMS, 2021). Therefore, I focused on general and specialty hospitals in Philadelphia to evaluate how the meaningful use of EHRs, as evidenced by hospitals receiving CMS incentives, has influenced patient safety and patient satisfaction.

Purpose of the Study

In this quantitative study I examined the impact of the meaningful use of EHRs on patient safety and satisfaction outcomes. I aimed to identify the general and specialty hospitals in Philadelphia that have demonstrated the meaningful use of EHRs by the end

of the program's second stage. I examined whether the meaningful use of EHRs related to patient safety and satisfaction. Secondary data was used in the study. For the independent variable, the meaningful EHR use score, I employed the CMS EHR incentive program's public use files to determine all general and specialty hospitals in Pennsylvania (PA) that enrolled in the Meaningful Use program. The variable was based on two categories: the hospitals that demonstrated meaningful use and received incentives and those that did not. The dependent variables were patient safety scores and patient satisfaction scores. Data on patient safety was obtained from the Hospital Value-Based Purchasing (HVBP) program's data set on the CMS's Hospital Compare website. The variables were measured by summing the hospitals' total ratings/scores for the top six measures against hospital-acquired infections (HAI).

Furthermore, the data on patient satisfaction was obtained from the CMS's Hospital Comparison website. In addition, I used the HVBP-Hospital Consumer Assessment of Healthcare Providers and Systems [HCAHPS] data set to average the star ratings for the survey's global category. The HCAHPs survey's international category assesses the overall hospital rating and whether the patient would recommend the hospital.

I correlated specialty hospitals with and without meaningful use of EHRs on patient safety and satisfaction scores. Establishing the association between the hospitals' scores for patient safety/patient satisfaction and meaningful EHR use determined whether the latter impacted the former variables. Thus, the study's findings helped determine the

actual impact of the EHR Incentive Program. Additionally, the project results established the implications of the meaningful use of EHRs for hospitals and patients.

Research Questions

The study was conducted based on the following research questions and hypotheses:

RQ1: What is the correlation between meaningful use (IV) and patient safety (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$1: There is no significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$1: There is a significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

RQ2: What is the correlation between meaningful use (IV) and patient satisfaction (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$2: There is no significant correlation between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$2: There is a significant correlation between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

RQ3: What is the association between meaningful use scores (IV) with patient safety (DV) scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity?

$H_0$3: There is no statistically significant association between meaningful use scores and patient safety scores in general and specialty hospitals after controlling for

demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

$H_1$3: There is a statistically significant association between meaningful use scores and patient safety scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

RQ4: What is the association between meaningful use scores (IV) with patient recommendation scores (DV) scores in general and specialty hospitals after controlling for a demographic, geographic region, age, year, gender, and race/ethnicity?

$H_0$4: There is no statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

$H_1$4: There is a statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

Theoretical Framework

The constructs of the institutional theory guided the study. The theory described how the different aspects of social structures, such as norms, rules, and routines, influence an institution's work (Chiasson & Davidson, 2004). Also, the institutional theory evaluates the creation of social structure elements and their diffusion, adoption,

and adaptation over time and in given spaces. The theory also covers the rise in using and disusing these social structures. Additionally, the theory examined the environment's influence on the organization's social structures (Scott et al., 2000).

In the healthcare setting, the institutional theory has been used to understand how information technology (IT) resources such as EHRs have been adopted and assimilated into institutions (Sherer et al., 2016). Therefore, the forces and factors influencing the adoption and meaningful use of EHRs within healthcare institutions can be examined by applying the institutional theory. The institutionalization of healthcare organizations makes them subject to multiple regulatory forces, namely mimetic, normative, and coercive (Chiasson & Davidson, 2004).

Mimetic forces influence the copying of the behavior of similar organizations, while normative forces promote learning from others in similar professional networks (Sherer et al., 2016). Coercive forces result from internal or external pressures to adopt a particular behavior. All three forces can influence organizations' structure and climate by forcing them to adopt certain behaviors (Sherer et al., 2016). In the current study context, mimetic forces cause the relevant hospitals to adopt and use EHRs to influence other hospitals. Normative forces encourage healthcare providers to learn how to use and improve their EHRs with the help of other professionals in their network. Coercive forces are involved, such as incentivizing by the CMS, whereby hospitals may feel compelled to adopt and use EHRs to qualify for financial incentives.

Healthcare organizations are highly institutionalized, making them more resistant to change (Chiasson & Davidson, 2004). As a result, adopting new technology systems

such as EHRs may not necessarily reflect a change in their practices; hence, more

influences are required to instigate meaningful use in hospitals (Scott et al., 2000). Based

on the concepts of the institutional theory, the hospital environment, for example, is an

essential factor in shaping the use of EHRs. Additionally, hospital goals influence how

the person may use the EHR system. For example, within the study context, the CMS

incentivized hospitals that demonstrated the meaningful use of EHRs. Therefore,

receiving financial incentives by meeting the standards set by the CMS to receive

financial incentives may have been a contributing factor in how EHRs were used (Scott et

al., 2000).

Several studies have used institutional theory to explain the adoption and use of

EHRs in different countries. For example, Currie and Finnegan (2011) examined the

employment of EHRs in the United Kingdom's National Health Service. The study

findings established that institutional forces drive the adoption and appropriate use of

EHRs. In a different study, Jensen et al. (2009) found that the institutional theory can be

applied to interpret the implementation of an EHR system in a hospital ward in Denmark.

In addition, Sherer et al. (2016) used institutional theory to explain the adoption

and use of EHRs in ambulatory facilities in the United States. The study's findings

indicated that the forces central to institutional theory, namely mimetic, coercive, and

normative, are all significant factors influencing the adoption of EHRs. Moreover, the

authors established that the coercive factors are the most significant influencers for

adoption, while the normative and mimetic forces guided the use of the EHR systems.

Normative forces continually influence the adoption and specific uses of EHRs in the

United States, causing physicians to keep learning new strategies to improve the use of their systems, hence influencing meaningful use.

Nature of the Study

A quantitative method was the approach I used for conducting this study. Using statistical or mathematical analysis, the quantitative research methods (QRM) helped investigate the hypothesis and determine the relationship between the dependent and independent variables (McCusker & Gunaydin, 2015). The variables involved in the study included meaningful EHR use as the independent variable and patient safety and patient satisfaction as the dependent variables. Researchers use the QRM to solve problems using numerical data to hypothesize or confirm the results (McCusker & Gunaydin, 2015). The QRM was suitable for the study because of its flexibility in determining the relationship between EHRs and patient satisfaction and outcomes.

The data obtained from this study were analyzed using statistical methods to determine the relationships between the variables. This approach complemented the study to confirm the hypotheses that EHRs do not significantly affect patient satisfaction and patient outcomes. Furthermore, the QRM was an appropriate approach for collecting and analyzing numerical data using quantitative analytical tools, such as correlation and linear regression analysis techniques, to determine the impact of EHRs on patient satisfaction and patient outcomes.

A correlational study design was the quantitative research design most applicable to the study. A correlational design can determine how two or more variables are related and how a relevant variable affects another (Bhasin, 2019). Additionally, a correlational

analysis determined the extent to which the meaningful use of EHRs impacts patient satisfaction and outcomes and further identified a relationship between the dependent and independent variables.

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Literature Review

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Literature Search

A critical analysis and a literature synthesis of different sources and existing literature from peer-reviewed articles are used in the study. Only relevant and secondary studies were examined to acquire the most appropriate content for this section published in the last ten years, or between 2010 and 2020, which was used to answer research questions and hypotheses. The literature comprising peer-review articles was obtained from CINAHL, PubMed, the Cochrane Library, MEDLINE, and PsycINFO databases. The keywords used to identify relevant articles for review were *health information technology, electronic health records, patient safety,* and *patient satisfaction*.

Literature Related to Key Concepts and Variables

Electronic Health Records (EHRs)

EHR technology provides the basis for healthcare professionals to use computer systems to manage healthcare practices, such as storing, retrieving, sharing, and using patient health information to communicate and make clinical decisions on the best treatment (Alotaibi & Federico, 2017). Such technologies enhance information processing and provide advanced clinical decision support. Furthermore, the technologies help reduce human errors, promote patient health outcomes, facilitate coordinated care, improve clinical practice efficiency, and track patient data over time (Alotaibi &

Federico, 2017). Health information technologies encourage digitalization in healthcare organizations using analog tools.

Wass et al. (2017) explained that digital technology supports the distribution or sharing of information, enabling digitalization processes in healthcare organizations that use analog methods. The researchers further argued that digitalization and the rapid growth of digital health information in the healthcare sector have contributed to the transformation of healthcare delivery within and across healthcare organizations. The introduction of health information technology and patient health portals has provided new ways to ensure that healthcare information is accessible to service providers and patients (Wass et al., 2017).

The implementation and use of such technologies are based on legal efforts that support advanced systems. Such efforts include enforcing the Health Insurance Portability and Accountability Act, HITECH, and eHealth Action Plan, which offer online patient services. Health information technologies allow patients and service providers to access medical information about the treatment plan and appropriate medicines (Kruse et al., 2017; Wass et al., 2017).

One of the health information technologies used in clinical practice is EHRs. EHRs are beneficial in improving clinical outcomes in clinical practice. According to Hersh et al. (2013), EHRs were initially adopted in clinical practice for billing activities and improving nursing efforts for the efficiency and quality of care. Most health systems use EHRs to improve the quality of care and efficiency in organizations. Palabindala et al. (2016) maintained that adopting EHRs is not new in the healthcare system, and

healthcare professionals in primary care settings and hospitals adopt the technology to improve patient health care. The researcher's consensus was that investing in EHRs within the medical system promotes safe clinical practice, improves communication between multiple healthcare providers and patients, and minimizes the risk of clinical errors.

Similarly, Kruse et al. (2018) explained that EHRs improve population health. Healthcare providers use EHRs for digitally recording patient health information, including medical history, contact information, test results, and treatment regimens. Recording such information helps the service providers analyze patient data for appropriate care. EHRs provide easier access to health data on population health, which helps survey the population for a specific health condition and adopt appropriate and safe interventions to address potential health risks (Kruse et al., 2018).

Monica (2019) stated that many professionals discovered the benefits of EHRs and other HIT tools. EHRs have enhanced patient care by 70% and have improved patient safety. However, Monica did not clearly say how patient satisfaction related to patient health outcomes. Although there were difficulties using EHRs, there is a continued need for patients and clinicians to make headway towards a more developed, coordinated, and practical approach to care for which EHRs are essential.

Similarly, Alanazi et al. (2020) expressed that EHRs have clinical benefits to healthcare providers as they assist in easily sharing and accessing health data at the point of care, contributing to enhanced and safe care provision. The clinical benefits of EHRs in healthcare delivery relate to healthcare professionals' positive perceptions of using the

system. Alanazi et al. argued that most healthcare professionals perceive EHRs as improving their clinical environment's efficiency, quality of care, patient-clinician communications, and access to clinical data. Based on the clinical benefits of EHRs in healthcare organizations, the federal government promoted the implementation of EHRs through the HITECH Act (Hoover, 2017). As a result, several hospitals have strived to adopt EHRs because the federal government supported their usage to enhance healthcare delivery (Adler-Milstein et al., 2014). In addition, EHRs have impacted the quality of healthcare delivery by improving billing precision and clinician performance (Lynn et al., 2015).

The evidence indicates that EHRs were introduced into the medical system for research, quality improvement, and billing purposes (Lynn et al., 2015; Yanamadala et al., 2016). Accordingly, the EHRs focus on billing precision and work performance among physicians. Lynn et al. (2015) stated that the EHRs maintain the documentation of patients' comprehensive clinical care plans with the financial cost of care they receive. In doing so, EHR systems ensure accurate patient healthcare bills and value-based payments.

Current studies on EHRs often focus on guideline compliance and quality metrics rather than patient outcomes or quality improvement (Ancker et al., 2014; Ancker et al., 2015; Mehrotra et al., 2012). Nonetheless, these studies suggest that the employment of EHRs significantly reduces medical errors (Ancker et al., 2014; Ancker et al., 2015; Mehrotra et al., 2012). EHRs lower medical errors by keeping patient records on medication and allergies and checking for clinical problems when prescribing treatment

or drugs. The system alerts the healthcare provider to any clinical conflicts that can cause errors during patient treatment (Campanella et al., 2015; Evans, 2016). Automating EHRs in clinical practice also reduces clinical errors by ensuring adherence to treatment guidelines.

