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PERCEIVED USEFULNESS OF ELECTRONIC HEALTH RECORD (EHR) AND QUALITY OF NURSING CARE AMONG NURSES IN A MILITARY HOSPITAL IN KINGDOM OF SAUDI ARABIA

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Biographical Sketch

The author, Mary Jane Turzar Dela Pena, was born on December 31, 1988 in Pasay City and now currently living in Jeddah Saudi Arabia as the only daughter of Iluminada Turzar and late Leoncio Dela Pena.

She finished her primary school at Queens Row Elementary school and her secondary education from Eastern Bacoor National High School where she received her academic awards during her Sophomore and Junior years. Jane is not only academically inclined but she is also interested in cooking and arts. During her High School years, she participated in extracurricular activities such as dance group, editorial writing, and student council. In 2005, she was admitted to the Adventist University of the Philippines under the Bachelor of Science in Nursing.

Her college nursing journey was consistently spent with religious subjects and summer sessions were maximized by continuing open courses like driving and attending church services within the campus.

As of today, Jane is working as a staff nurse where the research study commenced while working out her nursing license in Ireland.

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Dedication

I would like to dedicate this work to my co-nurses, my organization, the patients and to my supportive family. First to my co- nurses, who work to the best of their ability in rendering nursing care despite circumstances that may arise and changes in technology that influences our field. Second to my organization, King Abdulaziz Medical City-Jeddah, may this work help to achieve our goal of giving the optimum level of care to all our eligible patients, and may this work influence how procurement and investment of technology takes place within the organization. I would like to dedicate this work as well to all the patients who are benefiting from the availability of technology. May this work prove that the use of technology in provision of care is beneficial for them. And lastly to my family who are always there supporting me. Through the years of hard work, their love and understanding helped me to finish this work.

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ABSTRACT

The use of an Electronic Health Record (EHR) system is designed to improve the healthcare system of the hospital (Ryu & Kim, 2018). However, despite its advantages, some nurses have experienced the complexity of the software and the absence of uniform standards (HabibiKoolaee et al., 2015). Hence, this quantitative study employed a descriptive-correlational research design to determine the relationship between the use of Electronic Health Records (EHR) and the quality of nursing care. There were 277 nurse respondents from King Abdulaziz Medical City and random sampling was used to recruit the respondents. Frequency and percentage were used to describe the demographic and experience-related profile of the respondents. Mean and standard deviation described the central tendency of data and the variation of responses of respondents. Pearson Correlation was used to determine the significant relationship between the usefulness of EHR and quality of nursing care and Chi - square was specifically used to determine the significant relationship between the socio-demographic and experience-related profile of respondents and the quality of nursing care.

Findings of the study revealed that the usefulness of the EHR system has a positive significant relationship with quality of nursing care. The experience-related profile like pre-exposure to EHR systems (x^2 2.4, p 0.04) was found to have a positive significant relationship with quality of nursing care. However, the socio-demographic profile like age (x^2 1.5, p 0.19) and sex (x^2 2.7, p .848) and length of service (x^2 1.1, p 0.36) were not significantly related to the quality of nursing care, even experience-related profile like computer literacy (x^2 2.2, $p>0.05$). As a result, the use of electronic health records has a positive relationship with the quality of nursing care regardless of the socio-demographic profile of end users except for pre-exposure to EHR. Therefore, it is

recommended that the use of EHR be continuously utilized and the healthcare industry will engage with developmental programs about it, to consistently enhance and improve quality of care and with set limitations of this study, it is recommended that this study be used as the basis of a more in-depth study in the future.

Keywords: Electronic health record, nursing care, use of EHR, quality of care, hospital information system

Chapter I

THE RESEARCH PROBLEM

Background of the Study

From the time a patient is admitted until they are discharged from the hospital, nurses engage in a variety of activities to assist patients in meeting their needs. Each activity must be adequately recorded to provide reliable and important proof. In the quest to deliver smart, cost-effective, and high-quality healthcare, stakeholders in the healthcare sector must contend with new challenges that include investments in exponential technologies with lower costs, improvements to care and access to healthcare, patient experience enhancements, and workforce shaping (Arabi et al., 2022).

One intervention created is the development of electronic health record systems, which makes recording data very efficient, accessible, and accurate. This technology enables greater telemedicine use for remote diagnosis and treatment, better access to services and service delivery, protocol-driven healthcare quality improvement, and the use of artificial intelligence tools for efficient management of common electronic health record systems and highly customized treatment protocols (Kazley et al., 2014).

Implementing an electronic record system speeds up decision-making, improves data accuracy and completeness, and lowers the cost of patient care per hospitalized patient to provide high-quality nursing care more efficiently. Even if keeping services transparent prevents the development of bad stereotypes as medical professionals utilize computers more and more, which drastically reduces and eliminates malpractice claims, access to medical information in the nursing care setting enhances productivity, lowers costs for both the patient and the healthcare practitioner,

and boosts revenue. Consequently, the expanding adoption of electronic health records is anticipated to boost nursing care quality while increasing the productivity of healthcare companies (Balestra, 2017; Sarawasta & Hariyati, 2018).

Effectiveness in providing patients with high-quality nursing care incorporates evidence-based practice in the areas of diagnosis and treatment, as well as in the ability to access medical records from any location at any time (Ryu & Kim, 2018). As nurses spend more time concentrating on the patient, they are better equipped to provide holistic care depending on the patient's needs. Hence, with the aid of the electronic health record, nurses can contact patients and families, effectively communicate, and sustain a trustworthy relationship with both patients and medical professionals (Schenk et al., 2018).

In Saudi Arabia, the Ministry of National Guard for Health Affairs began using Electronic Health Records almost ten (10) years ago throughout all of its hospitals, King Abdulaziz Medical City (KAMC), and satellite primary health care centers. Using QCPR, KAMC-Jeddah implemented its first hospital information system in November 2013 (quadramed computerized patient record). It is a software program for keeping track of patients that offers a comprehensive electronic health record solution by combining all facets of patient care into a single, secure record. But even with this automation, doctors still had to hand-write notes on each patient's chart. In May 2016, KAMC-JED implemented BESTCare, an Electronic Health Record system, and the hospital started using a paperless documentation method. Since the implementation of these health information systems, end users (such as physicians, pharmacists, nurses, therapists, etc.) have expressed a variety of opinions about it. Furthermore, although earlier research has demonstrated that using an EHR has a considerable positive impact on the services delivered, it is unclear how much this has an impact on

the level of service quality (Lovell, 2022).

King Abdulaziz Medical City has also implemented the EHR system in order to meet the demands imposed on healthcare organizations and to comply with the government mandate for the improvement of Saudi healthcare systems and services. The system is intended to link all Saudi Arabian hospitals and enhance the hospital's healthcare delivery, patient information flow, waiting times, and removal of duplicate and incorrect records. The extension of the system's capabilities through the adoption of the Ambulatory Care Center and the integration of SMS into the system, which leads to enhanced service efficiency, stand out as benefits of the installation of EHR in the hospital. With the present full adoption of the EHR system, the hospital has a well-structured and defined roadmap for the EHR system implementation (Lovell, 2022; Arabi et al., 2022).

However, despite its significance, the researcher observed that the continued usage of the EHR system, specifically among nurses, in the delivery of healthcare services at King Abdulaziz Medical City reveals several issues, including the lack of expertise and understanding among nurses and other health professionals regarding the use of computerized systems. This may be because of the complexity of the software, the lack of vendor support and maintenance, the lack of standardized standards, lack of computer literacy, which all prevent the proper adoption of the EHR system. Notably, social hurdles like language barriers exist because the EHR system is only available in English (EW & Grove, 2016; HabibiKoolaee et al., 2015; Saraswasta & Hariyati, 2018). Thus, as most earlier studies have concentrated on the advantages of EHR for both patients and healthcare professionals. Only a few research have looked at how using an EHR affects the patient's quality of care even when the difficulties nurses have using the system at work constitute significant obstacles to the

introduction of the EHR. Hence, the researcher, as one of the nurses in a military hospital in the Kingdom of Saudi Arabia (KSA), determined the relationship of the usefulness of EHR electronic health records (EHR) on the quality of nursing care.

