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Impact Of Electronic Health Records On Quality Service Delivery For Nurses

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Abstract
Introduction: *According to Reisman, (2017), EHR represents the ability to easily share medical information among stakeholders and to have a patient s information follow him or her through the various modalities of care engaged by that individual.*
Objective: *To determine the Perception of nurses on Electronic Health Records on quality service delivery.*
Methodology: *An extensive search on the literature from studies related to our title with key words that reflected EHRs and nursing workflows was conducted on four electronic databases: Pubmed/Medline, Cinalh, Eval and Cochrane.*
Results: *The EHRs significantly enhances patient safety across all processes during patient care, and improves time efficiency for the nursing staff.*
Conclusion: *Implementation of EHR has the potential to contribute to improvements in both the processes and outcomes of nursing service delivery.*

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I. Introduction

Many health care services are implementing or planning to undergo digital transformation to keep pace with increasing Electronic Medical Record (EMR) functionality. Electronic Health Records (EHRs) documentation being a subset of Electronic Medical Records (EMRs), characteristically encompasses use of a bedside terminal, central computer or personal digital assistant (PDA). EHR systems have the advantage of being able to be enhanced with features such as computerized physician order entry (CPOE), electronic prescription, nursing documents, and decision support (Baumann, 2018). According to Reisman, (2017), EHR represents the ability to easily share medical information among stakeholders and to have a patient s information follow him or her through the various modalities of care engaged by that individual.

The usage of an information system has been proven in multiple studies to lead to more full and accurate recording by health care workers. Information quality is especially crucial in-patient treatment, but EHRs also provide valuable data for secondary uses like health policy development (Holroyd-Leduc, *et, al*., 2011). The amount of time spent by nurses on documentation and clerical tasks, decreases the time available to them to spend on direct patient care and communication with patients and relatives (Baumann, 2018).

In recent years, the broad use of electronic health record (EHR) systems held up the prospect of more efficient information sharing amongst clinical professionals. It was thought that switching from paper to electronic health records would allow nurses to spend more time on direct patient care and less time on documentation eventually resulting into quality nursing services (Ibid).

Background

With implementation of EHR, nurses' documentation time increased from 9% to 23% physicians time from 16% to 28%, and interns time from 20% to 26% (Baumann, 2018). Several data components documented in EHRs by the nurses included daily charting, medication administration, physical assessment, admission nursing

note, nursing care plan, referral, present complaint, past medical history, life style, physical examination findings, diagnoses, tests, procedures, treatment, medication, discharge, history, diaries, problems, findings and immunization.

Clinical information systems have a myriad of benefits which include the reduction of errors, improvement in clinical decision-making and real time access to patient information. Clinical information systems provide financial benefits due to cost-savings from improved efficiency and reduction of errors. As a result, healthcare organizations should adopt such clinical information systems to improve quality of care and stay competitive in the marketplace. Research clearly documents the increased adoption of electronic medical records in U.S. hospitals from 2005 to 2007. This is important because the electronic medical record provides an opportunity for integration of patient information and improvements in efficiency and quality of care across a wide range of patient populations (Palacio, 2010).

Electronic health record (EHR) nursing documentation offers a method to record the patient's health status, individual needs, and responses to care, and to support clinical reasoning regarding the patient's future care. Additionally, the EHR has the potential to improve patient care, care team communication, and patient experiences through well-designed workflows and clinical content relevant to the role, venue, and patient's clinical status (Karp, 2019).

Statement of the problem

According to recent estimates, only 12% of US hospitals have a basic EHR system in place, while only 2% have a comprehensive EHR with decision support aspects, which is the most effective way to meet the most recent meaningful use criteria. Nurses who worked in hospitals with at least a minimally functional EHR were more likely than other nurses to report nursing excellence and quality improvement efforts in their workplace, according to a study conducted from the perspective of more than 16,000 hospital staff nurses working in four large states in the United States. The widespread implementation of electronic health records (EHRs) and their "meaningful use" is a national priority. In the US, the institute of medicine has long recognized the potential for information systems to assist in addressing overuse, underuse, and misuse of health care services observed in most of the institutions without information technology systems (Kutney-Lee 2011).

While research has indicated clearly that incorporation of EHRs improves delivery of health care services, impact of health information technology on the quality of nursing care is largely unexplored. Data on reasons as to why nursing professional have not embraced it are scanty. The purpose of this study is to determine the perception of nurses on Electronic Health Records in the delivery of quality nursing services. The findings from this study will form the degree to which nurse leaders and policy makers support the growth of technology and champion its use in the clinical setting. This is bound to affect the success of Electronic Health Records implementation and, subsequently, improved quality of nursing care.