Aldosari (2017) noted that the healthcare professionals who use EHRs with features for clinical decision support adhere firmly to evidence-based clinical guidelines. The system alerts the clinicians and assists them in abiding by the treatment guidelines based on patient health information. Such adherence is crucial in reducing redundancy in patient examination and laboratory tests across departments (Aldosari, 2017). Many hospitals have implemented EHRs, which provide real-time clinical decision support that reduces prescribing errors (Abramson et al., 2013). Other studies have demonstrated that EHRs help track and monitor adverse health outcomes, including pulmonary embolism, deep vein thrombosis, and catheter-associated urinary tract infections, providing valuable data for improving safety outcomes (Rochefort et al., 2015; Shepard et al., 2014). Even though EHRs are perceived to reduce medical errors and improve the quality of care, other studies have presented conflicting information on EHRs in healthcare practices.

Yanamadala et al. (2016) determined that quality improvement in health care showed few benefits with using EHRs. Yanamadala et al. (2016) study demonstrated that, despite EHRs efficacy in checking and tracking systems for patient health information, EHRs could be counterproductive by adding complexity to hospital operations. Some researchers believe EHRs rendered minor improvements in the quality of care for heart failure and myocardial infarction in clinical settings. Moreover, existing studies

demonstrated that the use of EHRs involving increased documentation had unintended consequences, such as clinical inefficiency, which complicated the delivery of quality care and increased the number of hours patients spent with service providers during clinical visits (Ancker et al., 2015; Yanamadala et al., 2016). Yanamadala et al. (2016) found that billing and maintaining accurate patient health information using EHRs is essential; however, identifying and recognizing health problems was challenging.

Patient Satisfaction and Patient Safety

Unethical practices followed by healthcare professionals and increasing commercialization have contributed to a high level of violence, indicating the importance of patient satisfaction and patient safety (Jawaid, 2014). Medical professionals agreed that patient satisfaction could be ensured through accountability and by eliminating unethical practices (Jawaid, 2014). Berkowitz (2016) pointed out that patient satisfaction describes patients' responses to their healthcare experiences regarding healthcare delivery and quality of care. Clinical environment, staff responsiveness during healthcare delivery, and pain control were key factors that impacted patient satisfaction. In addition, Berkowitz (2016) argued that communication between physicians and patients during preoperative clinical practice and the service patients received in healthcare shaped patient satisfaction.

Chen et al. (2018) declared that many hospitals considered patient satisfaction to rate patient health outcomes. Chen et al. (2018) believed that reporting patient satisfaction helped patients choose healthcare facilities to obtain medical services. The

information about a patient's satisfaction is increasingly utilized as an essential metric for rating the quality of services and hospital performance (Berkowitz, 2016).

Patient safety is an essential tool for reflecting quality improvement in healthcare organizations. Measuring patient satisfaction is a sound quality management practice to identify the quality of services and strategic goals healthcare organizations adopt to improve satisfaction (Al-Abri & Al-Balushi, 2014). Patient satisfaction was used as a metric to rate the quality of service in a study that measured patient satisfaction scores to evaluate the quality of services and healthcare organizations' performance (Rama & Kanagaluru, 2011). The study evaluated the clinical factors influencing patient satisfaction concerning healthcare services. Based on the study's findings, the clinical environment regarding cleanliness, staff behavior, and healthcare bills were the key factors influencing patients' satisfaction (Rama & Kanagaluru, 2011). The results showed the usefulness of patient satisfaction as a metric for determining healthcare delivery in hospitals (Rama & Kanagaluru, 2011).

Similarly, Schoenfelder et al. (2011) investigated the key determinants of patient satisfaction across 39 hospitals in Dresden, Germany. The study explored patients' perceptions of neurology, surgery, pediatrics, ophthalmology, urology, and internal medicine departments (Schoenfelder et al., 2011). From patients' perceptions, the study revealed that treatment outcomes, the kindness shown by the staff, clinical aspects of care, and the performance of services, including cleanliness, accommodation, quality of food, quality of care, and the involvement of the patient in decision-making, were key determinants of patient satisfaction in health care. The research showed that patients

perceived that the kindness demonstrated by nurses through effective communication, discharge procedures, and post-discharge complications positively impacted patient satisfaction (Schoenfelder et al., 2011).

Patient satisfaction helps rank and contrast medical care services across hospitals. Kaye et al. (2017) linked patient satisfaction with safety and health outcomes by explaining that a higher level of patient satisfaction was reflected by a higher safety level, which may have accounted for improved health effects. Patient satisfaction is often coupled with clinician performance; therefore, clinical care delivery and the quality of patient experiences measure a given hospital environment's safety (Kaye et al., 2017).

Chen et al. (2018) conducted a retrospective study in which patients' perceptions were assessed to determine the relationship between patient satisfaction and safety and health outcomes. The study findings revealed that patient satisfaction influenced health outcomes and patient safety in healthcare practices. The study further illustrated that reduced medical health services were associated with poor clinical outcomes and low patient satisfaction. Also, the study demonstrated that poor physical health reflected low patient satisfaction, showing poor delivery of services that negatively impacted clinical outcomes (Chen et al., 2018). Another study showed that reduced readmission rates, mortality rates, decreased length of hospital stay, and a lower rate of health complications was significantly associated with higher patient satisfaction levels. Additionally, the study argued that the excellent satisfaction of patients is positively associated with better clinical outcomes after clinical procedures.

The research by Langley (2015) revealed that patients with low satisfaction are most likely to report poor experiences with medical care services. Additionally, the study mentioned that missed nursing care decreased patient satisfaction in hospitals because nurses who did not perform their daily care activities affected patients' experiences. Lake et al. (2016) analyzed the relationship between missed nursing care and patient care experience to discover that the former influences the latter. Hence, the influence of missed nursing care on patient satisfaction most likely prompted most patients to regard hospital care and experience unsatisfactorily and give a low hospital rating (Lake et al., 2016). Patient satisfaction is significantly associated with healthcare organizations' patient safety culture.

A prospective cross-sectional study by Okafor et al. (2018) found that patient satisfaction and patient safety have a close relationship. The study examined the effects of patient safety culture on patient satisfaction among patients in the radiology department. The study revealed that high patient satisfaction is linked to medical professionals' adequate care provision (Okafor et al., 2018). Also, the patient safety culture focused on reducing clinical errors to the barest minimum levels, and the ability of professionals to reduce such errors improved patient experiences with the services they received (Okafor et al., 2018). It is apparent that patient safety, including patient falls, has a significant relationship with patient satisfaction. Nursing practices, including pain assessment, clinical assistance, and assessing patients' needs to reposition, significantly reduced falls among patients (Zineldin, 2015). Such a reduction was associated with nurses' hourly rounding during their clinical practice, which reduced burnout and

workload. This shows that enhanced nursing practices and clinical performances influence patient safety, thus positively impacting patients' satisfaction (Zineldin, 2015).

Further, patient safety can be increased based on nurses' quality of care and whether they are responsive, compassionate, efficient, and well-trained professionals (Langley, 2015; Shirk et al., 2016). Okafor et al. (2018) indicate that patient safety is the initial step toward improving the quality of medical care delivery, which impacts patient satisfaction, establishing a patient safety culture by, for example, reducing medical errors. Avoiding medical mistakes and related adverse events in health care is essential for ensuring that patients receive safe and quality care.

Lawati et al. (2018) developed a fundamental patient rationale for health care, including primary care. Healthcare organizations are complex, and maintaining patient safety focuses on ongoing efforts among medical teams. A central component of delivering safe care is accurate patient identification. Arodietis (2019) contended that many clinicians are discouraged by the lack of EHR usability because of technical problems attributed to their systems failing to communicate and transmit information effectively. Incorrect patient identification becomes exponentially more problematic and dangerous as more information and applications are generated and introduced into healthcare (Arodietis, 2019).

Similarly, Yum (2015) argued that patient identification errors are global issues affecting patient safety. Dr. Yum explained that patient identification errors are the root causes of adverse medical events that affect patients' safety during clinical practice (Yum, 2015). Therefore, training medical professionals on patient safety concepts

focusing on patient identification reduces patient safety issues in clinical care services (Yum, 2015).

Healthcare teams collaborate to develop clinical systems that prevent patient harm (Ulrich & Kear, 2014). Developing a patient safety culture in healthcare organizations is crucial to ensure that healthcare professionals comply with health standards. For example, Iqbal et al. (2015) contended that a patient safety culture improves clinicians' work flexibility and increases their capacity to provide efficient and safe care through compliance with healthcare standards, such as maintaining hand hygiene.

EHR Use and Patient Outcomes

EHRs are complex by nature, and their designing and evaluation process poses a challenging task. Various end-users, including nurses, clinicians, physicians, and most patients, have different health care needs and requirements related to the functionality and usability of EHRs (Kaipio et al., 2019). During care delivery, medical professionals engage in complex information processing to improve and support their clinical activities, such as care planning, diagnosis, healthcare management, and the documentation of treatment plans (Page & Schadler, 2014). Healthcare professionals have different perceptions regarding the usefulness and effectiveness of EHR systems based on the objectives behind system usage, the context in which they are used, and each professional's background, such as experiences and competency in using EHRs (Salahuddin & Ismail, 2015).

Health information systems' use has a crucial relationship with patient safety, satisfaction, and clinical outcomes. The existing body of evidence demonstrated that poor

usability is linked to lower satisfaction among the end-users, user fatigue, and increased rates of errors (Culler et al., 2011; Heponiemi et al., 2018; Howe et al., 2018; Vainiomäki et al., 2017). Culler et al. (2011) observed that even though health information systems have clinical benefits, there have been unsuccessful attempts to implement them in some healthcare organizations due to resistance from the end-users and unexpected clinical outcomes among patients.

Similarly, Heponiemi et al. (2018) explained that using information systems in clinical practice is stressful for physicians. The researchers presented physicians' perceptions regarding using a health information system such as EHR. The researchers suggested that most physicians perceived such systems to be stressful because it requires a cognitive workload as they mastered all the systems they should use (Heponiemi et al., 2018). The study also revealed that physicians have poor work relationships with other professionals, leading to low job satisfaction. In terms of cognitive workload, physicians perceive interruptions and constant multitasking with information systems as increasing cognitive workload and stressful experiences (Heponiemi et al., 2018). In addition, some errors arise with using information systems, such as EHRs, during clinical activities. These errors, primarily occurring during the documentation of medication or treatment plans, endanger the safety of users, mainly patients (Ratwani et al., 2018).

Additionally, the downtime events of EHRs pose safety hazards for patients and can be ineffective, inefficient, and unsatisfactory when used in clinical practice (Larsen et al., 2018). Thus, as the healthcare organization's utilization of EHRs increases, dissatisfaction with these systems also increases. The usability and safety issues drive

healthcare clinicians' dissatisfaction (Ratwani et al., 2015). While there are challenges to the EHR system's ability, their potential is tremendously valued. However, many clinical healthcare providers perceive EHRs as challenging to use and containing confusing information (Ratwani et al., 2015).

Ratwani et al. (2015) found that physicians report confusing displays with EHRs, contributing to disparate usability and healthcare practices. Studies conducted among several family practice providers showed that EHRs are time-consuming, with some providers spending up to six hours daily (Arndt et al., 2017; Young et al., 2018). Family clinicians report that they spend most of their time performing clerical and administrative activities, including billing, coding, order entry, and documentation (Young et al., 2018).

Other empirical evidence has demonstrated that the end-users of EHRs feel dissatisfied with advanced technology. They feel that the clinical data or notes in EHRs can be challenging to assess, take too much time to enter, consist of poorly formatted data that makes it difficult for other clinicians to read, lack standardized medical content, and may integrate erroneous or outdated information (Rizvi et al., 2017). Other studies have evaluated the EHR system's usability based on physicians' perceptions concerning satisfaction and clinical efficiency (Hudson et al., 2018; Kaipio et al., 2017; Kaipio et al., 2019; Viitanen et al., 2011). Hudson et al. (2018) conducted a study to provide better insights into physicians' satisfaction levels and usability issues following clinical information systems in critical care. The study discovered that despite significant and progressive improvement with the design and introduction of information systems,

physician satisfaction based on their use is slow to improve due to increased stress levels, which leads to reduced job satisfaction (Hudson et al., 2018).