Statement of the Problem

With the current problems encountered in the workplace, lessons and benefits are learned from work experiences, showing the need for continuous improvement in the EHR system in hospitals. However, despite the benefits of the system use, healthcare professionals continue to experience barriers to the effective implementation of the EHR system (Arabi et al., 2022; HabibiKoolaee et al., 2015; Saraswasta & Hariyati, 2018). The study determined the relationship of the use of Electronic Health Record (EHR) on the quality of nursing care among nurses in a military hospital in the Kingdom of Saudi Arabia (KSA).

Objectives of the Study

General Objective:

To determine the relationship between the perceived usefulness of Electronic Health Record (EHR) and the quality of nursing care among nurses in a military hospital in the Kingdom of Saudi Arabia (KSA).

Specific Objectives:

1. To determine the socio-demographic profile of the respondents in terms of:

1.1 age;

1.2. sex; and

1.3. length of service (years of experience)

2. To determine the experience-related profile of the respondents in terms of:

2.1. pre-exposure to other EHR system; and

2.2. computer literacy

3. To determine the usefulness of electronic health records (EHR), in the areas of:

3.1 results management;

3.2 order entry management;

3.3 decision support;

3.4 electronic communication and connectivity;

3.5 patient support;

3.6 administrative processes; and

3.7 reporting and population health management.

4. To identify the level of quality of nursing care in the military hospital in KSA, resulting from the use of electronic health records, in the dimensions of:

4.1 effectiveness;

4.2 efficiency;

4.3 focus on patients;

4.4 accessibility;

4.5 relatedness; and

4.6 competence

5. To determine the significant relationship of the perceived usefulness of EHR and the quality of nursing care in a military hospital in KSA.

6. To determine the relationship between the quality of nursing care and the socio- demographic profiles of respondents in terms of:

6.1 age;

6.2 sex; and

6.3 length of service (years of experience)

7. To determine the relationship between the quality of nursing care and the experience-related profiles of respondents in terms of:

7.1 pre-exposure to other EHR system; and

7.2 computer literacy

Significance of the Study

Findings of this study are expected to be beneficial to the following:

***Healthcare Industry*.** The study may bring benefits to the healthcare industry as better clinical decision-making is brought about by the use of the Electronic Health Record, resulting in better management of patients and better healthcare providers' collaboration in the provision of patient care and the betterment of the quality of patient care.

Nurses. The study may provide nurses with new information on the capability of the Electronic Health Record system in the generation of accurate information to nurses on speed-up access to patients' information, access to prescriptions, and enhanced decision-making for the management of patients and care provision.

***Patients*.** Findings of the study may help the patients be informed of the benefits and in understanding the advantages of using electronic health records, which have been linked to better patient care. Thus, the study may help the patients due to the availability of patient's health information to various doctors and healthcare providers, which greatly enhances care coordination and boosts the effectiveness of patient care practices.

***Nursing Informatics*.** Findings of the study may provide a better understanding of

technologies evolving in nursing informatics which can help maintain and develop medical systems, data supporting nursing practice, and the improvement of patient outcomes. The study may also serve as a reminder to nursing informatics that indicates the need for nurses for advanced training and education before EHR implementation, and the provision of continuous support after the EHR system is in place.

***Nursing Administrators*.** The study may provide information about the benefits of the use of Electronic Health Records and its acceptance in the performance of nursing services and administration, through the accessibility of patient information and integration of information tools for decision support systems, telemedicine, electronic prescription, and emergency information that enhance clinical decisions and more efficient and safer healthcare system. The study may serve as a guide for hospital management in the use of electronic health records for the improvement of health service delivery and the improvement of the attitude of health workers towards the utilization of the EHR system.

Future Researchers*.* The present study may help future researchers since it provides new knowledge in the area of Electronic Health Record benefits as well as about the acceptance in healthcare systems. The study may serve as a reference to future research studies aimed at integrating and utilization of advanced technologies that will improve primary care practices, healthcare decision-making, and the provision of timely and relevant information in healthcare systems.

Scope and Limitations of the Study

The study determined the relationship of the perceived usefulness of Electronic Health Record (EHR) on the quality of nursing care among nurses in military hospitals in KSA. The usefulness of EHR was focused and limited on the aspects of results management, order entry management, decision support, electronic

communication and connectivity, patient support, administrative processes, and reporting and population health management. Likewise, it determined the level of quality of nursing care in the military hospital in KSA, resulting from the use of electronic health records in the dimensions of effectiveness, efficiency, focus on patients, accessibility, relatedness, and competence. Variables like age, sex, length of service, pre-exposure to other EHR systems, and computer literacy were investigated as well on its relationship with the quality of nursing care at the military hospital in KSA.

The survey was conducted online via survey monkey and was limited to 277 respondents, who are registered nurses of the military hospital in KSA and are using the Electronic Health Record system in the provision of nursing care. One of the limitations of the study was that the data was gathered using an online tool. The researcher continued the random selection of respondents within working hours until sample size has been achieved. The above-mentioned limitations were acknowledged and presented for full transparency.

Chapter II

THEORETICAL BACKGROUND

This section emphasizes the related studies and literature that have been compiled to characterize the relationship of the perceived usefulness of Electronic Health Records (EHR) on the quality of nursing care. Research hypotheses derived from the conceptual framework were incorporated in the last part of the chapter.

Review of Related Literature

Electronic Health Record

The use of an Electronic Health Record system ensures that no tests or findings are repeated by enabling the electronic receipt of laboratory results, radiology reports, and x-ray images. The system is viewed as an electronic replacement for paper patient records, with the benefit of securely distributing information about patient care options to various users. EHR combines data from several sources, giving healthcare professionals access to tools for decision support, a holistic perspective of patient care, and reports that help them based care on the best available evidence. Most EHRs can perform additional functions that support good quality of care, including the functions of results management on patients' visits' data and demographic data, results in clinical decisions, financial management reports, quality assurance, exchange health information, medication reconciliation, screening tools and checklists, and results of patient education. Some EHR systems include support for integrated practice management which enables the functions of patient portals, online scheduling, and results from billing (Wilson-VanMeter & Courtney, 2019).

According to Jabali and Jarrar (2018), Electronic Health Record was required for the optimization of clinical outcomes, safety, and quality. As a result, hospitals in the Eastern Province of Saudi Arabia were required to adopt more electronic health

records (EHR) and EHR functionalities. There was the need to perform periodic EHR status to enforce policies that can significantly increase the adoption rate of Electronic Health Record systems. Findings of the study showed that 47% of the respondent hospitals had an Electronic Health Record system with obstacles used in the provision of documentation functions, decision support, and communication tools. A mechanism for security did not cover all threats, despite the secured electronic health record system. Other problems identified are the existing weak financing, technical training of supporting staff, and limited awareness among hospital personnel on the utilization of electronic records.

A study conducted by Al-Harbi (2011) revealed that healthcare providers perceive that the information technology in KAMC was valuable and beneficial to both patients and the organization. However, there were risks and barriers associated with the use of it, as identified by the respondents. Some of its barriers are language barriers and some risks are about frequently missed nursing care which may affect the well-being of patients. Since this study was too broad and used a convenience sampling method which is not a strong method to represent a population, it was recommended that more reviews of studies conducted discuss the perceived benefits of EHR and technology acceptance among nurses.

The impact of emerging technology on the care of patients by nurses was also examined in the study of Huston (2013) and revealed the speed at which advances in technology are changing healthcare settings. The findings of the study emphasized the ability of healthcare providers in applying and integrating rapid technological change in the provision of optimal patient care. As a result, nurses will need to develop skills in the use, acquisition, and integration of emerging technologies, and are certain to encounter challenges in the face of the new technology integration. Adoption of the

Electronic Health Record (EHR) allows healthcare providers access to critical information of patients from multiple providers, resulting in better-coordinated care.

Given the broad application and implication of EHR, the present study assessed the usefulness of EHR in the dimension of; a) results management, b) order entry management, c) decision support, d) electronic communication and connectivity, e) patient support, f) administrative processes, and g) reporting and population health management.