Justification

The care nurses deliver to sustain life, enable recovery, alleviate suffering and promote health ought to be captured within the electronic health record (EHR). To share this information between clinical disciplines and care settings, data needs to be recorded and stored in a standardized format in the system. The nursing profession benefits from being provided a means to document, store, and retrieve evidence-based practice in a semantic way to facilitate nursing research and reveal the impact of nursing care through electronic means (Weaver, Warren, & Delaney, 2005). Each country benefits from having easily accessible coded data that can be combined into useful reports or data sets. Using the International Nursing Minimum Data Set, these reports enable countries to compare nursing's contribution to care on a national and international level (Lee, 2016).

Broad Objective

To determine the Perception of nurses on Electronic Health Records on quality service delivery

Specific Objective

1. To evaluate the perception of nurses on quality of care in hospitals with implemented EHRs.
2. To establish perception of nurses on patient safety in hospitals with implemented EHRs
3. To determine time efficiency for nurses in hospitals with implemented EHRs

Research Questions

1. What is the perception of nurses on quality of care in hospitals with implemented EHRs?
2. What is the perception of nurses on patient safety in hospitals with implemented EHRs?
3. What is the perception of nurses on nursing time efficiency in hospitals with implemented EHRs?

Conceptual Framework/Theoretical Frame work

Health in our hands

Referring to the personal, accessible, and mobile nature of eHealth technologies that enable access to health information as and when needed. With increased consumer health literacy, the growth of a population is invested in their own health and well-being. Within this domain, there are multiple benefits in terms of improving access, empowering consumers, and facilitating behaviourur change.

Interacting for health

It enhances the need for health professionals and consumers to communicate with one another. Multiple examples of digital health services, including virtual consultations, telehealth clinics, and Web-based group forums, using a variety of telecommunications and Web-based conferencing software to connect for real-time interactions.

Data enabling health

This domain encompasses the collection, management, analysis, and application of health data, including the design and implementation of technologies that provide new and expanded forms of knowledge about ourselves as individuals, our community, and the population as a whole. The role of electronic medical records and electronic health records in the collection, storage, and communication of health data, and in particular, routine clinical data as both the central repository of health information and a communication tool that enables the sharing of information across a network of providers.

	Independent Variable	**Subcategories**			**Dependent variables**
1	**Electronic Health Records**	Health in our hands: the use of eHealth technologies to monitor, track, and inform health	Health, not just health care	Patient care	
			Consumer-driven and -controlled health		**Quality Nursing service Delivery**
			Health via social media and the Internet		
		Interacting for health: the use of technologies to communicate between stakeholders in health	Connecting for real-time health	Patient safety	
			Social discourses and storytelling		
			New ways of interacting to personalize care		
			Supporting health professionals		
		Data enabling health: the collection, management, and use of health data sources	Data management systems and data repositories	Nursing Time Efficiency	
			Data for precision health		
			Data enabling quality		

Adopted from, Shaw, *et al*., (2017). Table 1. Conceptual model – Electronic Health Records in Nursing service delivery

II. Literature Review

This chapter will highlight related studies that the researcher has accessed to guide in the discussion and recommendations. It encompasses EHRs and quality nursing care, patient safety and nursing time efficiency.

EHR and quality nursing services

According to Kossman (2008), Nurses preferred electronic health records to paper charts and were comfortable with technology. They reported that use of electronic health records enhanced nursing work through increased information access, improved organization and efficiency, and helpful alert screens. Initially, nurses

thought that use of the records hindered nursing work through impaired critical thinking, decreased interdisciplinary communication, and a high demand on work time (73% reported spending at least half their shift using the records). They thought use of electronic health records enabled them to provide safer care but decreased the quality of care. Administrative implications include involving bedside nurses in system choice, streamlining processes, developing guidelines for consistent documentation quality and location, increasing system speed, choosing hardware that encourages bedside use, and improving system information technology support.

The aspects of information quality most often explored in the studies reviewed were the completeness and accuracy of different data components. It has been shown in several studies that the use of an information system was conducive to more complete and accurate documentation by health care professionals. The quality of information is particularly important in patient care, but EHRs also provide important information for secondary purposes, such as health policy planning (Evans, 2016).

The standardized nursing terminologies, recognized by the American Nurses Association (ANA) are the vehicles for the aggregation of nursing data recorded in EHRs which can be used to improve quality of patient care and safety. Patients benefit from the continuity of care facilitated through the use of standardized terminologies through improved and unambiguous communication between patient care professionals. Organizations benefit by being able to measure nursing care and its impact on patient care through queries of the patient record instead of the costly manual chart audits. This determination of the nursing impact is essential to validating the contribution of nursing to the health care and patient safety (Strudwick, 2016).

In a related retrospective cross-sectional study that was conducted in American hospitals, Abbass, (2012) found that hospitals with higher penetration of electronic health records had more nurses employed (coefficient = 0.234, P = .002) compared with hospitals with low penetration of electronic health records. More nurses can be translated into quality of care.