Similarly, research by Kaipio et al. (2019) showed that despite the usefulness of EHRs in reducing the wait time and referral process in the healthcare system, physicians perceive that the EHR system's usage poses technical problems regarding repeated documentation of medical information, time pressure, and difficulties in sharing and reading the clinical records, which affect the wellbeing of physicians. Further, a systematic review that assessed the methodological and reporting trends concerning the EHR system's usability in healthcare supported the system's inefficiency in reporting practices (Ellsworth et al., 2017). The review found that many clinical professionals lack the expertise and competency to use the EHR system, affecting implementation. These professionals resist using EHRs because they perceive EHRs to be complicated and multifaceted, thus affecting their work efficiency (Ellsworth et al., 2017). The challenges with EHRs' usability are the primary factors that lead to dissatisfaction among physicians and other end-users. Hudson et al. (2018) pointed out that the system's response time and layout designs contribute to physicians' dissatisfaction following EHRs' usage. Other researchers have suggested that the intuitiveness of the user interface and the lack of support for teamwork or collaboration are the primary concerns that negatively influence the efficiency and safety of using EHRs (Kaipio et al., 2019; Viitanen et al., 2011). Some researchers reported nurse dissatisfaction with information systems due to the documentation process (Topaz et al., 2016). Healthcare professionals, including clinicians and physicians, face challenges entering medical data and retrieving care

information from a clinical note. The researchers noted that healthcare professionals negatively perceive EHR usability due to frustration and dissatisfaction while recording and retrieving patient data. Physicians' negative perspective toward EHR usability is associated with a lack of interoperability, cumbersome functionalities of the system, and technical issues that may arise, leading to an increased workload for nurses, inefficiency in clinical practice, and a low level of satisfaction (Topaz et al., 2016).

Despite the significant challenges linked to using EHRs, the system remains an essential asset for healthcare professionals who utilize them to share, communicate, summarize and synthesize patients' healthcare information that can be used for clinical decision-making (Rizvi et al., 2016; Rosenbloom et al., 2011). The EHR system's usability has clinical benefits for medical professionals and patients. The evidence indicates that EHRs' usability has clinical challenges; it remains a standard part of clinical practice. Like other medical information systems, the EHR was designed to improve medical care delivery and clinical outcomes (Wolfe et al., 2018).

EHRs' usability facilitates medical effectiveness during clinical visits by supporting diagnostic and therapeutic findings. The use of technology promotes clinical aspects, including interpersonal and communication skills, diagnostic procedures, the dexterous negotiation of medical systems, the adoption of evidence-based approaches in nursing practices, and the promotion of humanism and professionalism among professions (Wolfe et al., 2018). Consequently, the implementation of EHRs across various health sectors has been on the rise. Ratwani et al. (2015) identified a rapid increase in the implementation of EHRs in ambulatory care facilities and hospitals. The

researchers explained that despite the safety issues and challenges associated with EHRs' usability, the information technology vendors had taken vital steps, including introducing a user-centric design that enhanced the safety and usability of EHRs.

EHR usability plays a crucial role in supporting healthcare professionals' clinical tasks. Schopf et al. (2019) investigated the perceptions of physicians working in Norwegian hospitals regarding the benefit of EHRs usability in their clinical activities. The study found that some physicians perceived that the usability of EHRs improves their ability to manage tests. Additionally, the EHR provides alerts on drug interaction and warnings about drug allergies (Schopf et al., 2019).

Rizvi et al. (2017) opine that, to date, very few studies have investigated the usability issues of EHRs in terms of clinical notes. Some recent studies report that the documentation process and the interpretation of electronic notes are time-consuming. Doctors and clinicians spend minimal time measuring vital signs and medicines and entering and studying laboratory results (Brown et al., 2014). Consequently, there is a necessity for a comprehensive understanding of EHR usability in current clinical practice to determine the EHR systems' effects.

Risks and Disadvantages of Adopting EHRs in Hospitals

As noted in various empirical studies, financial issues may occur from using EHRs in a healthcare facility (Kazley et al., 2014; Lim et al., 2015; Menachemi & Collum, 2011; Palabindala et al., 2016; Wang & Biedermann, 2010). The financial costs of EHRs include costs for adopting, implementing, and continually maintaining them, revenue losses, and temporary productivity losses (Menachemi & Collum, 2011). The

EHRs' implementation process costs include system costs and induced costs. System costs involve training, software and hardware equipment, support, and maintenance. On the other hand, induced costs are linked to the temporary loss of productivity among medical personnel using the EHR system (Wang & Biedermann, 2010). Most physicians mention that their lack of EHR adoption and implementation is because of the high upfront costs and maintenance costs (Menachemi & Collum, 2011).

The Health Information Technology for Economic and Clinical Health (HITECH) Act is crucial in promoting EHRs to reduce healthcare costs and enhance patients' quality of care. The HITECH Act provides financial aid to healthcare providers to bear the high costs of adopting EHRs (Lim et al., 2015). According to Kazley et al. (2014), hospitals should not be worried about the costly investment of adopting EHRs because it saves the cost of patient care. Although the HITECH Act grants hospitals financial support when implementing the EHR system, the hospital must cover the cost of ensuring that policies and technical support are available. The Health Insurance Portability and Accountability Act of 1996 [HIPAA] states that each hospital manages its EHR system (Palabindala et al., 2016). Similarly, possible non-financial costs that may affect the implementation of EHRs are related to the time spent by the system developers and the end-users to get a system online and fully implemented (Fleming et al., 2011).

Several studies have demonstrated that a physician's workflow may be affected when the EHR system is adopted, affecting its success (Carayon et al., 2015; Fleming et al., 2011; Menachemi & Collum, 2011; Vishwanath et al., 2010). The time EHRs' end-users spend to implement and master the new system averaged 134.2 hours (Menachemi

& Collum, 2011). The estimated cost per physician based on their hours on non-clinical responsibilities in the US is $10325 (Fleming et al., 2011). Carayon et al. (2015) study showed that the implementation of EHR systems increased reviewing and documenting administrative duties of healthcare providers, and healthcare providers using specific procedures were made challenging with the use of EHRs. Dissatisfaction action among healthcare workers who are end-users of EHRs tends to experience adverse effects with workflow related to the new technology. The adverse reactions and opinions about EHRs may hinder their implementation; hence, the system may not enrich patient safety and quality of care (Vishwanath et al., 2010). Vishwanath et al. (2010) further mentioned that a physician's perception of the new system, including the use of EHR, affects its success rate in a healthcare facility. Most physicians undervalue EHRs due to the perceived similarity between EHRs and computerized provider order entries (CPOEs) (Vishwanath et al., 2010). Perceptions of EHRs' value may be improved via technology learning curves accompanied by the constant spreading of awareness about communication on their value.

Adopting EHRs also places a patient at risk of exposure to patient privacy violations, as noted by various researchers (Harman et al., 2012; Kruse et al., 2017; Menachemi & Collum, 2011; Ozair et al., 2015). An EHR contains sensitive patient information (Kruse et al., 2017). The risk of privacy violation may accrue because the patient's personal health information is exchanged electronically (Menachemi & Collum, 2011). Patient data may be hacked by unauthorized internal and external users, which can be avoided using education programs, firewalls, and intrusion detection software

(Harman et al., 2012). The HIPAA Security Rule dictates that organizations must conduct audit trails and document every result, which aids in preventing patient privacy violations involving EHRs (Harman et al., 2012). According to the HITECH Act of 2009, healthcare organizations are responsible for monitoring data breaches by external and internal unauthorized users (Harman et al., 2012). Portable EHRs may be protected through cloud storage, encryption, and strong passwords that are changed continuously (Ozair et al., 2015). HIPAA lists three pillars called security safeguard themes – physical, administrative, and technical– to protect patients' health information (Kruse et al., 2017). Kruse et al. (2017) proposed various security measures that cover the three pillars suggested by HIPAA to secure EHR data. As Harman et al. (2012) suggested, security measures include using a firewall, cryptography, radio-frequency identification (RFID), and cloud computing. Cloud computing's integration into EHR systems has been noted to secure patient information and reduce patient data storage by healthcare facilities because data transfer electronically occurs via rented software, storage, and computing power. The healthcare facility's cost-saving occurs through transferring the ownership and maintenance burden while incorporating cryptography measures into the data (Lee & Chang, 2012). When EHRs are used in healthcare facilities, patients' quality of care is enhanced when their data is kept safe (Lee & Chang, 2012).

Medical errors may arise with the employment of EHRs, affecting the quality of care patients receive (Menachemi & Collum, 2011; Ozair et al., 2015). EHRs may lead to an increase in medical errors due to various reasons. Poorly designed system interfaces combined with inadequate training of EHRs end-users may create errors in the treatment

or prescription of medication (Menachemi & Collum, 2011). Medical providers may become too dependent on technology; hence, its absence may cause an issue, especially during downtime (Menachemi & Collum, 2011). The integrity of data refers to accurate data that are not tampered with. When EHRs are used, a patient's current condition may be misrepresented due to inaccurate cut-and-paste options. Inaccuracies may also occur when physicians select an item on a drop-down menu, leading to significant medical errors (Harman et al., 2012; Ozair et al., 2015). Vendors need to work with healthcare providers to make EHRs more accurate and user-friendly (Ozair et al., 2015). According to Ozair et al. (2015), a patient's data privacy may be violated through medical identity theft, leading to inaccurate patient records input, followed by the inaccurate billing of a person's insurance company. Harman et al. (2012) noted that documentation errors might cause low data integrity, for instance, unintentionally recording a pulse of 76 as 40 (Harman et al., 2012).

Research on the comparative completeness of EHRs and paper records was done by Wu et al. (2018). The authors observed that paper records adhere more to the National Institute for Health and Care Excellence (NICE). EHRs have minimal adherence to the NICE guidelines; however, they store data better and process and analyze it faster and more efficiently. Riedmann et al. (2011) recommended that decision support alerts be used to replace forced-choice fields with an electronic form to reduce prescription errors in EHRs. The unintended consequences of EHRs were discussed by Atasoy et al. (2019). According to the authors, researchers have become keen to note EHRs' unintended consequences because they lead to more harm than good. EHRs may be used in obtaining

reimbursements from insurers. However, the system is susceptible to up-code claims; it is challenging to identify charges captured from up-coded claims. Atasoy et al. (2019) further mentioned that the consequence of up-coding claims is that claims documentation becomes difficult. Misuse and design of EHRs add complexity to an already complex delivery of healthcare, causing unintended adverse consequences such as errors in dosing, inability to detect serious illnesses, and delays in treatment because of -computer interactions or loss of information. The value of billing is high in healthcare facilities that use EHRs. An unintentional consequence of EHR may increase fraud and abuse, causing severe legal implications (Bowman, 2013). Adopting EHRs may affect human capital because it reduces the workload; therefore, some healthcare workers may lose their jobs (Atasoy et al., 2019).

Impact of EHR Use on Patient Experience

Patient experiences reflect what they went through during their treatment sessions. Similarly, a patient's expectation versus what they underwent depends on patient experiences, with patient outcomes being considered (Wolf et al., 2014). Patients had reported various experiences when EHRs were used in their treatment and diagnosis (Migdal et al., 2014; Rose et al., 2014; Tutty et al., 2019). The user experience with EHRs may influence patient experiences; in this case, the users are physicians. EHRs' design, policies, and regulations may affect physicians' attitudes toward them. Negative attitudes toward EHRs may affect the quality of care and lead to adverse patient experiences (Tutty et al., 2019). Patient experience is optimized by increasing the interaction between patients and their physicians. When EHRs are used, physician-patient

communication improves, which improves the patient experience by increasing patient satisfaction, enhancing patient outcomes, and decreasing the risks of medical malpractice lawsuits.