Results Management

Electronic Health Record system allows receiving of results from the laboratory, radiology reports, and x-ray images electronically, ensuring non-duplication of tests and results. The systems are made to manage outcomes related to patient care, diagnoses, medications given, vaccination results, laboratory findings, and test results, even though they differ in terms of capability and content. EHR integrates information from multiple sources, providing a comprehensive view of patient care, accessibility to tools for decision support, and reports that aid healthcare teams to deliver care on the best evidence available (Myers & Stevens, 2016).

The study of Menachemi & Collum (2011) claims that results management in the aspect of clinical results is a focus of electronic health record systems which relate to the quality of care and patient safety. Quality care is derived from doing the right way to the right person at the right time and derived from the best possible results. Patient safety is achieved with effective results management focusing on the avoidance of injuries to patients from the care provided to patients. Quality of care is the achievement of the dimensions of patient safety, efficiency, and effectiveness. Other dimensions of quality of care involve timeliness, patient-centeredness, and equitable access. Findings showed that Electronic Health Record systems work to prevent

patient encounters that violate best practice recommendations; as a result, the systems are associated with higher adherence to efficient treatment and evidence-based clinical recommendations. It was discovered that results management in the outpatient setting increased vaccination rates among patients using the recommended drugs and enhanced adherence to immunization requirements.

Electronic Health Record systems also focus on results management in organizational outcomes for both outpatient and inpatient settings, which lead to achievements of increased revenue, less tangible benefits, averted costs, improved regulatory compliance, and increased satisfaction among healthcare providers. Increased revenue comes from effective management of results from decreased billing errors and improved cash flow, as the electronic system eliminates inaccurate coding and billing. Results management in the electronic health record system increases patient visits, with averted costs resulting from efficiencies created from the available electronic patient information. Other results available include test utilization, availability of supplies to maintain files, and availability of resources devoted to the management of patients. Information from the EHR system's effective results management, which focuses on preventative services, is utilized to examine how the system is used to increase vaccination coverage and adherence rates (Estrada & Dunn, 2012).

According to Goodman et al. (2012), an Electronic Health Record system is linked to knowledge resources to display information during clinical decision-making. The efficiency and effectiveness of the communication provided by the system among the healthcare team affect the overall timeliness and coordination of the provision of care. Communication tools have been integrated with the EHR system such that laboratory and test results are electronically attached to the record of the patient. When laboratory results and tests are completed, the system identifies critically abnormal results which

are of special importance, sending information for the result. The physician finds details of medical results in the system with all relevant facts, allowing the making of remedial actions.

Order Entry Management

An EHR system application known as computerized physician order entry is thought to be a promising technological advancement that enables doctors to type orders into the system rather than hand write them. The method radically alters the ordering process, which can significantly lower the underuse, overuse, and misuse of healthcare services. The use of electronic physician order entry can shorten a patient's hospital stay, lower costs, prevent medical errors, and increase compliance with various types of medical regulations. Adopting computerized physician order entry (CPOE) technology comes at a significant expense in terms of organizational process and technology, system implementation, redesign, user training, and support. The technology behind the system, which is still very new, has the potential to be very beneficial and provide a crucial foundation for the healthcare system. The report recommends that CPOE technology be promoted to organizational executives as a vital tool in raising the standard of care. Hence, with the deployment of Computerized Physician Order Entry (CPOE) systems in the EHR system, transcription errors are decreased, improving patient care and safety (Johnson, 2011).

Healthcare providers can electronically order services from laboratories, radiology centers, and pharmacies using the computerized physician order entry management function of the electronic health record system. This functionality ranges from basic ordering capabilities to more complex systems that include customized order sets, alerting, and result reporting. The program decreases medication-related errors and offers clinical decision support. The Electronic Health Record (EHR)

program known as Computerized Physician Order Entry (CPOE) is used by doctors to place orders and offers significant benefits for electronic test orders in the absence of paper forms. By sending messages when the right patient arrives, the system guarantees order correctness. It enables medical personnel to recognize tests that have been carried out (Weiner, 2018).

Electronic Health Record systems with computerized physician order entry systems encourage effective, secure, and evidence-based patient care. The system includes order sets that serve as clinical decision support, enabling time savings and care process improvements that enhance patient outcomes. Order sets, which are collections of orders that are categorized by clinical purpose, are supported natively by computerized physician order entry systems. The system has crucial features for efficient ordering and decision-making, which have a big impact on ordering. Because order sets are expensive to generate and maintain and because the most crucial order sets should be developed first, healthcare providers develop priorities when creating order sets (Galanter et al., 2014).

The Computerized Physician Order Entry (CPOE) program was integrated into the EHR system due to the complexity, volume increase in clinical options, and requirement to reduce the possibility of error in clinical operations. The CPOE program maintains extensive information and provides a facility for retrieval as well as uniform and accessible care protocols. With the help of the physician order input system, transcription errors are removed, protocols are followed, and an exact dose is calculated. Effective patient care is provided for those who need growth monitoring and preventive medical procedures. The order entry system in the majority of healthcare facilities includes algorithms for weight-based dosage and age-based variations of weight-based dosing. Information technology has consistently been seen as a crucial

element of the healthcare system in the identification of significant quality issues (Natalya & Adisasmito, 2019).

By minimizing the uncertainty of handwritten instructions and integrating support aids for clinical decisions, the CPOE system enables direct entry of medical records by the competent person as well as direct entry of orders into the system. The adoption of CPOE is being promoted more and more as a crucial response to the problem of medical mistake reduction, efficiency enhancement, and improvement of healthcare quality. The development of the electronic health record system, which can store and share information, was motivated by the increase in medical documentation and communication among healthcare professionals (Schor, 2016).

According to Elshayib and Pawola (2020), prescription errors can be considerably reduced by managing order entry data, which includes managing information on current drugs, patient diagnoses, allergies, and histories of drug interactions. The implementation of the Computerized Order System helps supply chain management and capacity planning by reducing errors and pointless waiting times. By reducing care differences, increased clinician adherence to recommended standards of care can enhance the quality of care delivered through the order entry system. However, the ineffective use of order entry systems might be hampered by healthcare personnel's lack of education and training. Other factors include interface designs' correctness and dependability, maintenance costs, a lack of leadership commitment, challenges in introducing new applications, and a lack of integration of the system with processes and information and communication systems that are already in place.

Decision Support

The development of Electronic Health Record systems (EHR) facilitated the use

of decision support tools which are considered as key components of the systems for clinical information, communication, and connectivity. Decision-support tools are fully integrated into the processes of care which enable healthcare providers and patients for accessibility of medical knowledge relevant to the care of patients. With the system, negative interactions between a drug already taken by the patient and an additional drug that might be prescribed. A database platform in the decision support tool stores and collects care information of patients coming from diverse sources. The monitor combines clinical rules, information, and triggering events available in the repository for the generation of reminders, alerts, and other vital messages for the care delivery. The care process is instituted, when all decision support and results are entered into the EHR system (Lewkowicz et al., 2020).

Decision support systems' application in health record systems focuses on the improvement of quality decisions made by physicians and managers. Decision support systems include clinical decision support systems used for making a diagnosis of diseases and prescribing medicine. Another decision support system is a knowledge management system used for managing financial resources and marketing analysis. The decision support system is the provision to patients and clinicians with computer-generated patient-related information and clinical knowledge in the enhancement of patient care, which are presented at appropriate times and intelligently filtered. The system is integrated with a data warehouse, which is decision oriented. The effective use of the decision support system reduces costs and is designed for the improvement of patient care in the healthcare industry. Almost all hospitals are equipped with electronic health record systems focusing on the reduction of waiting time for outpatients, increased hospital revenues, and reduction of patients' length of hospital stay. As a result, healthcare organizations are increasingly adopting health record

information systems, with the evolution of information technology (Chae et al., 2011).

Decision support in Electronic Health Record systems is discussed in the study of Rothman et al. (2012). The clinical decision support system and automation of processes are the highest functional level of the EHR system, enhancing patients' health and the healthcare system. In using patient data more effectively and efficiently using clinical decision support, healthcare delivery is improved, enhances anesthesia practice, and provides solutions to patient needs issues. The support system utilizes active and passive decision support in the modification of clinician behavior by means of specific action recommendations. Medication errors are reduced with the use of recommendations, which can result in savings through the avoidance of adverse drug events. The time to follow-up actions is reduced with the clinical decision support, with prediction proving useful in the forecast for patient outcomes, prompting treatment plan, and avoidance of costs, prior to engagement in decision making. Consequently, the Electronic Health Record system has numerous uses involving containment of cost, reduction of errors, and the improvement of compliance through the utilization of real-time data.