The care nurses provide to sustain life, enable recovery, alleviate suffering and promote health should be captured within the electronic health record (EHR). The documentation of nursing care, using an electronic health record, demonstrates the impact of nursing care on patient care and validates the significance of nursing practice (Tastan, *et, al*., 2014).

The system-wide implementation of an integrated EHR has potential benefits, such as increased organizational efficiency, improved communication, improved practitioner performance that includes improved prescribing, better quality of care and improved outcomes. Several research evaluations of health information technologies have largely focused on physician behavior and patient outcomes associated with medical management. Nurses comprise the largest professional group in the healthcare workforce, yet the impact of health information technology on the quality of nursing care is largely unexplored. Adverse events such as hospital acquired pressure ulcers (HAPUs) and falls are directly related to the quality of nursing care, which could be enhanced through the use of health information technologies. For example, risk assessment tools in KP Health Connect identify patients at risk of developing pressure ulcers or falling and nurses are alerted and prompted to implement preventive measures. In a study that was done to examine the impact of KP Health-Connect implementation on nursing care process and outcome measures across Kaiser Permanente hospitals in Northern and Southern California it was found that KP Health-Connect implementation would be associated with improved documentation of HAPU and fall risk, and lower HAPU and fall rates (Dowding, 2012).

Nurses have the ability to positively impact the quality of patient care through successful innovation adoption related to the use of Evidence Based Practice (EBP) computerized documentation tools at the bedside. Incorporating electronic, evidenced-based practice (EBP) tools into bedside nurse's workflow promotes decision making at the point of care that may improve quality with no negative impact on direct cost. A quantitative, retrospective study analysis using interrupted time series model of a large data set was conducted in a 431-bed urban hospital, with 10 medical surgical units and 2 critical care units. The data revealed that total falls, Catheter Associated Urinary Tract (CAUTI), and Central Line Associated Blood Stream Infections (LABSI) rates were positively impacted after the implementation of an integrated EHR. Hospital-acquired pressure ulcer (HAPU) and Ventilator Associated Pneumonia (VAP) rates were negatively impacted at the implementation period followed by a significant positive rate reduction that surpassed the pre-implementation period (Walker-Czyz, 2016).

EHR and patient safety

In particular, computer-based decision support systems have been shown to improve patient safety by reducing the rate of prescribing and documentation errors and subsequent adverse events. They can provide staff with alerts for suggested corollary actions, potential drug interactions and adjustment of drug doses, a task poorly performed by human prescribers without aid. In addition, EHR systems have the potential to improve information flow and access to knowledge, perform checks in real time and assist with monitoring (Hessels, 2015).

Nurses working in hospitals with basic EHRs consistently reported that poor patient safety and other quality outcomes occurred less frequently than reported by nurses working in hospitals without an EHR. Findings

in one of the papers suggest that the implementation of a basic EHR may result in improved and more efficient nursing care, better care coordination, and patient safety.

In a related study, it was noted that the widespread adoption and "meaningful use" of electronic health records (EHRs) was a priority. This is because the potential for information systems to assist in addressing the overuse, underuse, and misuse of healthcare services would easily be identified to maintain patient safety (Kutney-Lee, 2011).

Strong evidence highlights the potential of computerized provider order entry (CPOE)—a component of a basic EHR—in reducing the incidence of medication errors. A study of over 3,000 hospitals found that a hospital's use of an EHR, including CPOE, contributed to significantly better performance. In studies of hospitals within single US states, certain elements of EHR systems have been associated with improved quality outcomes, including lower mortality and complication rates (Ibid).

Overall EHRs are associated with reductions in medication administration errors and time spent on documentation, as well as improved quality of nursing documentation. Nurse communication and workflow seem to be positively influenced by technology as studies have identified nurse satisfaction with improved integration of technology systems into workflow processes, such as documentation, medication, and patient discharges and transfers. In a related study, the researcher found that nurses who worked in hospitals with at least a minimally functioning EHR were more likely than other nurses to report nursing excellence and quality improvement efforts in their workplace (Waneka, 2010).

Further, (Hessels, *et, al*., 2015) postulates that nurses working in hospitals with a basic EHR were less likely to report that things fell "between the cracks" when transferring patients between units, and they were also less likely to report that they were not confident in patients' readiness for discharge. These findings suggest that the level of detail available in EHRs may allow for more comprehensive unit transfer reports, as well as discharge summaries to posthospitalization healthcare providers, in addition to verbal or written reports. Therefore, nursing administrators should be fully engaged in the process of EHR adoption and implementation to ensure effective use and success. It is important to note that having a basic EHR was associated with better outcomes independently of nurse staffing, indicating that they both play an important role in the quality of care.