Communication enabled by EHRs may improve through proper care, monitoring, and patient education (Migdal et al., 2014). The methods used in communicating with patients while using an EHR make their experiences better, as explained by Rose et al. (2014). They speculated that physicians using EHRs followed various communication techniques like building rapport and maintaining eye contact. The researchers also observed that EHRs promoted collaboration between patients and healthcare providers regarding treatment and medication plans, increasing the satisfaction of a patient's needs and goals and decreasing the stimulation of negative emotions (Rose et al., 2014). Various strategies may be used to resolve communication issues with EHRs. One is to train medical personnel to maintain eye contact with the patient while using the EHR. Two, to ensure that a healthcare provider engages in a conversation with the patient before entering data on the EHR. Examination rooms may be rearranged to enable the patient to view the healthcare provider's data EHRs (Rose et al., 2014).

The patient's trust in the nurse/physician/healthcare provider and the systems used in a facility plays a crucial role in determining their experiences (Asan et al., 2018; Rose et al., 2014; Zhang et al., 2015). Involving patients in preparing an EHR makes them trust the nurse/healthcare provider, improving their experiences (Rose et al., 2014). EHRs enhance patient-centered care by creating trust between patients and healthcare practitioners through electronic messaging features (Zhang et al., 2015). Asan et al.

(2018) performed a mixed-methods study to investigate how EHRs may be used as a patient engagement tool. The authors proposed that trust increases when patients and physicians share the EHR screen as the patient's feelings of alienation are eliminated. Improving patient engagement using EHRs enhances trust, comprehension, and transparency (Asan et al., 2018). Asan et al. (2018) point out that patients go to hospitals expecting efficient, timely, and effective treatment. Therefore, when EHRs are used, patients may get the services they expect to find at the healthcare facility.

Patient experience is also improved by utilizing EHRs in hospitals; one explanation is that the patients become more equipped to self-manage their condition and empower themselves. EHRs' use in medical facilities also promotes patient-centered care (Rathert et al., 2017). However, physicians have mentioned that using the EHR system hampers the recording of psychosocial and emotional data, thereby hampering supportive and healing relationships (Rathert et al., 2017).

Patient information and safety quality are enhanced when EHRs directly access their results (Sittig & Singh, 2012). According to Wolfe et al. (2018), using EHRs improves physicians' clinical knowledge, diagnostic acumen, and diagnosis speed, thus enhancing patient experiences. Wolfe et al. (2018) added that EHR systems entail the automation of screening processes, making it easier for pragmatic clinical trials and results to be sent instantly to those who have qualified.

Patients accessing health records using EHRs improve their healthcare experience by becoming engaged in treatment decisions. In addition, patients' confidence while communicating with healthcare professionals increases, and they feel prepared for future

hospital admissions and visits (Zanaboni et al., 2020). Jabour (2020) noted that patient experiences with EHRs improved due to the short time involved in establishing diagnoses. The author also observed the time spent waiting and consulting when EHRs and paper records are investigated similarly.

Impact of EHRs on Clinical Outcomes

Clinical outcomes refer to situations wherein diseases, symptoms, or abnormalities are either present or absent (Ndifon et al., 2016). Patient-reported outcomes are measured using patient-reported measures of experience and outcome. Patient outcomes may be obtained using the feedback feature in EHRs (Harvey, 2018). EHRs significantly improve patient outcomes regardless of illness or pre-existing conditions (Kuo & Dang, 2016; Miller & Tucker, 2011; Ndifon et al., 2016). According to Ndifon et al. (2016), implementing EHRs to reduce neonatal mortalities through the research done by Miller and Tucker (2011) was successful, with 16 deaths per 100000 births registered. According to Ndifon et al. (2016), authors contributed to reducing neonatal deaths through EHRs. Similarly, Yuan et al. (2019) noticed a 0.59% reduction in congestive heart failure-related deaths in healthcare facilities that adopted EHRs. The clinical outcomes of diabetic patients were noted to improve with EHRs use by Herrin et al. (2012). The authors discovered that patients treated with the help of EHRs were most likely to receive optimal diabetes care (Herrin et al., 2012). The research findings of Herrin et al. (2012) and Ndifon et al. (2016) were similar to those found by Kuo and Dang (2016). Kuo and Dang (2016) reviewed scholarly literature to investigate the impact of using secure messaging in EHRs for self-managing diabetes. The authors noted

that various researchers had reported significant improvements in patients' hemoglobin A1c when secure messaging was used. However, the authors found that patients' secondary outcomes, such as their cholesterol and blood pressure levels, did not improve (Kuo & Dang, 2016).

McCullough et al. (2016) examined the impact of using IT on hospital patient outcomes. The authors observed that their mortality rates are reduced when technologies like EHRs are used for patients with severe illnesses or conditions. Agha (2014) studied the impact of utilizing technology on the quality and cost of medical care. Incorporating technologies into the health sector improves patient outcomes, reducing mortality rates, readmissions, complications, and adverse drug events (Agha, 2014). Patient portals may be incorporated into EHRs and can act as a platform that facilitates patients' awareness of their health records (Goldzweig et al., 2013). The authors noted that the evidence was insufficient to conclude that portals cause improved health outcomes and reductions in care costs (Goldzweig et al., 2013).

Electronic health records provide physicians with the point-of-care and practice-level data essential in identifying patients who require or have not undergone screening. Therefore, misdiagnoses or late diagnoses are reduced, resulting in improved patient outcomes. Also, when EHRs are used, chronic disease-related mortalities are significantly reduced. Similarly, patient outcomes in primary care settings improve because point-of-care EHRs suggest ways of establishing diagnosis and treatment procedures (Manca, 2015). Adverse patient outcomes from missing necessary tests or screening are avoided when EHRs are used (Recio-Saucedo et al., 2018). According to

the study by Wani and Malhotra (2018), the data on using EHRs to improve health outcomes is inconsistent. The authors further argued that patients' length of stay in facilities that have not fully adopted EHRs is shorter than those that have. EHRs may significantly improve patient outcomes if assimilated into the healthcare systems and cultures (Wani & Malhotra, 2018). Patient outcomes are measured using the quality of care based on six aspects: efficiency, patient-centeredness, effectiveness, timeliness, safety, and equity. The EHR enables patients to access their data, promoting efficiency, effectiveness, safety, and patient-centeredness (Neves et al., 2017).

Similarly, Neves et al. (2017) endorsed that EHRs use in healthcare facilities reduces waiting time and harmful delays. Moreover, with EHRs, equity in healthcare is enhanced despite patients' characteristics, thus enabling better care for underserved populations. Healthcare facilities must ensure that the transition to EHRs or new technology does not adversely affect patient outcomes. According to Barnett et al. (2016), research workload, inefficient workarounds, and disruptions in the continuity of care may occur when EHRs are upgraded or newly implemented. A reference case is that a hospital recorded double mortality rates after activating an order entry module component in its existing EHR system (Barnett et al., 2016). Therefore, healthcare organizations need to eliminate the negative impact on patient outcomes by upgrading or implementing new EHRs (Barnett et al., 2016).

Health Care Providers' Perceptions of EHRs

The adoption of EHR systems depends on various factors, such as the HCP's perception and the system's end-users (Alanazi et al., 2020; Williams et al., 2019). The

negative perceptions of HCPs regarding EHRs are related to the risks of using the system, workflow disruption, high initial costs, lack of expertise in the system, and privacy concerns. Alanazi et al. (2020) also mentioned the positive perceptions of EHR, including improved work efficiency, patient safety, improved access to patient data, and better communication between the provider and the patient. The improvement of physician satisfaction is also included among the positive perceptions of EHRs, as Williams et al. (2019) stated. The efficiency of EHRs determines physician satisfaction, and the former is influenced by the HCP's age and experience level (Williams et al., 2019). Healthcare facilities should use the technology acceptance model for assistance in determining the factors that may hinder EHR implementation and its success (Alanazi et al., 2020).

Modifying EHRs components or upgrading an existing EHR system requires system designers to know the perception(s) of the end-user. Users perceive that an upgrade of an EHR system or newly implemented EHRs can be more efficient, provide better patient outcomes, and offer healthcare providers better satisfaction when compared with their previous system use (Williams et al., 2019). Therefore, HCPs' perception of EHRs is essential for system designers, hospital management, and patient acceptance and attitude toward EHRs.

Definitions

Electronic health records (EHRs): EHRs are digitized versions of paper records used in healthcare organizations to record patient health information, including health history, patient contact details, test results or lab values, treatment regimens, and

allergies. EHRs are digital systems for keeping health information secure and available only to authorized individuals (Kruse et al., 2018).

The meaningful use of EHRs: Under the HITECH Act, the CMS gives incentives to eligible professionals (EPs) who successfully exhibit the meaningful use of the certified EHR technology (Wani & Malhotra, 2018). The HITECH Act specifies three main determinants of meaningful use, such as its use for the electronic exchange of health information to advance healthcare quality and its application to demonstrate clinical quality and further measures (CMS, 2021). Therefore, the meaningful use of EHRs can be defined as healthcare facilities using certified EHR software to increase efficiency, safety, and overall quality of care. Meaningful use is implemented in three stages: (a) EHRs' adoption and their use for data entry, (b) EHRs' use for information sharing and care coordination, and (c) the use of EHRs to improve care outcomes and reduce costs. Healthcare facilities that meet the objectives of each stage are certified as having demonstrated meaningful use and hence receive financial incentives.

Patient safety: Patient safety entails doing no harm or preventable harm to patients during healthcare delivery (Lawati et al., 2018). Thus, patient safety is an attribute of clinical care that minimizes the prevalence, incidence, and impact while maximizing patient recovery from adverse events (Lawati et al., 2018). In addition, patient safety is often measured concerning preventing medical errors or adverse events in clinical care administration, such as HAIs or patient re-admission.

Patient satisfaction: Patient satisfaction denotes how patients are content with the healthcare services in or outside a hospital. It is a patient-reported measure of the quality

of care that gives healthcare providers insights into the efficiency and effectiveness of medicine and healthcare structures and processes (Al-Abri & Al-Balushi, 2014). Patient satisfaction is measured monthly in every U.S. hospital involving a random number of patients using HCAHPS.

Assumptions, Scope, and Delimitation

Assumptions, limitations, and delimitations are the primary aspects of this study's research to describe the shortcomings the researcher may face while conducting the study. The three factors discussed are circumstances, potential shortcomings or influences out of the researcher's control, and the researcher's actions to achieve the study's aims and objectives (Theofanidis & Fountouki, 2018). This subsection addresses the assumptions, limitations, and delimitations of my study.

Assumptions

Assumptions are concepts or situations perceived to be valid to a given extent, either not supported or outside the scope of the research (Pyrczak & Bruce, 2018). The first assumption of this study was that the databases used to find relevant articles yielded significant results regarding the number of articles that addressed this research topic. The second assumption is that only secondary sources provided relevant articles related to the research topic. The third assumption is that the eligible articles adequately provided in-depth information to answer the research questions and test the hypotheses.

Limitations

Limitations are possible hindrances out of the researcher's control and are closely related to the study's methodology and data analysis (Pyrczak & Bruce, 2018). This study

had potential limitations. The first limitation was that the study was explanatory, using secondary data, and the information obtained from the existing articles may not be acceptable to different healthcare organizations. Moreover, limiting the research to secondary data can affect the validity and reliability of the findings. Another limitation of the research is that it was restricted to articles about EHRs. Therefore, the results may not help describe patient satisfaction and safety regarding other health information technologies, such as computerized clinical decision support systems. As the findings may not apply to other technologies used in a healthcare facility, this study's findings cannot be generalized.

Delimitations

Delimitations are choices or boundaries set by the researcher to achieve the study's objectives. These factors supported the study's authenticity because they maintained the research questions, objectives, study sample, and study variables (Theofanidis & Fountouki, 2018). This research delimited that secondary data was used to measure patient satisfaction and safety, as the available data may not be specific to the study.