With the use of the Electronic Health Record system, clinical documentation's completeness and accuracy are improved, allowing for greater relevance in care data delivery. The decision support system increases adherence to clinical guidelines by clinicians. Clinical decision support for current anesthesia includes improved documentation, the timing of antibiotic administration, timely billing, vomiting prophylaxis, and postoperative nausea. Implementation of the Electronic Health Record system offers opportunities for data mining which improves clinical, operational, and financial processes. The utilization of Electronic Health Record data in real-time for providing support to decisions and process automation has the greatest

potential for cost reduction and improvement of the overall quality of patient care (Romano & Stafford, 2011).

Additionally, the positive effects of adding decision support for red blood cell transfusion into computerized physician order entry are evident, as the evaluation of the intervention's impact on the use of red blood cell resources revealed a reduction in the average number of red blood cell transfusions required for each patient. The cost of the transfusion dropped after the intervention. Before and after the protocol's implementation, there was no discernible difference in hospital length of stay or adjusted hospital mortality. Implementing an evidence-based decision support system can reduce the need for red blood cell transfusions in critically ill patients (McDonald & Abhyankar, 2011).

The decision support system, which gives patient recommendations, has been found to be a very durable and effective instrument for changing the behavior of clinicians. It saves time for clinicians. However, the design and deployment of decision support systems are difficult since they call for computing infrastructure, modifications to the current workflow, and machine-readable patient data. The adoption of support systems in healthcare organizations will grow depending on the ability to help staff members provide better patient care. The improvement of hospital performance, the standard of clinical care, patient safety, and the decline in the incidence of significant drug errors are all influenced by both Electronic Health Record systems and Decision Support Systems (Lin, 2012).

The study conducted by Patterson et al. (2019) provides valuable insights into the impact of Decision Support Systems (DSS) integrated into Electronic Health Records (EHRs) on clinician behavior and decision-making processes. Patterson et al. (2019) acknowledge that decision support systems can be helpful in certain clinical

scenarios. These systems are designed to provide evidence-based recommendations, reminders, and alerts to assist clinicians in making informed decisions at the point of care. In some cases, DSS can lead to positive changes in clinical practice and improve patient outcomes. However, the study also revealed that Decision Support Systems may not always result in significant behavior change among clinicians. Despite the presence of supportive recommendations, physicians may override or ignore them for various reasons. This suggests that the mere presence of decision support does not guarantee its acceptance and implementation in real-world clinical settings. One of the key reasons cited for clinicians bypassing decision support recommendations is the perception that using the system might be time-consuming and disruptive to their workflow. If clinicians believe that the extra steps required by the DSS slow down their workflow or hinder their efficiency, they may be less likely to rely on its guidance. Another crucial factor influencing clinicians' response to decision support is the alignment of the system's recommendations with their own clinical judgment and expertise. If clinicians perceive the DSS suggestions as contradicting their professional judgment or patient-specific factors, they might choose to disregard the recommendations.

Electronic Communication and Connectivity

Since the Electronic Health Record (EHR) system is a secure, flexible, and dependable architecture that supports highly distributed and independently managed clinical information and communications technology systems and applications, the application of electronic communication and networking greatly increases the capacity for information gathering, processing, and exchange among healthcare system stakeholders. The move to home-based clinician-guided self-care is brought about by the communication and connectivity system, which empowers patients to assume more control and active work in making decisions and implementing their own health

care. The electronic application spearheaded the change by giving patients unparalleled access to information and enabling ongoing contact and conversation between patients and their healthcare professionals. Because to coordinate the care of patients with numerous chronic illnesses, electronic health records are utilized to transmit patient data among doctors (Lindberg et al., 2013).

For patients with various chronic illnesses to receive adequate medical care, clinicians must communicate with one another about their patients. Electronic Health Record systems (EHR) are thought to be the best way to increase the quality of care since they prevent improper care coordination, a factor in bad care. The EHR is a significant step in encouraging care coordination because of its function of electronic communication and connectivity. The patient data can be updated and exchanged continually by physicians using the record system, and the data can be logically presented in clinical groupings. The EHR system can be used to store data, manage results, manage order input, as decision and patient support, and sustain connectedness and communication between healthcare professionals and patients (Chiara, 2018).

According to Hovenga & Grain (2022), the applications of system connectivity and interoperability are vital components of the electronic health record system, which allows effective and efficient communication among system users. The electronic system allows talking with patients in cyberspace securely, and streamlines care providers' workflow, thus, providing interoperability. The network technologies integrated with the EHR system provide fast data transfers, with data, voice, and image communication. Moreover, the system contains information on personal health which provides support for continuing quality health care of patients.

Silow et al. (2012) also stated that Electronic Health Record systems facilitate the

exchange of electronic information in the system that co-exists with other healthcare systems, such as pharmacy systems and laboratory systems. Hence, the electronic system is required to receive information about the patient as a clinical document utilizing standard clinical care information, designed to promote interoperability between systems. Notably, the EHR systems mitigate major challenges in healthcare organizations, involving improvement of communication and connectivity among care providers and the control of medical care costs. The EHR system improves the coordination of care while increasing the participation of the patient, resulting in improved patient care. The system achieves a better flow of communication brought about by the integration and interconnectivity of electronic records systems.

Tsai et al. (2020) discovered that while EHR systems offer beneficial features such as instant messaging and improved communication capabilities, certain obstacles hindered the seamless exchange of medical information among healthcare teams. One major challenge highlighted in their research was the prevalence of technical glitches and system downtime, which were frequently encountered during the utilization of EHR-based communication channels. These interruptions disrupted real-time communication and impeded the smooth flow of critical information, potentially impacting patient care and decision-making processes. Moreover, the study shed light on concerns expressed by healthcare providers regarding the security and privacy of patient information transmitted through EHR communication channels. Worries about potential data breaches and unauthorized access to sensitive medical data led to hesitancy among some healthcare professionals to fully embrace EHR-based communication methods, despite their potential advantages. So, enhancing system reliability, minimizing technical disruptions, and reinforcing data security measures are crucial steps towards optimizing the use of EHR-based communication tools. By

tackling these challenges, healthcare organizations can harness the full potential of EHR systems to facilitate efficient and secure communication, thereby promoting better collaboration among healthcare teams and ultimately enhancing the quality of patient care.

Patient Support

According to Hasman and Mantas (2013), a patient support system in the Electronic Health Record system integrates clinical applications for providing patient support and functions in the provision of patient health data and information, which are managed effectively and efficiently to provide high-quality patient care. The system organizes patients' record keeping and medical information to provide timely access to clinical information and reduce redundancy to improve the quality of healthcare service delivery. Medical errors and drug adverse effects on patients are eliminated in the use of the EHR system, with the availability of medical information and decision support systems at the point of healthcare service delivery. Patient information can be shared among users, through a secured Electronic Health Record system. The system facilitates information integration, communication, and patient care coordination among healthcare providers. Patients are engaged in the treatment process by allowing them to receive materials using the EHR system and entering data themselves through home monitoring devices and online questionnaires. The system has a digital-based reminder system for the patient and the clinician which increases compliance with preventive service protocols.

The EHR system integrates the function of recording and providing the patient's clinical health information and treatment and clinical encounter information. The electronic system provides support through the collection and display of the medication of the patient, indication of patient allergies, collection of the results of laboratory tests,

and other clinical data. Decision support is provided in which the system requires the highlighting of abnormal test results, providing alerts on abnormal vital signs, and if an allergic drug has been prescribed. The record system provides security and confidentiality of patient data. Through its control functions, access to the health data of the patient is limited to selected persons, based on documented and defined roles, and the defined standard practices (Victoroff, 2014).