In one of the studies that the researcher selected for review, in which a cross-sectional, secondary analysis of nurse and hospital survey data was conducted in the US, the final sample included 16,352 nurses working in 316 hospitals in 4 states. Logistic regression models were used to evaluate the relationship between basic EHR adoption and nurse-assessed quality of care outcomes. Nurses working in hospitals with basic EHRs consistently reported that poor patient safety and other quality outcomes occurred less frequently than reported by nurses working in hospitals without an EHR (Kutney-Lee & Kelly, 2011).

EHR and Time efficiency

According to Baumann (2018), Initial adjustment to EHR appears to increase documentation time but there is some evidence that as staff become more familiar with the system, it may ultimately improve work flow.

Hospital staff are a valuable healthcare resource and effective use of their skills is a major determinant of quality of care and achievement of national health goals. Staff salaries often constitute the majority of hospital costs; Australian hospitals spent 62% and German hospitals spent 60% of their total expenditure on staff salaries in 2012/13 and 2013/14 respectively. Therefore, it is vital that staff time can be allocated to ensure efficiency and for optimized quality of patient care (Westbrook, *et, al*., 2013).

The last two decades have seen an increase in the amount of time spent by hospital clinicians on documentation and clerical tasks, decreasing the time available to them to spend on direct patient care and communication with patients and relatives. The rising focus on quality of documentation, with more detail needing to be documented about the care process has led to increasing time pressure and staff dissatisfaction. A consequence of this is burnout, with studies reporting up to 49% of hospital physicians meeting burnout criteria. Burnout is associated with decreased quality of care and an increase in subsequent health costs (Walker et al., 2020).

The widespread adoption of electronic health record systems over recent years has held the promise of more efficient information sharing between clinical staff. It is hoped that transitioning from paper to electronic health records would ultimately lead to decreased documentation time for staff and increased time for direct patient care.

Findings of Bingham (2021) from deploying a large scale EMR across all healthcare craft groups and workflows have described for nurses that an EMR enables them to spend longer periods with patients per direct care episode and use their time on other activities more effectively.

III. Methodology

An extensive search on the literature from studies related to our title with key words that reflected EHRs and nursing workflows was conducted on four electronic databases: Pubmed/Medline, Cinalh, Eval and Cochrane. Therefore, all papers that addressed the research question were retrieved, regardless of their study design. Abstracts of all papers identified from the search strategy were read and assessed by the author. Abstracts that were rated as relevant to the research question were kept and full-text papers were retrieved for further review. In the absence of an abstract, full-text papers were retrieved and reviewed. Reference lists of selected papers were examined to identify other relevant articles.

IV. Analysis

In total, 14 papers met our inclusion criteria; five were randomized controlled trials, six were posttest control studies, and 3 were one-group pretest-posttest designs. A weighted average approach was used to combine results from the studies (Jiang, *et al*., 2012).

V. Discussion

Of the 14 research papers that were reviewed under this study, implementation of Electronic Health Records was positively identified to have helped increased access to information, enabling organization and efficiency in the nursing care. The system has also ensured completeness and accuracy in documentation by the nurses. The quality and completeness of the nursing information is key for policy planning and enhanced nursing delivery of care. Both Evans (2016) and Strudwick (2016) have postulated in their studies that incorporation of EHRs in the management of the patients has improved data completeness and organization.

Quality of care encompasses delivery of the needed care or service timely through evidence-based practice to meet the patient's needs. Use of EHRs has greatly minimized medication errors and enhanced effective communication between health professionals thus increasing the parameters of quality care through implementation of EHRs (Farid, 2019).

In more than 4 articles, the researchers mentioned that electronic health records play a key role in patient safety. The system easily detects the overuse, misuse, medication errors to enhance patient safety (Waneka, 2010, Kutney-Lee, 2011 & Hessels, 2015).

Nurses in hospitals with fully implemented basic EHRs were consistently and significantly less likely to report unfavorable outcomes in their hospitals than did nurses in hospitals without fully implemented basic EHRs. Time spent on recording patient data on the manual charts by the nurses was one of the factors that increased cost of health care. The use of EHRs including computerized provider order entry documents has shown significant reduction on time spent on clerical work by nurses.

VI. Limitations of the study

A common limitation of other studies examining the effect of EHR implementation is the wide variation in technology capabilities across settings. In conjunction with cross-sectional data, which fail to take into account changes in outcomes over time, this variation makes it difficult to assess the effect of EHRs on quality nursing care. Limitation of time to review a representative sample as well.

VII. Conclusion and Recommendations

Implementation of EHR has the potential to contribute to improvements in both the processes and outcomes of nursing service delivery. The EHRs significantly enhances patient safety across all processes during patient care, and improves time efficiency for the nursing staff. Further research is required to improve our understanding of how technology such as EHR can be used effectively to help improve the quality of care received by patients.

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