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Significance, Summary, and Conclusions

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Significance

There is conflicting evidence on the benefit of EHRs on patient safety. However, Guo et al. (2017) concluded that EHRs produce a positive outcome regarding patient safety and increase the potential for significant enhancement in health care. Although various healthcare organizations have invested heavily in EHRs, many HCPs believe that

the systems have not fulfilled their potential to improve patient health care, minimize costs, or improve patient satisfaction (Palabindala et al., 2016). Based on the mixed research results, hospitals and the U.S. healthcare system cannot confidently affirm that HIT, particularly EHRs, has bettered health care, cut patient care costs, and improved patient satisfaction. A limited body of research studies has quantitatively examined the correlation between patient satisfaction and EHR usability. Marmor et al. (2018) pointed out that many health organizations have opposed going electronic, believing that patient care would not improve. In contrast, many studies by prestigious organizations have found the opposite. Therefore, understanding how the meaningful use of EHRs impacts patient satisfaction and patient safety is essential.

This study added to the literature on the demonstrated meaningful EHR use rates among hospitals in PA, which may reflect the nationwide use. Also, meaningful use indicates performance or quality that positively reflects better patient care and outcomes. Finally, the study results could significantly impact business practices that could positively contribute to social change.

Contribution to Business Practice

For healthcare quality to be significantly improved, healthcare managers, administrators, and providers must improve clinical patient outcomes. Ndifon et al.'s (2016) prevailing view are that EHRs enhance patient outcomes and raise the quality of care for patients with various health conditions. However, usability challenges threaten patient satisfaction and safety (Marmor et al., 2018).

The study contributed significantly by supplying valuable information that may induce practitioners to implement and use EHRs in their daily clinical practices. Additionally, the study's findings may help medical professionals realize the impacts of meaningful EHR use on patient satisfaction and safety. In addition, the study may provide constructive information to professionals on implementing and operating EHRs safely. Hence, this study could inform clinicians about whether to continue using EHRs in their clinical practices.

Snyder et al. (2011) explain that HIT, specifically EHRs, has emerged as an essential tool for obtaining, collecting, and navigating patient health information that helps medical professionals reduce medical errors while promoting patient-centered care. These systems facilitate the availability of patient health information providers need to deliver appropriate care. Consequently, my study may contribute to clinical practice by providing evidence on how EHRs promote patient health information availability and inhibit medical errors. Such evidence enabled practitioners to improve their health care delivery based on the increased accessibility of patient medical histories, treatment plans, and other necessary health information.

Implications for Social Change

The clash between patient interaction and charting has become a significant source of conflict among clinicians about the government regulations concerning EHRs and the CMS's quality of care indicators (Howe et al., 2018). Clinicians adhered to governmental regulations by filing and retrieving patient information for EHRs while maintaining interaction with patients to avoid low satisfaction scores, which the CMS

uses as a quality indicator. Patient satisfaction is subjective and subjective to their expectations, so it is challenging to meet all the regulation expectations without personal sacrifice. More than 80% of HCPs report burnout and intrusion of work on their time, most of which is spent on EHRs (Howe et al., 2018). The study's findings contributed to social change by highlighting the specific challenges that could benefit from interventions.

Meyerhoefer et al. (2018) proposed that the difficulties in integrating EHRs and the frustration clinicians face with EHRs may lead to poor delivery of services and patient dissatisfaction. Even though many believe that EHRs improve health care quality and patient satisfaction, the patient and provider satisfaction data remain mixed (Meyerhoefer et al., 2018). Numerous providers are concerned about the effects of EHRs on their work processes and patient interactions. Farber et al. (2015) cited a study examining how providers spent their time. While a provider spends time prescribing, writing, and ordering laboratory studies, the study has found that the time spent performing these tasks decreased their time for performing other tasks, such as managing preventive care, as a result, increasing chronic diseases.

With this study, I sough to serve healthcare professionals by improving their competence with EHRs to enhance patients' health outcomes to contribute to social change. This study's findings may contribute to social change by increasing patient access to care and improving patient diagnosis and effectiveness. Chen et al. (2015) explained that research outcomes could help achieve positive change in a community by imparting knowledge and skills to enhance social change in the healthcare system.

Additionally, informing clinicians, nurses, healthcare administrators, and policymakers about the effects of implementing the meaningful use of EHRs in healthcare facilities helped ensure patient safety.

Further, the research findings may contribute to social change by giving clinicians new insight into EHRs to improve safety, satisfaction, efficiency, communication, and patient engagement, consequently improving patient outcomes. This research also supported comprehensive policies for using EHRs, alleviating EHR usability issues and unintended consequences for patient safety and outcomes.

Summary and Conclusions

This section discussed the backdrop of the problem, problem statement, purpose statement, and nature of the study. In addition, Section 1 of this research study includes the research questions and hypotheses, theoretical or conceptual framework, operational definitions, assumptions, limitations and delimitations, the subject's implication, and an appraisal of the relevant professional and academic literature.

Challenges exist based on the reviewed articles about EHR systems use and clinical issues. It is apparent from the articles that the use of EHR systems in clinical practice poses significant challenges to the end-users, including patients and healthcare providers. For instance, EHR usability is associated with workplace challenges, such as difficulties documenting medication among professionals with limited knowledge of such systems. Consequently, a lack of expertise in EHR systems leads to resistance to change or poor implementation in healthcare organizations. Thus, educating medical professionals on using EHR systems in their daily practice or delivering healthcare

services to their patients is crucial. Next, given the widespread use of EHRs for many clinical tasks, interoperability is essential for the efficient and convenient provision of health care. While it is generally acknowledged that poor interoperability negatively impacts patient care, little is known about the specific patient safety implications. Possibly understanding the impacts on patient safety can prioritize EHRs' interoperability efforts with designs and standards.

HIT systems have been found to improve patient satisfaction and patient outcomes. Further, healthcare organizations do not or fail to implement EHRs primarily because of the challenges associated with EHRs, especially while retrieving the required medical history of patients. However, some professionals have witnessed that EHR systems improve patient satisfaction and patient outcomes (the primary health determinants of the quality of care received by the patient) regardless of the clinical benefits. Therefore, EHRs' adoption and extensive usage among medical professionals across and within the departments of healthcare organizations remain a critical challenge. However, some reviewed studies showed that using EHR systems in clinical practice reduces medication errors, improves the work efficiency of professionals, reduces workload, and enhances job satisfaction, which are the key determinants of patients' satisfaction and clinical outcomes.

Some healthcare professionals who understand EHRs believe these systems facilitate work efficiency and reduce clinical errors. They believe that EHRs allow medical professionals to record information on patient health, keep it, and share it with other professionals, especially during their hourly rounding. The sharing of patient

information through EHR systems allows professionals to understand each patient's

treatment plan, thus preventing medication errors and other clinical problems that may

affect patient safety and clinical outcomes.

The lack of expertise among some healthcare professionals regarding using EHRs

in their clinical practice indicates the need to educate and train nurses and other

healthcare professionals to improve their awareness and usage of the systems for

enhancing patient safety and patient outcomes. Educating healthcare professionals is

essential to support the adoption of such systems. Despite some researchers' significant

challenges, EHRs are crucial for any healthcare professional to prevent clinical errors that

negatively impact patients' satisfaction and clinical outcomes.

Collaborative health care has been at its best since the pandemic. Although

COVID-19 has been formidable, innovative pandemic practices are continually being

used to fight the virus and deliver care to every patient or person in the safest way

possible. For example, the United States Department of Health and Human Services

(HHS) 2019 agreed to providers using FaceTime and Zoom for virtual visits for wide-

ranging conditions, primary care check-ups, medication(s) follow-ups, and COVID-19

screenings.

Many hospitals and health systems initiated and expanded telehealth programs

days after the pandemic (Dress et al., 2020). In addition, Congress authorized $500

million to the CDC under the Coronavirus Assistance, Relief, and Economic Security Act

(CARES) for their Public Health Data Modernization Initiative (Dress et al., 2020). The

$560 million is a modest down payment, as many existing EHRs needed to be upgraded

to tackle the pandemic or another public health crisis (Dress et al., 2020). They also corrected current issues with EHRs (Dress et al., 2020). However, Clinicians still experience continual frustration on many levels, such as user interfaces and usability issues, the quality of the recorded data, and the limited ability of the data to support discovery and interoperability among systems (Dress et al., 2020). In addition, certain limitations have restricted the ability of clinicians to deliver care during the COVID-19 crisis (Siwicki, 2020).

Having seamless health IT systems is appreciated bt health providers to state and federal government public health systems. EHR designs were primarily focused on supporting patient-centric healthcare. However, a myriad of other factors has exacerbated the interoperability situation. Siwicki (2020) pointed out the sheer number of different EHR systems used across thousands of healthcare providers, each having its unique way of capturing and storing health information. In addition, hospitals operate with various EHRs, with the average reportedly being about 16 unrelated EHR vendors with affiliated practices (Siwicki, 2020).

As telemedicine becomes more of a must-have than a nice-to-have, it must be interoperable. Telehealth can increase access to care, such as for patients with multiple or chronic conditions who struggle to leave their homes (Siwocki, 2020). Nevertheless, device interoperability creates the high acuity necessary to stimulate activity in a medical facility (Siwocki, 2020). Another essential point limiting telehealth use response is that while some hospitals and large healthcare practices can deliver care in this way, many hospitals and private practices cannot (Siwicki, 2020). Realistically, it is not possible to

undertake every type of visit remotely. For example, patients must go into an office for imaging tests, blood work, and diagnoses requiring a hands-on approach. In addition, the security of personal health data being transmitted electronically is a concern. Also, while insurance companies increasingly cover telehealth visits during the pandemic, some services may not, leading to out-of-pocket expenses.

Section 2 of this study discusses the purpose statement, the researcher's purpose, participants, research method and design, population and sampling, and the definition of ethical research. This section also covered data collection instruments, techniques, analysis, and validity of the research study.

Section 2: Research Design and Data Collection

I focused on the impact of meaningful EHR use on patient safety and patient satisfaction. I explored hospital data regarding ERH's meaningful use and patient outcomes in this quantitative study to determine how they relate. The study's objectives described the hospitals' rates of meaningful EHR use compared to their adoption rates and then correlated them with patient outcomes related to safety and satisfaction. Existing data from the CMS databases were used for the study.

Effective EHR use in clinical practice is linked to improved patient outcomes (Yanamadala et al., 2016). However, EHRs' adoption does not necessarily imply meaningful use; not all hospitals with EHRs have demonstrated meaningful use. I explored the relationship between meaningful EHR use and patient outcomes, such as safety and satisfaction. This section covered the design and methodology used in the study. In addition, the possible threats and the ethical procedures to be followed in conducting the study were discussed. Lastly, the project procedures were summarized.

Research Design and Rationale

The study variables included meaningful EHR use as the independent variable and patient safety and satisfaction as the dependent variables. The independent variable was measured as either the demonstrated or non-demonstrated meaningful use of EHRs for the CMS's second stage of the interoperability program. In addition, the list of hospitals enrolled in the program was compared with those who received incentives after demonstrating the meaningful use of EHRs, available in the CMS's public use files from 2018. Thus, the "meaningful EHR use" variable was measured in two stages: the

hospitals that received incentives for the second stage of the interoperability program, formerly known as the EHR Incentive Program, and those that did not but were enrolled in the program.

The 2018 dataset on meaningful use was the most recent available dataset on EHR use for the interoperability program by the CMS, which is currently in its third stage. The 2018 dataset marked the end of the second stage. It contained a list of all hospitals and clinicians who demonstrated the adoption and use of EHRs for advanced clinical practices to enrich efficiency, safety, and overall quality of care.

In April 2018, the CMS renamed the Meaningful Use EHR Incentive Program to the Promoting Interoperability Program (CMS.gov, n.d.). This new phase fostered interoperability: the meaningful use of keeping/preparing EHRs' measurements, emphasizing improving patient access to health information and increasing patient engagement, satisfaction, and outcomes.

Unfortunately, identifying hospitals that have met the requirements of the third-interoperability stage is yet to be done; hence, the data is unavailable. Nevertheless, the "meaningful" dataset was the most appropriate for the project because the evaluation determined the long-term effects of the interoperability program by establishing the influence of demonstrated meaningful use on patient satisfaction and patient safety.

The dependent variables were patient safety and patient satisfaction. Patient safety was measured in terms of the hospital's scores for the top six HAIs, and the scores for each category were summed to get one measure for each hospital. Patient satisfaction was measured as the degree to which patients are content with the hospital setting's services.