Electronic Health Record (EHR) system is used by healthcare providers in accessing accurate and complete patient information in providing support to patients for better medical care. Patients are provided with an improved diagnosis of diseases and outcomes with the use of the electronic system, thereby, reducing and preventing medical errors. EHR makes patient records readily available at the point of care, allowing the care provider to deliver high-quality patient care. Overall clinical benefits are obtained from the practice, as care providers have reliable access to complete health information of the patient. The patient support provided by the EHR system improves the safety of the patient, reduces medical errors, and supports better outcomes for the health of the patient. Patients' records on allergies and medications are kept in the system, which automatically checks on problems with new prescriptions, alerting the clinician to potential conflicts. The system sends alerts on patients' life-threatening allergies aimed at making appropriate adjustments. With the occurrence of potential safety problems, the system exposes care providers, thus, avoiding serious consequences and achieving better patient outcomes. EHRs systematically and quickly identify and make corrections to problems in service operations, which is not possible in a paper-based setting (Kern et al., 2014).

Administrative Processes

Seymour et al. (2012) stated that Electronic Health Record systems perform

administrative processes needed by physicians and hospitals, in which the system becomes a central database of information driving patient documentation, clinical support, and quality and billing support. Administrative processes for patient documentation allow the EHR system to document the complete encounter between the patient and the doctor, which is easy and fast. The documentation process stores data on patient history, notes of the physicians, orders, laboratory results, pharmacy prescriptions, reports from radiography and x-rays, and other medical interventions. The system contains all levels of administrative applications, involving patient registration which records patient demographics and assigns the patient with an ID number used by the health provider.

The administrative process application enables the health providers to track the information for compliance with government regulations and insurance companies. To identify appropriateness of the physicians' ordering tests for the condition of the patient, the information can be tracked, allowing care providers to report to the government, quality data. Administrative processes for the tracking of patient statistics and utilization are available in the EHR system. Information includes the number of tests, care days, service availability, and number of patient visits. The EHR system streamlines the administrative processes and supplies real time and accurate data, improving efficiencies of the use of the EHR system (Setia et al., 2020).

The study of Shortlife and Chiang (2021) cites the administrative application of Electronic Health Records (EHR) in the healthcare system, specifically in the aspects of scheduling of hospital admissions, procedures in outpatient and in-patient, and patient visits, resulting in improvements of efficiency of healthcare service delivery and offering a better timely service to patients. The patient information stored in the EHR system provides accurate and speedy validation of the patient's insurance eligibility,

which adds value to the patient and the service provider through the use of the EHR system. The automated system is used to improve access to healthcare services, reduce paperwork, and provide more timely payments, eliminating the reliance on the data from the billing system in understanding resource utilization and practice patterns. Using the Electronic Health Record system, the medical query system provides valuable information on associations of types of disease, utilization of resources, and severity of diseases. The query system in the EHR is an essential tool for administrative processes and tasks in the formulation of informed decisions, specifically, in the increasing costs of healthcare.

Administrative application of the EHR system eliminated delays in treatments, in which patients are able to schedule their own appointments, thus, allowing the staff to check on the eligibility of the insurance. The system facilitates and simplifies the administrative processes of appointment scheduling and insurance verification. The system improves efficiency in the delivery of healthcare services, the safety of the patient, increased accessibility to healthcare services and reduces medical expenditures' costs. The study found the usefulness of the administrative application of the EHR system as well as the clinical functions of access to knowledge resources, integrated communication, clinical decision support, and integrated view of data and information of the patient (Whiteside, 2014).

Reporting and Population Health Management

Healthcare institutions require reporting requirements at different levels for quality of care and patient safety, which is facilitated by the EHR system. The Electronic Health Record extracts patient charts for data required in reporting, to reduce errors. The EHR can establish standardized data formats and terminology for the requirements of the private and the public sector. The system provides data on

statistics concerning the number of patients treated annually, and the status of diabetic patients, through the searchable database. Clinical information and data in the EHR are represented in standardized format in readable form, reducing the burden of collecting data at different reporting levels (Fife & Eckert, 2014).

With the integration of the reporting and population health management application, data reporting completeness and accuracy are increased, while reducing the cost of data collection and organization. The electronic system is used for varied applications in many aspects of the healthcare system. The need to achieve efficiency, patient safety, improved service delivery, reduce costs of medical expenditures, and increased access to healthcare services are the main drivers of the increasing use of the EHR for reporting in the healthcare system. The system integrates the capability of the provision of provider and facility-level usage and the reporting of activities. The system can be customized to run more complicated reports for the management of the health of the patients (Peifer et al., 2017).

According to Waithera et al. (2017), the essential function of an Electronic Health Record system is the provision of health information and reporting with the aim of improving the reporting and utilization of health information. To support the function, the Electronic Health Record system is provided with the capability to generate reports for quality improvement from the clinical data, thus, the generation of the aggregate reports which are submitted to government health ministries and other organizations. The system has the capability to comply with the requirements reporting and population health management at the local and national levels to maintain quality patient care and patient safety. Routine reporting done by the system for vital health quality achieves internal quality improvement in the healthcare systems while eliminating errors in the extraction of health information and data.

Quality of Nursing Care

The implementation of electronic-based nursing care to achieve a quality of nursing care is examined in the study of Saraswasta & Hariyati (2019). Implementation of the electronic medical record resulted in reduced documentation work, thus, increasing the time of nurses in the interaction with patients, and resulting in improvement in the quality of nursing care. Service quality of nurses was found to improve with the electronic nursing care documentation. Service quality improvements were in the aspects of efficiency, effectiveness, focus on patient, equality, time discipline, and confidentiality. In the improvement of the quality of care to patients, utilization of the Electronic Health Record system requires continuous development, specifically in the digital era of health workers. Quality of nursing care focuses on efficiency, effectiveness, time discipline, equality, and confidentiality and security. Achievement of efficiency in quality of nursing care in the use of EHR reduces patient care costs as accurate data is completed quickly to speed up decision making. Data in the record system can be accessed for a long time. The system allows nurses to focus on patients, thus, achieving high quality of nursing care. Nurses can provide holistic care according to the needs of patients, with nurses provided with the ability to interact with patients and their families. In maintaining a trusting relationship between healthcare providers and patients, communication is essential and transparency in services prevents the rise of negative prejudices, allowing nurses to focus more on computers. Thus, with the use of the EHR, nurses' professionalism increased as they provided care services. Confidentiality and security which can endanger the patient can be overcome with the use of the electronic system.

Electronic-based nursing care documentation for the improvement of quality of care was examined by Biron et al. (2017). Nursing experience and the capability of nurses to operate the technology-based record system influence the ease of the use

of the electronic health record. Consideration in the usability of the information system requirements can result in the effective and efficient use of the record system, which can lead to improved quality of nursing care. Also, resulting in increased work satisfaction of nurses, affecting their quality of care to patients is the ease of the use of the Electronic Health Record. Implementation of the system influences the time to interact and intervene with patients and their families. Improvement in the education of nurses improves their use of the EHR, resulting in improved patient health outcomes. The quality of nursing care from the use of EHR, covers the aspects of effectiveness, efficiency, focus on patient, timeliness, confidentiality and security, and equality.

The use of Electronic Health Records is designed to improve the quality of nursing care and patient outcomes (Yanamadala et al., 2016). Utilizing the Electronic Health Record system, patients obtained the lowest rates of mortality and readmissions. The use of the system has the potential of decreasing medical errors through the provision of improved access to vital information, integration of care with different providers, better communication, and more efficient monitoring and documentation. Prescribing errors are decreased through real time clinical decision support. The system allows nurses to monitor and track patient outcomes, which provide critical information for the improvement of safety outcomes of patients. The study provides evidence of the relationship of the EHR system implementation, and the improved quality of nursing care delivered in the inpatient setting.

Use of EHR and Quality of Nursing Care

The study of Walker-Czyz (2014) investigated the impact of the use of electronic health records on the quality of nursing care. Computerized technology is used to capture and retrieve healthcare information in healthcare institutions, providing nursing interventions, medical records, and capturing patient's responses to healthcare

provision. Rapid increase in the use of Electronic Health Record has been recorded aimed at providing effective, safe, timely, patient centered, equitable, and efficient nursing care. Adoption of the computerized health record system must ensure that the overall objectives of safe and efficient patient care are achieved. As diffusion of innovations is secured, computerized documentation has the potential for the enhancement of safety and quality of care delivery. Electronic Health Record provides support in the performance of quality improvement initiatives, thus, has the capability to transform quality improvement processes in healthcare institutions. Findings of the study revealed that the use of integrated Electronic Health Record tools in the practice of nursing have impacts on the quality outcomes of costs, hospital conditions, nursing care, and nurse turnover. With diffusion of innovations, the adoption of Electronic Health Record positively impacts on quality and cost, followed by improved state of implementation. The study provides an evidenced-based model for supporting organizations' innovation on Electronic Health Record adoption. Utilizing servant leadership principles, integrated EHR implementation, supports quality of nursing care delivery, and improves the healthcare institutions' overall performance through the enhancement of nurses' decision-making initiatives.

Tominanto et al. (2019) stated that the use of Electronic Health Records results in improvement of patient care. The system collects and stores information of patients which provide insights essential in treatment. The EHR system provides better patient care delivery that achieves higher rates of patient satisfaction and fewer errors in medication, which when managed efficiently, is lifesaving. Data shared in the electronic system allow healthcare providers in choosing the right patient medication, or in the provision of history if the patient is unresponsive. In cases of specific medications and current medications, the system allows clinicians to look at the patient data more

meaningfully. With an EHR system, the ability of clinicians to get information becomes broader and easier. With the use of the electronic health record, care providers make sure that care is coordinated, achieve better outcomes, and increase the quality of care, which are the goals of patient care, facilitated using the EHR system. Measurable successes have been seen with the EHR implementation, use, and ongoing adaptations, which have resulted in fewer days spent in the hospital, an increase in timely discharges of patients, and higher telemetry capacity. The system has been found to allow clinicians to collect and analyze patient information and data in advance, making the patient get the treatment without telling the patient's history of treatment. The EHR system also contains the patient portal, which is an extension of the patient's health records and can be shared with the patient and anyone on the care team.

Lee and Clarke (2015) emphasized that the adoption of Electronic Health Records is a government priority in healthcare institutions that are aimed at effectively addressing healthcare services and are expected to have a significant impact on the quality of care. This system provides great savings to the healthcare system in any country and highlights the vital component of computerized order entry which reduces the incidence of medication errors. It also significantly contributes to better performance of the medical and healthcare system, which essentially results in lower mortality, improved quality care and outcomes, and reduced complication rates.

The effect of Electronic Health Records on the improvement of quality of care was investigated in the study of Willis (2013), claiming the positive effect of EHR on patient care and the work lives of clinicians. With the increase in medical knowledge, treatment options, and chronic conditions, physicians and healthcare providers need tools for information access, good sources of information, and access to multidisciplinary teams of specialists and professionals, which are facilitated by the

implementation and use of electronic health records. The technology was found to provide information in formats that are not possible with the paper system. Improved quality outcomes and measures were made possible as EHR enhances the attainment of the management of chronic diseases, screening targets, and prevention. When screening and prevention maneuvers are due, EHR provides treatment alerts and goals. The best approach to certain conditions in clinical practice was identified by the EHR system, providing the resources and information that point to care providers. Costs and duplication were eliminated with improved accessibility of laboratory data. With EHR intervention in the hospital, disease outcomes were improved, providing effective assessments for drug interactions, which better inform care providers and their patients. Findings revealed that the use of EHR improved patient care and quality of care. With increased knowledge of the meaningful use of electronic health records, improved care can be provided to the critical mass of EHR users.

Relationship Between Quality of Nursing Care and Demographic Profile

Variables like age, sex, length of service, pre-exposure to other EHR systems, computer literacy, and training and its relationship with the quality of nursing care were also illustrated below.

Age and Quality of Nursing Care

Differences in quality of care of younger and older nurses were examined in the study of Letvak et al. (2013). The study on age cohort differences provides basis in understanding health related productivity and the staff's potential quality of care. Having implications for the nursing profession, is an aging nursing workforce, considering that health problems have been found to increase as people age. As people age, weight gains occur, and being overweight contributes to chronic illness. Older workers were found to require more recovery time after work, considering

variability in people's age-related changes. Aging can pose safety risks in the average and younger employees in the healthcare environments, with older shifts workers can also have more pronounced health problems than the younger shift workers. Thus, both health and age have impact on the quality of nursing care and productivity of nurses. Managers strive in the provision of working conditions conducive to patient and nurse safety, nurses need awareness of their health problems due to aging, which can have impact on the provision of care.

A study conducted by Yontz et al. (2015) stated that although age is a major contributor to the attitudes of nurses toward acceptance and the use of technology and information systems in the job context, the utilization or acceptance of computerization may not be affected by age. Still, it is true that most younger nurses have more familiarity with computers and technology than older groups and consequently, are more accepting of EHR and have more positive attitudes toward computerization. Hence, younger nurses must also understand lifestyle choices of today which can have an impact on future health and nursing practice. There is a need for nurse managers to determine the assigning of difficult jobs and complex patients to older nurses because of their experience. The study suggests the distribution of work assignments to older nurses, specifically those with health problems, that require critical thinking skills and assessment rather than physical abilities and strength.

The aging nurse in the current nursing workforce was discussed in the study by Keller and Burns (2010). With aging nurses, leaders need to develop strategies to improve nurses' availability and maintain the current levels of employment. One strategy for maintaining current employment levels is the retention of older nurses at the bedside. The study provided an understanding of the effects of aging on the human body, the advantages and disadvantages of employing aging nurses, and methods in

the adaptation to the work environment to the needs of the aging nurses, policies addressing the needs of aging nurses, and implications in the nursing practice. Society strives for the promotion of a positive view of normal aging; however, aging is coupled with varying degrees of illness and disability, contributing to risk factors for occupational injury. In aging, a person's ability to learn new tasks remains, however, the performance of high-speed tasks declines. Older workers are the most productive and skilled employees, yet they are the most vulnerable. They tend to suffer from chronic diseases and the presence of conditions favoring unequal treatment and age discrimination in the workplace. Older nurses offer a wealth of skills and experiences benefitting the employer organization. Employers need to consider the needs of older nurses to continuously work safely until retirement. Through the offering of alternative work shift options, employers can adopt strategies for the retention of older nurses at patients' bedside for caring.

Sex and Quality of Nursing Care

The study of Hathway et al. (2020) claims that women are more likely to achieve positions in senior management in the nursing profession and progression can be associated with work satisfaction. The progression of men in the nursing workplace is expected to be taken for granted, thus, perceptions of nursing careers have interesting results relative to ethnicity. A result of poor workforce planning are under-resourced services and staff shortages, leading to the feeling of nurses being underpaid and overworked. The profession is faced with the fact that the workforce is overwhelmingly made up of women. The profession suffers from historical construction in which people, usually women, enter the field as a calling, having consequences for modern nursing. Nursing staff demonstrates huge amounts of goodwill by working in difficult contexts and working beyond paid hours. The nursing profession is predominated largely by women, thus, the need for women to occupy a greater number of senior roles. Several

health organizations show that women are under-represented in leadership positions across medical professions, more widely. Vertical sex segregation indicates that even when nursing institutions are dominated by women, men are benefiting from the organizational logic providing privileges for masculine characteristics such as leadership, assertiveness, and rational thought, giving men access to high-level positions and higher salaries. Highly specialized work contexts exacerbate the fact, involving mental health nursing, which is attractive to men, altering gendered constructions in nursing as men can find opportunities for higher pay while occupying clinical roles.

Sex equity in the health workforce is discussed in the study of Bonilo et al. (2019). The study claims that many of the workers in the health sector are women, indicating women's representation in highly paid health occupations has increased steadily over the years. Women were found to be less likely to be in full-time employment than men, with a gender-sex pay gap of 28% in the health workforce. The study of Finnegan (2019) claims that there is a lack of men in nursing and is a worldwide phenomenon, with men representing less than 10% of the global nursing workforce. Males and females possess unique abilities and skills which can contribute to the profession's advancement. Diversification of the nursing workforce can help avoid future crises in the profession, which can include the attraction of more males in the profession. However, it is believed that the shortage can be alleviated with more males entering the profession. Solving the workforce problem in nursing can help advance nursing as a profession with equal power in the future design of healthcare systems. Men can provide new solutions to future problems, thus creating a more reflective population being served by nursing. As a greater percentage of the population are men, male nurses can express health concerns to other men which can be difficult to share with

women. As a result, nursing is not moving toward gender balance, thus, stereotyping and gender bias in nursing are harmful leading to early career abandonment.