This variable was measured by averaging the scores for the global domain from the HCAHPS to obtain a single measure for each hospital. The measures for patient satisfaction and patient safety were each compared with the hospitals' EHR use, whether demonstrated as meaningful or not, to determine any relationships between them and, if so, what.

A correlational study design was adopted in conducting the project. Correlational research is nonexperimental and involves observing two or more variables to establish if there exists a statistically corresponding relationship between them (Apuke, 2017; Creswell, 2015). In addition, correlational research is conducted to identify the related variables and establish the extent to which they are associated, or a change in one causes some shift in the other variable (Creswell, 2015). Therefore, a correlational study design was best suited for the study because of the focus on the type of relationship (if any) between the independent and dependent variables. I established whether meaningful EHR use influences the hospitals' patient safety and satisfaction scores. The existence of a relationship was evaluated, and the type of relationship (if any), whether positive or negative, was established. These evaluations helped address the research questions and assemble the best-suited design.

The design facilitated the current research on the gaps between EHR adoption, its potential use, and how it may impact patient outcomes if meaningfully used. The correlational design measured the relationship between the variables without influencing either of the variables. In addition, the design established if the demonstrated variables

have a relationship and, if so, to what extent meaningful EHR use and its potential

improved patient outcomes and patient safety.

Methodology

Population

The target population in each study is the population of interest, based on which

the researcher seeks to make references and draw meaningful conclusions about a given

phenomenon being studied (Howe & Robinson, 2018). The target population of the

present study was the general and specialty healthcare organizations in PA. One hundred

thirty-one general and specialty hospitals in PA are enrolled in the EHR Incentive

Program. The enrolled hospitals were considered as the project's sample size. Population

size is beneficial when calculating the sample size needed to achieve the study objectives

(Zehnalová & Kubátová, 2019).

Sampling and Sampling Procedures

I chose to use purposive sampling for selecting the sample size in this study

because it entailed recruiting participants based on availability. General and specialty

hospitals in PA enrolled in the EHRs incentive program were sampled. The dataset on

EHR use was employed to identify the sample used for the project. The public-use files

published by the CMS contain datasets on the EHR Incentive Program, including

information on the eligible providers and facilities that participated in the program from

the first stage and those who qualified for incentives by demonstrating meaningful EHR

use. In addition, the public-use files contain a list of all eligible hospitals and providers

nationwide participating in the program by submitting their information on EHR adoption.

The sampling procedures for the project were conducted in two steps: identifying all hospitals located in PA and selecting only the general and specialty hospitals. The CMS-assigned hospital certification number (CCN), a six-digit code allocated to all hospitals in the United States, was used to identify the hospitals in PA. The first two digits of the CCN identify the state of the hospital, and the last two digits denote the facility type. For hospitals in PA, the first two digits of the CCN are either 39 or 78. Therefore, the dataset was filtered to find the hospitals participating in the program whose CCN's first two digits were either 39 or 78.

General and specialty care hospitals are identified by codes 0001 to 0879, starting from the third to the sixth digit of the CCN. The facilities with CCN codes 390001 to 390879 and 780001 to 780879 were purposively sampled for the study. The sample size was 131 hospitals, meeting the minimum sample size required. A minimum sample of 108 clinicians/hospitals was required for the study to have a power of 80% at medium-size effect ($d = 0.3$) and 0.05 levels of significance. The priori analysis was conducted using G*Power (version 3.1.9.4) software.

The CCNs of the sampled 131 hospitals were used to identify the hospital's patient safety and satisfaction scores. Using CMS Hospital Compare, patient safety and patient satisfaction scores were obtained from the HVBP datasets for safety and HCAHPS. For each dataset, the investigator filtered the data based on the CCN and selected those corresponding to the 131 facilities sampled from the public-use files for

the EHR Incentive Program. All four datasets used in the project are freely provided for public use by the CMS.

Instrumentation and Operationalization

Instrumentation is the process of collecting data using appropriate instruments. These instruments are beneficial when seeking to collect statistical or numerical data to answer the research questions. The data used were secondary; therefore, the instruments discussed initially collected the data. For example, data on EHR usability and patient satisfaction were collected using instruments. However, patient safety events are reported randomly, and no standardized instrument is used to record them.

The hospitals submitted the data on patient safety measures and EHR use to the CMS, which published the data. Appropriate professionals, eligible hospitals, and critical access hospitals who have adopted the EHR systems in their practice submit their specifications for using the systems by completing forms available on the CMS website. The CMS assesses the authenticity of EHR use by the facilities and determines those that have demonstrated meaningful use, thus qualifying them for incentives. The CMS also publishes the datasets for all the eligible professionals, hospitals, and critical access hospitals enrolled in the program for each stage and those that received incentives for demonstrating meaningful EHR use.

Regarding patient safety measures, all hospitals submit their reports on the number of HAIs for each of the top six infections monitored by the CMS. In addition, the CMS monitors the occurrence of infections through the hospital-acquired condition (HAC) Reduction Program, which encourages hospitals to improve patients' safety by

reducing the number of illnesses patients encounter during their hospital stay. The HAC Reduction Program oversees the top six HAIs and the patient safety and adverse events composite (PSI) for 90 days.

The monitored PSI-90 includes a list of 10 conditions measured every 90 days, including pressure ulcers, iatrogenic pneumothorax, patient falls leading to hip fractures, perioperative hemorrhage, pulmonary embolism, and unrecognized abdominopelvic accidental puncture. Postoperative measures include acute kidney injury, respiratory failure, sepsis, and wound dehiscence (CMS, 2020). The top six infections tracked by the CMS include central line-associated bloodstream infections, catheter-associated urinary tract infections (CAUTI), surgical site infections (SSIs) in the colon, SSIs from abdominal hysterectomy, bloodstream infections, and Clostridium difficile colitis (C. diff). The CMS evaluates HAI measures using hospital report data, patient charts, and the National Healthcare Safety Network (CMS, 2020).

Patient satisfaction is measured using HCAHPS. The Agency for Healthcare Research and Quality developed the HCAHPS to measure patients' perspectives regarding the quality of care received in hospitals (CMS, 2020). The survey compares the quality of care provided by hospitals nationally and motivates them to enhance their quality of care based on patient satisfaction (CMS, 2020). The survey has 30 items assessing patients' perspectives of the hospital. The HCAHPS covers ten domains ranging from composite topics such as the patient's experience with the providers to their perception of the hospital environment and how they would overall rate the hospital. The

survey is taken by random patients treated at a hospital every month, and the average ratings are published (CMS, 2020).

Operationalization

The study comprised three variables: meaningful EHR use, patient satisfaction, and patient safety. The CCN variable, which contains the code for each hospital, connected the data from the three datasets. The three variables were studied to determine if they have a statistical relation. Meaningful EHR use is defined as the demonstrated use of certified EHR software by healthcare facilities to further the efficiency, safety, and quality of care. Meaningful EHR use was measured as a categorical variable concerning two categories: hospitals that demonstrated meaningful use and hospitals that did not. The sample of hospitals that have adopted EHRs and were enrolled in the EHR Incentive Program was divided into two groups: those that received incentives for demonstrating meaningful use and those that did not receive incentives for demonstrating meaningful use.

The meaningful use variable was obtained from two separate datasets from the CMS' (2018) public-use files. The first dataset, the Eligible Hospitals Public Use File (PUF) Stage 2 and Stage 2 Modified (ZIP), contains all hospitals enrolled for Stages 1 and 2 of the EHR Incentive Program. The dataset was used to identify the sample hospitals in PA. The second dataset, the EH Recipients of Medicare EHR Incentive Payments (ZIP), includes a list of hospitals that received incentives because they demonstrated meaningful EHR use. This dataset identified the hospitals in PA that demonstrated meaningful EHR use.

Patient safety was a continuous variable measured by summing the total scores for the top six HAIs monitored by the CMS. The CMS measures and scores each hospital based on the reported incidences of six HAIs: central line-associated bloodstream infections, CAUTI, SSIs in the colon, SSI from abdominal hysterectomy, bloodstream infections, and C. diff. The scores are recorded under the labels HAI-1, HAI-2, HAI-3, HAI-4, HAI-5, and HAI-6 for the six HAIs, respectively. The sum for each of the six HAI scores was calculated and used as one continuous variable.

Similarly, patient satisfaction was also a continuous variable obtained from an HVBP dataset. The variable was measured by averaging the two items in the global domain of the HCAHPS for the hospitals. The two global questions concern the overall hospital rating and whether the patient would recommend the hospital to others. The patient answers the hospital rating question by choosing between zero and 10. In contrast, the question on recommendation has three responses: "No, I would not," "Yes, I would probably recommend," and "Yes, I will recommend." The CMS allocates single linear scores for each question by linear scoring and averaging survey responses, adjusting HCAHPS linear mean scores, rescaling the linear mean scores, applying quarterly weights, and final rounding (HCAHPS, 2019).

The patient satisfaction and safety variables were retrieved by filtering the columns based on the hospitals' CCNs. For the patient safety dataset, the columns needed for the study were the CCN and the HAI-1 to HAI-6 columns. Similarly, the CCN, hospital rating and recommendation columns were utilized for the dataset on patient satisfaction. For both datasets, the filter function in Microsoft Excel was applied to select

only the rows with a CCN starting with either 390 or 780, corresponding with hospitals in PA. The dataset was then further filtered manually to identify the CCNs that match the 131 from the meaningful use dataset; if there was any missing data for any of the variables, the hospital with the corresponding CCN was dropped from the analysis.

Data Analysis Plan

Data analysis was conducted using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS), Version 26. Both software were used based on convenience. Descriptive analysis was conducted using Microsoft Excel because the software can record and code the necessary data. All the relevant data was compiled in one Excel file containing columns for CCN, whether the hospital demonstrated meaningful EHR use, patient safety score, and patient satisfaction score. Data were cleaned using Microsoft Excel, where redundant entries and missing variables were removed from the dataset. The data cleaning procedures ensure that the data recorded was correct and facilitated using Microsoft Excel to filter the necessary data from the original datasets and then record it into the file. Data cleaning procedures ensured the recorded data's consistency by removing redundancies and missing variables.

The analysis procedures pertained to the research questions and hypotheses. For example, to test the first hypothesis: The rates of demonstrated meaningful EHR use in PA are above average, and the percentage of hospitals that demonstrated meaningful EHR use was calculated. The null hypothesis was accepted if the hospitals exceeded 50% of the enrolled hospitals for the program. An independent sample *t*-test was tested for the statistical significance between the response and the explanatory variables. An

independent sample *t*-test is appropriate for comparing the mean of the two groups

(Banta, 2018). The second hypothesis was assessed using the independent sample *t*-test to

test the correlation between meaningful EHR use and patient safety.

The Chi-square test for identifying correlation evaluated the third hypothesis. The

Chi-square test determines a relationship between non-numeric variables (Nihan, 2020).

The assumptions linked to the Chi-square are a large sample size, independent variables,

and random data selection (Nihan, 2020). Independent *t*-test and the Chi-square are

measured within a 0.05 significance level. Suppose the probability value obtained from

the independent t-test and the Chi-square is below 0.05. We reject the null hypothesis and

conclude a statistically significant relationship between the independent and dependent

variables.

The hypotheses are presented below

H1: Meaningful EHR use positively influences patient satisfaction scores.

H2: Meaningful EHR use positively influences patient safety scores.

H3: Meaningful EHR use positively influences patient recommendation scores.

Threats to Validity

Reliability in quantitative research entails the instrument's consistency and

accuracy in measuring what was intended. An ideal research instrument accurately and

consistently provide similar results when used repeatedly and in the same situation (Heale

& Twycross, 2015). Three attributes are tested for reliability: internal consistency of

homogeneity, stability, and equivalence. Internal consistency was evaluated because

secondary data was used. The data collection instruments have proven valid based on

Cronbach's alpha above 0.70. Additionally, the data was retrieved from credible sources, ensuring validity.

However, the study had several threats to external and internal validity. External validity examines how a study result can be generalized according to different populations or settings (Heale & Twycross, 2015). In this case, threats to external validity include the factors contributing to the study findings' lack of generalizability across the county, state, or even different healthcare institutions for the one used as the project setting. In addition, the type of data used, especially on EHR usability, affected the generalizability of the findings. Because of the sampling procedures followed to collect the data, hospitals with fewer physicians may be unrepresented or underrepresented in the sample.