Length of service (Years of Experience) and Quality of Nursing Care

Kummer et al. (2013) stated positive job experiences from the number of years of service rendered in the healthcare organization are linked to positive attitudes toward EHR implementation and use and thus, achieving high-quality nursing care. Notably, nursing experiences derived from long years of service positively influence the use of technology in the workplace.

With long years of service, nurses gain more experience in technology use, thus, develop favorable attitudes toward EHR implementation that contribute to the enhancement of the quality of nursing care. Hence, it was suggested that to identify gaps in technology knowledge and skills, monitoring of trainees' progression through the use of EHR is essential (De Veer & Francke, 2010).

Pre-exposure to EHR and Quality of Nursing Care

The study of Habboush et al. (2018) claims that due to rapidity of EHR implementation, most hospital and healthcare providers were not able to leverage the full potential of the EHR for enhancing technology learning. Sufficient exposure during training is vital. When properly planned and executed, the use of the EHR system can be effective. Pre-exposure to the use of Electronic Health Record is important to achieve optimal use of EHR in the provision of quality care. In the EHR environment, pre-exposure, continuous learning, and reinforcement learning of technology is a desirable behavior. EHR related tools are used which contribute to strengthening learning habits of the automated system. To expose trainees to population-based approaches, data from the EHR can be extracted for practice-based technology learning and improvement. This allows tracking of desired clinical measures to provide

support to patient management. Pre-exposure to EHR can be enhanced through practice based learning activities, providing a good support for the continuous lifelong learning experience for EHR use.

The study of McCrorie et al. (2019) claims that medical staff with prior exposure to EHR utilization are efficient in performing little tasks, using the electronic health record system, however, were anxious into integrating the use of EHR into their health work practices. A strategy is needed in preparing the users of EHR for the use of the system, which has several components, involving awareness of the technology, pre-exposure to EHR, understanding of the EHR benefits to clinical jobs, technology training, interactive demonstrations, and e-learning materials. Knowledge and exposure to EHR is essential for the use of the automated records system, which is expected to improve the efficiency of information transfer and other clinical processes and transactions, optimizing opportunities in producing robust evidence in a high level of quality care.

Computer Literacy and Quality of Nursing Care

In the study of Tafazoli et al. (2017), the utilization of technology in healthcare services has been found to improve the decision-making skills and competencies of nurses and thus, increase the quality of nursing care. Information derived from computer-based systems aids professionals in the healthcare environment. Computer literacy is the ability of a person to use and control the computer and its applications in the achievement of certain goals. An important prerequisite for nurses is the ability to use computers, as information in clinical practice is acquired through the computer. The study proves the importance of acquiring adequate computer skills to achieve effectiveness in work performance and improve the quality of nursing care. The findings of the study revealed a positive correlation between computer literacy with

high quality of nursing care delivery. Nurses were found to have adequate computer skills resulting in the effective and efficient use of computers in quality healthcare delivery.

The study of Darvish et al. (2014) mentioned that nursing informatics is important in the promotion of quality health care, thus, the need to acquire appropriate technology education. In nursing care in health systems, technology is vital, as it is essential in all aspects of the nursing profession. Nurses need to receive the necessary information technology training for all nursing categories, which is found important to empower nurses for the provision of high-quality health care. Associated with the collection of patient information are decision support systems, clinical nursing information systems, and medical diagnostic systems. Quality of care improves with literacy in hospital information systems and health care systems. The study provides evidence of the importance of computer literacy as a prerequisite for the improvement of quality patient care. The use of technology in nursing care increases patient safety. Information is the source of all activities, and nursing management outcome derives from information technology. Implementation of information systems provides better access to evidence that affects the quality of patient care, supporting evidence-based nursing, thus, the need for acquiring knowledge and skills in computers. The quality of nursing care is enhanced with the increasing information and communication technology applications. Utilizing technology creates a positive attitude in the productivity of nurses, hence, the need for nurses' involvement in the initial systems' design for the improvement of the quality of nursing and health care.

Computer literacy levels of healthcare staff were investigated in the study by Kuek and Hakkenes (2019). An Electronic Health Record is to be implemented, thus, the need to assess the levels of digital literacy among health workers. Computer literacy

is the ability to make use of technologies aimed at participating and contributing to the performance of tasks. Healthcare workers must be able to effectively use the EHR system, which has been identified to provide patient safety and improve the quality of care. Findings show high digital literacy levels of staff, who expressed confidence in the use of technology. Health services need to provide targeted training and education to address the certain low levels of literacy and confidence in the use of information systems prior to the electronic health record system's implementation. Computer literacy and digital information have the ability to transform the sustainability and quality of patient and health care. The study shows a positive impact of information technology on the accessibility of care, care processes, preventive care, effectiveness and efficiency of care, and patient satisfaction. A certain portion of the workforce with less confidence in the use of information and communication technology, which can be barriers to EHR adoption. Health services must actively address the negative factors of EHR implementation, through the provision of more intensive training to increase computer and digital literacy, thereby increasing health workers' attitudes towards technology use and increasing technology engagement to provide safe and high-quality patient and health care.

Synthesis

Prior literature and studies illustrate how the use of an Electronic Health Record (EHR) system is designed to improve the healthcare system of the hospital (Ryu & Kim, 2018). EHR was defined to have a lot of advantages such as efficiency, improve access to medical information in the nursing care setting, enhances productivity, speeds up decision-making, improves data accuracy and completeness and boosts revenue, lowers mortality rate, lowers cost of patient care, drastically reduces and eliminates malpractice claims, lowers costs for both the patient and the healthcare

practitioner etc., which effectively shown to provide patient safety and improve the quality of care (Chae et al., 2021; Elshayib & Pawola, 2020; Fife & Eckert, 2017; Goodman et al., 2012; Habboush et al., 2018; HabibiKoolaee et al., 2015; HabibiKoolaee et al., 2015; Saraswasta & Hariyati, 2018).

However, despite its advantages, some nurses experienced the complexity of the software and the absence of uniform standards (HabibiKoolaee et al., 2015). It is evident that the lack of computer literacy, lack of experience, lack of workforce of male and lack of support from administrative management, all prevent the proper adoption of the EHR system (Kummer et al. 2013; Finnegan, 2019; Habboush et al. 2018; Darvish et al. 2014). Notably, social hurdles like language barriers exist because the EHR system is only available in English (EW & Grove, 2016). Thus, as most earlier studies have concentrated on the advantages of EHR for both patients and healthcare professionals. Only a few research have looked at how using an EHR affects the patient's quality of care even when the difficulties nurses have used the system at work constitute significant obstacles to the introduction of the EHR.