Additionally, the proposed study relies on data collected three years ago, thus affecting the situation. Generalizing the study results may not reflect the current challenges or provide strategies for solving them, given that the situation may have changed over the years after the data was collected. EHR usability may have improved by educating the providers using the systems; hence, the challenges faced in early 2018 may not be like those experienced today.

Internal validity symbolizes the extent to which the evidence supports the results obtained in the study. In this case, threats to internal validity included factors influencing the study findings' validity. The first threat to internal validity was the lack of a clear association between the variables. Given the correlational design, causality cannot be inferred; therefore, there is no evidence of any changes in the dependent variables due to

the independent variable (Creswell, 20165). Therefore, the study cannot find evidence that meaningful EHR use causes patient safety and satisfaction changes.

Additionally, the data for each variable was collected separately using various tools and for different uses. Therefore, different samples were used to collect the data, affecting the results obtained on the relationships between the variables. Different populations and samples for each variable indicate no guarantee that the observed relationships exist. The lack of guarantee may affect the study's conclusions, affecting the project's construct validity.

Ethical Procedures

The study utilized secondary data; therefore, the doctoral student adhered to ethical procedures regarding protecting the confidentiality and anonymity of the hospitals represented in the data. All the secondary data were collected using ethically sound procedures that protected the participants who provided the data. The data is also available for public use, indicating that it does not violate ethical issues in its storage. The doctoral student did not store the data with identifiable information; hence, privacy and confidentiality were ensured. Only the hospital CCNs were used in storing the data.

The doctoral student managed and analyzed the data, which prevented the exposure of the data to unintended parties. All the utilized data was available for public noncommercial use; hence, permissions were not required. Furthermore, the analysis' findings did not lead to the initial participants' re-identifications from whom the data was collected, and the access requirements of the database from which the data was retrieved were adhered to stringently. Only the researcher and selected authorities accessed the

retrieved data to uphold privacy. Likewise, the data was only used for academic purposes and no other purposes. Upon completing the study, the data was destroyed by shredding.

Summary

The study aimed to establish how the meaningful use of EHRs affects patient outcomes, such as satisfaction and safety. A quantitative methodology and a correlational design were utilized to conduct and evaluate the study. A correlational study design facilitates evaluating relationships between the variables (Creswell, 2015). The study variables included meaningful EHR use and data retrieved from the CMS public-use files regarding eligible hospitals for EHR incentives. Patient outcome variables include patient satisfaction and patient safety, which were retrieved from the HVBP datasets through the CMS website and federal organization databases, namely the CMS and the Network of Patient Safety Databases [NPSD]. The retrieved data were analyzed using descriptive and inferential protocols. The inferential analysis included analysis of variance [ANOVA] and regression in determining the associations and the extent to which meaningful EHR use affects patient safety and satisfaction. The analysis results are presented in the next section.

Section 3 provides information on the study results, specifically about the data collection of the secondary data set and statistical testing procedures, with results explained in detail.

Section 3: Presentation of the Results and Findings

I aimed to determine the associations and how meaningful EHR use affects patient safety and satisfaction. The study variables were meaningful EHR use, and the data was retrieved from the CMS public-use files regarding eligible hospitals for EHR incentives. Patient outcome variables included patient satisfaction and patient safety; the data was retrieved from the HVBP datasets through the CMS website and federal organization databases, namely the CMS and the Network of Patient Safety Databases (NPSD). The data collected was evaluated using descriptive and inferential methods protocols. The inferential analysis included analysis of variance [ANOVA] and regression. Statistical package for social sciences (SPSS) version 26 was used to conduct inferential statistics.

Data Collection of Secondary Data Set

The study was conducted based on the following study questions and hypotheses:

RQ1: What is the correlation between meaningful use (IV) and patient safety (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$1: There is no significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$1: There is a significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

RQ2: What is the correlation between meaningful use (IV) and patient satisfaction (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$2: There is no significant correlation between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$2: There is a significant correlation between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

RQ3: What is the association between meaningful use scores (IV) with patient safety (DV) scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity?

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$H_0$3: There is no statistically significant association between meaningful use scores and patient safety scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

$H_1$3: There is a statistically significant association between meaningful use scores and patient safety scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

RQ4: What is the association between meaningful use scores (IV) with patient recommendation scores (DV) scores in general and specialty hospitals after controlling for a demographic, geographic region, age, year, gender, and race/ethnicity?

$H_0$4: There is no statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

$H_1$4: There is a statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

Additional hypotheses are presented below.

$H$1: Meaningful EHR use positively influences patient satisfaction scores.

$H$2: Meaningful EHR use positively influences patient safety scores.

$H$3: Meaningful EHR use positively influences patient recommendation scores.

Descriptive Statistics

Descriptive and frequency statistics were conducted using the SPSS version 26. Approximately 20.9% ($n = 24$) of the patients in the general and specialty hospitals in PA gave a rating of 88, while 0.9% ($n = 1$) rated 93 (Table 1 and Table 2).

Table 1

Frequencies Statistics

		Hospital rating score	Recommendation score
N	Valid	115	115
	Missing	0	0

Table 2

Frequency Table for the Hospital Rating Score

		Frequency	Percent	Valid percent	Cumulative percent
Valid	79	1	0.9	0.9	0.9
	81	4	3.5	3.5	4.3
	82	1	0.9	0.9	5.2

83	2	1.7	1.7	7.0
84	4	3.5	3.5	10.4
85	4	3.5	3.5	13.9
86	13	11.3	11.3	25.2
87	11	9.6	9.6	34.8
88	24	20.9	20.9	55.7
89	10	8.7	8.7	64.3
90	18	15.7	15.7	80.0
91	13	11.3	11.3	91.3
92	9	7.8	7.8	99.1
93	1	0.9	0.9	100.0
Total	115	100	100	

Table 3 represents the frequency of patients recommending the facility. Among the participants, 14.8% (n=17) had the highest recommendation score of 85. While the least score was ($n = 1$) at 0.9% was 81.

Table 3

Recommendation Frequency Summary Table

		Frequency	Percent	Valid percent	Cumulative percent
Valid	77	2	1.7	1.7	1.7
	78	2	1.7	1.7	3.5
	79	2	1.7	1.7	5.2
	80	1	0.9	0.9	6.1
	81	3	2.6	2.6	8.7
	82	5	4.3	4.3	13.0
	83	4	3.5	3.5	16.5
	84	3	2.6	2.6	19.1
	85	17	14.8	14.8	33.9
	86	4	3.5	3.5	37.4
	87	12	10.4	10.4	47.8
	89	9	7.8	7.8	68.7
	90	10	8.7	8.7	77.4
	91	10	8.7	8.7	86.1
	92	4	3.5	3.5	89.6
	93	7	6.1	6.1	95.7

94	3	2.6	2.6	98.3
95	2	1.7	1.7	100
Total	115	100	100	

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The inferential statistics were conducted to determine the association between the independent and the dependent variables. The independent *t*-test was conducted at a .05 significance level. The following hypothesis guided the inferential statistics:

*H*1: Meaningful EHR use positively influences patient satisfaction scores.

*H*2: Meaningful EHR use positively influences patient safety scores.

*H*3: Meaningful EHR use positively influences patient recommendation scores.

*H*4: Meaningful EHR use positively influences patient rating scores.

The total number of hospitals that demonstrated meaningful EHR use was 47%; thus, reject the null hypothesis because the percentage found was less than 50%, concluding that meaningful EHR use positively influences patient safety, satisfaction, recommendation, and rating scores. An independent *t* test was used to address the study question.

RQ1: What is the correlation between meaningful use (IV) and patient safety (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$1: There is no significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$1: There is a significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

Table 4 represents the group statistics for the facilities that demonstrated meaningful EHR use. It was found that 54 facilities demonstrated EHR use compared to 60, which

did not reveal a meaningful EHR use. Table 5 shows the results of the independent *t*-test.

The 54 participants who demonstrated meaningful EHR use (*M* = -.103439, *SD* .499)

compared to 60 who did not demonstrate meaningful EHR use (*M* = -.045977, *SD* .443)

revealed no statistically significant association, *t*(112) = -1.693, *p* = .479; thus, it fails to

reject the null hypothesis and concludes no significant correlation between meaningful

use (IV) and patient safety (DV) scores in Philadelphia general and specialty care

hospitals.

Table 4

Group Statistics Results

Meaningful EHR use	N	Mean	Std. dev	Std. Error mean
Meaningful use	54	-.103439	.4992066	0.0679334
No meaningful use	60	.045977	.4431931	0.0572160

Table 5

Summary of an Independent t-Test Result

	Group One		*Group Two*			
Source	*M*	*SD*	*M*	*SD*	*t(df)*	*P****
Variable 1	-.103439	.499	,045977	.443	-1.693(112)	0.479

Note: p < .05

To answer research question 2, an independent *t*-test was computed:

RQ2: What is the correlation between meaningful use (IV) and patient satisfaction

(DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$2: There is no significant correlation between meaningful use (IV) and patient

satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$2: There is a significant correlation between meaningful use (IV) and patient

satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

Table 6 represents the group statistics for the facilities that demonstrated meaningful

EHR use. It was found that 54 facilities demonstrated EHR use compared to 60, which

did not reveal a meaningful EHR use. Table 7 shows the results of the independent t-test.

The 54 participants who demonstrated meaningful EHR use (M = 88.398, SD = 3.2757)

compared to 60 who did not demonstrate meaningful EHR use (M = 87.075, SD =

3.3621) revealed no statistically significant association, $t(112) = 2.124$, $p = .982$); thus, it

fails to reject the null hypothesis and determines that there is no significant correlation

between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty

care hospitals in Philadelphia.Table 6.

Table 6

Group Statistics

Meaningful EHR use	*N*	Mean	Std. dev	Std. Error mean
Meaningful use	54	88.398	3.2757	.4458
No meaningful use	60	87.075	3.3621	.4340

Table 7

Summary of Independent t-Test

	Group One		Group Two			
Source	M	SD	M	SD	t(df)	P***
Variable 1	88.398	3.2757	87.075	3.3621	2.124(112)	0.982

Note: M = mean, *SD* = standard deviation, *N* = 114, ***p* < .05

To answer research question 3, an independent t-test was computed:

RQ3: What is the association between meaningful use scores (IV) with patient recommendation (DV) scores in Philadelphia's general and specialty care hospitals?

H0 – No statistically significant association exists between meaningful use scores and patient recommendation scores in general and specialty hospitals.

H1 – There is a statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals.

Table 8 represents the group statistics for the facilities that demonstrated meaningful EHR use. It was found that 54 facilities demonstrated EHR use compared to 60, which did not reveal a meaningful EHR use. Table 9 shows the results of the independent *t*-test. The 54 participants who demonstrated meaningful EHR use (*M* = 88.15, *SD* = 4.011) compared to 60 who did not demonstrate meaningful EHR use (*M* = 86.58, *SD* = 3.959) revealed no statistically significant association, *t*(112) = 2.094, *p* = .889; hence, there is no correlation between the meaningful EHR use and recommendation score from the patient survey in general and specialty hospitals in PA.

Table 8

Group Statistics Summary

Meaningful EHR use	*N*	Mean	Std. dev	Std. Error mean
Meaningful use	54	88.15	4.011	.546
No meaningful use	60	86.58	3.959	.511

Table 9

Summary of the Independent t-Test Results

	Group One		Group Two			
Source	*M*	*SD*	*M*	*SD*	*t(df)*	*P****
Variable 1	88.15	4.011	86.58	3.959	2.094(112)	0.889

Note: M = mean, *SD* = standard deviation, *N* = 114, ***p < .05

To answer research question 4, an independent *t*-test was computed:

RQ4: What is the association between meaningful use scores (IV) with patient rating (DV) scores in Philadelphia's general and specialty care hospitals?

H0 – No statistically significant association exists between meaningful use scores and patient rating scores in general and specialty hospitals.

H1 – There is a statistically significant association between meaningful use scores and patient rating scores in general and specialty hospitals.

Table 10 represents the group statistics for the facilities that demonstrated meaningful EHR use. It was found that 54 facilities demonstrated EHR use compared to 60, which did not reveal a meaningful EHR use. Table 11 shows the results of the independent *t*-test. The 54 participants who demonstrated meaningful EHR use (*M* = 88.65, *SD* = 2.643) compared to 60 who did not demonstrate meaningful EHR use (*M* = 86.57, *SD* = 2.878) revealed no statistically significant association, *t*(112) = 2.082, *p* =

.776); thus, it fails to reject the null hypothesis and concludes no statistically significant correlation between meaningful EHR use and hospital rating score from the patient survey dataset.

Table 10

Group Statistics Summary Results

Meaningful EHR use	N	Mean	Std. dev	Std. Error mean
Meaningful use	54	88.65	2.643	.360
No meaningful use	60	86.57	2.878	.372

Table 11

Independent t-Test Summary Results

	Group One		Group Two			
Source	M	SD	M	SD	t(df)	P***
Variable 1	88.65	2.643	86.57	2.878	2.082(112)	0.776

Note: M = mean, *SD* = standard deviation, *N* = 114, ***p* < .05

Summary

The study was established to answer the question: RQ1: What is the correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia? RQ2: What is the correlation between meaningful use (IV) and patient satisfaction (DV) scores in Philadelphia's general and specialty care hospitals? RQ3: What is the association between meaningful use scores (IV) with patient recommendation (DV) scores in Philadelphia's general and specialty care hospitals? RQ4: What is the association between meaningful use scores (IV) with patient rating (DV) scores in Philadelphia's general and specialty care hospitals?

The SPSS version 26 was used to conduct descriptive and inferential statistics, and the results were displayed in the listed tables. Although the relationship was not statistically significant, the results indicate a correlation between meaningful EHR and patient safety and satisfaction.

Section 4: Application to Professional Practice and Implications for Social Change

The purpose of the study was to investigate the impact of the meaningful use of the EHR on patient safety and satisfaction scores in the general and specialty hospitals in PA that have demonstrated meaningful EHR use by the end of the second stage program. Additionally, I aimed to determine how meaningful EHR use relates to patient safety and satisfaction scores. The following research questions and hypotheses formulated that guided the study :

RQ1: What is the correlation between meaningful use (IV) and patient safety (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$1: There is no significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$1: There is a significant correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia.

RQ2: What is the correlation between meaningful use (IV) and patient satisfaction (DV) scores in Philadelphia's general and specialty care hospitals?

$H_0$2: There is no significant correlation between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

$H_1$2: There is a significant correlation between meaningful use (IV) and patient satisfaction (DV) scores in general and specialty care hospitals in Philadelphia.

RQ3: What is the association between meaningful use scores (IV) with patient safety (DV) scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity?

H_03: There is no statistically significant association between meaningful use scores and patient safety scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

H_13: There is a statistically significant association between meaningful use scores and patient safety scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

RQ4: What is the association between meaningful use scores (IV) with patient recommendation scores (DV) scores in general and specialty hospitals after controlling for a demographic, geographic region, age, year, gender, and race/ethnicity?

H_04: There is no statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

H_14: There is a statistically significant association between meaningful use scores and patient recommendation scores in general and specialty hospitals after controlling for demographic characteristics of geographic region, age, year, gender, and race/ethnicity.

Discussion

In this qualitative correlation study, I aimed to assess the relation between meaningful EHR use and patient safety and satisfaction in 115 general and specialty

hospitals in PA. Frequencies and independent *t* tests were used to answer the study questions. The hypotheses were formulated and indicated that many patients (20.9%) rated the hospitals 88, and the majority recommendation score for the hospitals was 14.8%, with a score of 85. The independent *t*-test results for assessing the correlation between patient safety and meaningful EHR use were t (112) = -1.693, p = 0.479, CI [-0.324, 0.025], indicating no statistically significant relationship. Thus, meaningful EHR use does not impact patient safety (based on the HAIs). Also, the independent *t*-test results examining the relationship between meaningful EHR use and patient satisfaction were t (112) = 2.124, p = 0.982, CI [0.0887, 2.5576], indicating no statistically significant correlation between patient satisfaction and meaningful EHR use. Hence, meaningful EHR use does not influence the hospital's patient satisfaction score.

The independent *t*-test result for examining the correlation between meaningful EHR score and patient recommendation score was t (112) = 2.094, p = 0.889, CI [0.084, 3.045], indicating that the hospital's meaningful EHR use did not influence the patients' recommendation score in the general and specialty hospitals in PA. Additionally, the independent *t*-test results for assessing the correlation between meaningful EHR use and patient rating score t (112) = 2.082, p = 0.776, CI [0.052, 2.111] indicated no statistically significant correlation between the dependent and the independent variables. Therefore, the patient rating score was not dependent on the hospital's meaningful EHR use. The statistical findings concluded that patient safety measured by the HAI scores and satisfaction measured by recommendation and rating scores is independent of the facilities' meaningful EHR use.

The *p*-value was more significant than 0.05; thus, there was no statistically significant correlation between meaningful EHR use patient safety and satisfaction. However, based on the results that 47% of the hospital demonstrated meaningful EHR use, which is less than 50%; thus, concluding that there was a correlation between patient safety and meaningful EHR use indicates that there is a relation between the dependent and the independent variables, though the correlation is not statistically significant. Notably, the number of facilities that received the incentives based on meaningful EHR use in the second stage declined, as 47% demonstrated meaningful EHR use against 52% that did not demonstrate meaningful EHR use.

Limitations

The limitations identified in the study include using secondary data and articles restricted to EHR use and not patient safety and recommendations. The first limitation is that I explored secondary data, and the information obtained from the existing articles may not be acceptable to different healthcare organizations. Nevertheless, limiting the study to secondary data may affect the validity and reliability of the findings. Secondly, the study was restricted to articles about EHRs; hence, the results may not help describe patient satisfaction and patient safety regarding other health information technologies, such as computerized clinical decision support systems. As the findings may not apply to other technologies used in a healthcare facility, this study's findings cannot be generalized.

Recommendation

It is recommended that the study be conducted in diverse hospital settings in various states to assess the influence and impact of meaningful EHR use on patient safety and satisfaction to determine if the working environment affects the patient's recommendation, rating, and safety. This study's findings may be applied as a basis for replicating a similar study in different healthcare settings and states. Additionally, the study findings may be utilized to identify the basis for meaningful EHR use and patient safety and satisfaction.

Recommendation for Future Studies

The study findings indicated a relationship between meaningful EHR use and patient safety ad recommendation, even though the results were insignificant. However, the study findings can be applied to understand the relationship between patient safety, satisfaction, and meaningful EHR use. The recommendations made are founded on the outcome of the study findings.

It is recommended that further study be conducted to assess the extent of the relationship between meaningful EHR use and patient safety and satisfaction; the formation of an interprofessional group can achieve this to assess the information technology usage and patient safety and satisfaction based on the standard of care provided by the hospital; thus, a definitive relationship between the variables. According to Rosen et al. (2018), team-based care is an approach that could enhance patient-centered care through an alliance of two or more health care providers and staff in the

facility with each patient. These teams might comprise information technology staff, nurses, primary care providers, pharmacists, and physicians.

Recommendations for Practice

Interprofessional teamwork is essential in enhancing and augmentation patient-centered care and positive health outcomes, with prominence on collaboration to increase patient safety, resulting in higher patient recommendation scores (Morley & Cashell, 2017). Successful application and meaningful EHR use might increase patient safety and satisfaction; hence, is there a statistically significant correlation between the variables? Also, the business community might increase the facility incentive to enable the hospital's health care providers and ancillary staff to improve the quality of care, resulting in enhanced patient safety and satisfaction with the facility's services.

<div align="center">

Conclusion

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The study aimed to investigate the impact of the meaningful use of the EHR on patients' safety and satisfaction scores and identify the general and specialty hospitals in PA that have demonstrated meaningful EHR use by the end of the second stage program. Additionally, to determine how meaningful EHR use is related to patient safety and satisfaction scores.

The questions that guided this study were: RQ1: What is the correlation between meaningful use (IV) and patient safety (DV) scores in general and specialty care hospitals in Philadelphia? RQ2: What is the correlation between meaningful use (IV) and patient satisfaction (DV) scores in Philadelphia's general and specialty care hospitals? RQ3: What is the association between meaningful use scores (IV) with patient recommendation

(DV) scores in Philadelphia's general and specialty care hospitals? RQ4: What is the association between meaningful use scores (IV) with patient rating (DV) scores in Philadelphia's general and specialty care hospitals?

The results indicated that meaningful EHR use was not statistically significantly correlated to patient safety and recommendation. However, the limitations identified in the study include using secondary data and using the EHR articles only to describe patient safety and satisfaction. The recommendations include interprofessional teamwork to enhance patient safety and satisfaction while demonstrating meaningful EHR use, the business community and stakeholders to increase incentives offered to hospitals and healthcare facilities to enable patient-centered care.

Implications for Professional Practice

Professional Practice

The professional practice recommendations made are based on the project outcome. The adoption of EHR in medical facilities can improve patient care, save on healthcare costs, and reduce burnout among healthcare providers (Wani & Malhotra, 2018).

Fundamental, the first recommendation is enacting comprehensive policies that guide the utilization of electronic health records (EHR) to address usability issues, patient safety, and patient satisfaction concerns. Therefore, developing policies that address problems that might can help achieve the benefits associated with the meaningful use of EHR. The beliefs and self-efficacy of the patients should be identified and incorporated into the development of the policies by enacting functioning policies and regulations.

According to Emani et al. (2014), the clinician's beliefs on EHR systems are essential in enabling meaningful EHR use in medical facilities.

The second recommendation for professional practice is the adoption of EHR as the standard and primary tool for all medical records about patient care. The EHR should not be used only to store patient data but to collaborate with other professionals to make health decisions containing a logical and systematic basis for diagnosis and pertinent information from other healthcare team members and facilities.

The third recommendation is to train the health care providers on the use and application of the EHR to increase its benefits. The theoretical implication of the project is adopting the institutional theory to translate evidence theory into practice. The institutional theory describes how the different aspects of social structures, such as norms, rules, and routines, influence an institution's work (Chiasson & Davidson, 2004). Additionally, the institutional theory entailed the rise in using and disusing these social structures and examined the environment's influence on the organization's social structures (Scott et al., 2000). Thus, the project supports the adoption of the theory in the translation of knowledge to practice.

Positive Social Change

The impact of social change will be discussed at an individual, organizational, and social level. The potential positive changes include improving the patient's safety and satisfaction levels. Additionally, to encourage positive social change, training healthcare providers on the meaningful use of EHR will help increase nurses' and healthcare providers' knowledge, resulting in improved patient safety and satisfaction. Also,

adopting the meaningful use of EHR could result in reduced healthcare costs and expenses, contributing to affordable services.

Similarly, incorporating meaningful EHR can contribute to positive social change by increasing the security of the individual's personal health information and enhancing the patient's quality of care by involving patients and their families in their healthcare. As a result, improving care coordination. Additionally, the application of meaningful EHR use in medical facilities that have not adopted an EHR may enhance its use by identifying factors that hinder the full implementation of a system in areas with low usability rates.

Conclusion

This project aimed to identify the relationship between meaningful EHRs use on patient safety and patient satisfaction in Philadelphia, PA. The findings did not reveal a statistically significant correlation between the two variables. However, past research and studies have shown the association of the correlation from a negative and positive perspective. Therefore, I believe that the adoption and increased usability of meaningful EHR can result in positive outcomes for patients, health care providers, and health institutions. For patients, the positive outcome includes increased safety, satisfaction, and security of their personal information. Health care providers' benefits include increased efficiency, collaborative decision-making, and ease of accessing patient history records. The institutions will benefit economically through reduced expenses and costs associated with readmission and more extended hospital stays. Additionally, increased meaningful EHR use is associated with incentives that can be used to develop the medical facility. Thus, it is imperative for the government, EHR vendors, and medical facilities to

collaborate to ensure the increased usability of the EHR's meaningful use and to develop

policies to promote concerns and issues resolution that might arise.

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