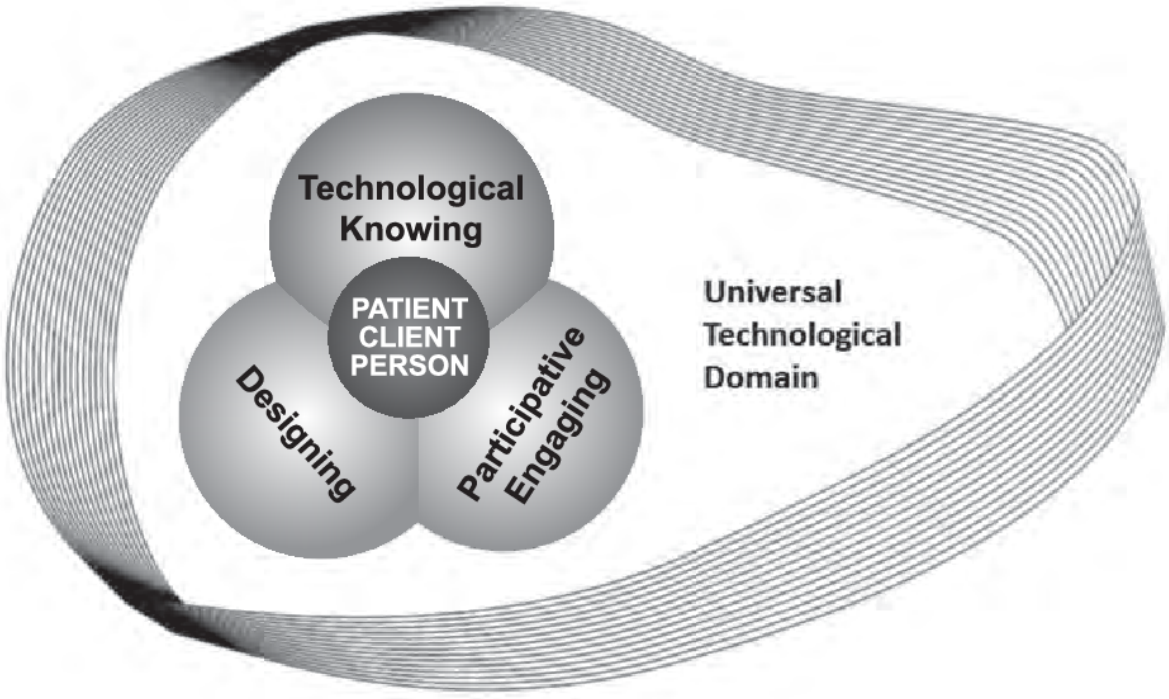
Lee and Clarke (2015) emphasized that the adoption of Electronic Health Records is a government priority in healthcare institutions that are aimed at effectively addressing healthcare services and are expected to have a significant impact on the quality of care. Thus, Tominanto et al. (2019) stated that the use of Electronic Health Records results in the improvement of patient care. The system collects and stores information about patients which provides insights essential to treatment. Silow et al. (2012) also stated the EHR system improves the coordination of care while increasing the participation of the patient, resulting in improved patient care. The system achieves a better flow of communication brought about by the integration and interconnectivity of electronic records systems. Hence, the present study was essential to conduct which

determined the relationship of the use of electronic health record (EHR) on the quality of nursing care among nurses in military hospitals in KSA.

The collected literature and studies were also outlined based on the perceived usefulness of EHR, which focused on the aspects of results management, order entry management, decision support, electronic communication and connectivity, patient support, administrative processes, and reporting and population health management. Likewise, it determined the level of quality of nursing care in the military hospital in KSA, resulting from the perceived usefulness of electronic health records in the dimensions of effectiveness, efficiency, focus on patients, accessibility, relatedness, and competence. Variables like age, sex, length of service, pre-exposure to other EHR systems, and computer literacy were investigated as well on its relationship with the quality of nursing care at the military hospital in KSA.

Theoretical Framework

Figure 1. Theory of Technological Competency as Caring in Nursing and the Process of Knowing Person within the Universal Technological Domain (Locsin & Purnell, 2015).



The study adopted the Advanced Technological Competency as Caring in Nursing by Locsin and Purnell (2015), which originally were developed by Locsin and Barnard (2007). The Technological Competence in Caring Nursing (TCCN) Theory can play a significant role in the successful integration of Electronic Health Records (EHR) and its impact on the quality of nursing care. TCCN focuses on enhancing nursing practice by developing and nurturing nurses' proficiency in using technology effectively while providing compassionate care.

The model shows technological competency as caring in nursing as the harmonious coexistence between caring in nursing and technologies, in which the harmonization of the concepts put the nursing practice in modern healthcare context. Bringing the patient closer to the nurse is technology, and when used to continuously know persons, the nursing process is lived. Technological Competence in Caring Nursing (TCCN) can serve as a valuable theoretical framework to explore how technology enhances the nursing profession, promoting competent and compassionate care through the integration and skillful use of technological tools and innovations. TCCN can encompass various aspects, such as the adoption of electronic health records, telemedicine, wearable devices, and AI-driven healthcare solutions, ultimately empowering nurses to provide more efficient and patient-centered care in the modern healthcare landscape.

In the context of EHR and nursing care quality, TCCN can guide the implementation process to ensure that nurses receive appropriate training and support in utilizing EHR systems. The theory emphasizes the importance of technological competence, enabling nurses to navigate EHR interfaces efficiently, input accurate patient data, and retrieve relevant information for making well-informed clinical decisions. TCCN also addresses the humanistic aspect of nursing care, promoting a

patient-centered approach while incorporating technology. Nurses can leverage EHRs to access comprehensive patient information, leading to more personalized care plans and improved patient outcomes. The theory highlights the significance of maintaining a balance between technology-driven efficiency and maintaining empathetic, compassionate interactions with patients. Additionally, TCCN advocates for the integration of EHR into interprofessional collaboration, emphasizing communication and teamwork among healthcare professionals. Through EHRs, nurses can easily share critical patient data with other members of the care team, leading to better coordination and continuity of care. In summary, the Technological Competence in Caring Nursing theory supports the successful integration of EHR into nursing practice, fostering both technological proficiency and compassionate patient care, which, in turn, can positively impact the overall quality of nursing care.

As depicted in the model, the framework for nursing practice was based on the theoretical view of technological competency, showing the process of technological knowledge involving knowing people through technologies of nursing and health, significantly used for fully knowing the persons as complete and whole. As a process of nursing practice, its use depends upon the theoretical ground in technological competency as nursing care.

The framework presents the continuous process of knowing the person, in which the nursing practice is guided by assumptions involving the multiple patterns of knowing, thus, caring is expressed in multiple ways, with caring considered as the substantive focus of nursing toward the other person. The model assumes that people are caring, seeking to know the person in many ways, viewed as integral to the nursing practice. The wholeness is a perspective allowing the recognition of human beings as persons who are complete in their beings, allowing the nurse to concentrate on the

nursing practice as a shared lived experience between the patient and the nurse.

In the continuous process, the nurse and the patient appreciate, support, celebrate, affirm each other, providing each other the mutual knowing being care participants. The patients and nurses become mutually engaged in nursing care planning and implementation. The use of technologies in nursing care are care aspects allowing nurses to know human beings as persons who are participants in the system of care. Technological competence is achieved as caring in nursing when nurses gain expertise in technologies in the nursing practice settings. Nurses are enabled to advance to the world of technology, are able to appreciate humanity, and come up with new discoveries, through acquiring technological competency as caring in nursing.

TCCN underscores the significance of knowing patients as whole individuals, fostering a continuous process of affirmation, celebration, and support between nurses and patients. Technological knowing, a fundamental aspect of TCCN, involves the competent use of technologies to understand patients comprehensively, acknowledging their hopes, dreams, and aspirations. Integrating this theory into nursing practice can lead to a coordinated interaction between technology and caring in the healthcare environment, promoting high-quality nursing and healthcare.

One practical application of Locsin's theory is its potential impact on the development of Electronic Nursing Record Systems (ENRS), part of the health information system. A theory based ENRS could focus on the human dimensions of nursing practice, not just physical needs and medical conditions. By providing patient information to multiple healthcare providers, ENRS facilitates better-coordinated care, ultimately leading to improved healthcare service quality. Nurses respond to calls for nursing through the provision of unique human services served by human technological creations, relative to the maintenance of the influence of technological

competency as caring from nursing in the nursing environment of the high-technology world. Nursing as a professional practice and discipline is considered as nursing as caring, which is integral to healthcare practice, facilitating wellness and human health. The nursing practice of technological knowledge will fully know the person as a whole.

The theory is related to the present study because the nursing framework provides nurses with the varied meaning of being human and gaining deep knowledge of the influence of technological competency as caring in nursing, with the human existence reality in the world of technological advancements. To know people, nurses need to have new lenses in viewing the contemporary world, aimed at preserving humanity in the future. Technological competency as caring in nursing allows nurses to advance to the world of technology in the form of new discoveries and a greater appreciation of humanity.

At the core of TCCN is the idea that nurses must understand and connect with patients as whole individuals, going beyond their medical conditions. This understanding is fostered through a continuous process of affirmation, celebration, and mutual support between nurses and patients. By emphasizing the importance of knowing people in their entirety, TCCN encourages nurses to develop empathetic and compassionate relationships with patients, which are crucial for providing holistic care.

In the contemporary healthcare landscape, technology plays an increasingly significant role in nursing practice. TCCN recognizes the necessity of technological competence in nursing, referring to the proficient use of various technologies to deliver effective care. This includes electronic health records, telemedicine, wearable devices, and other healthcare innovations.

Technological knowing, a core component of TCCN, involves using technology

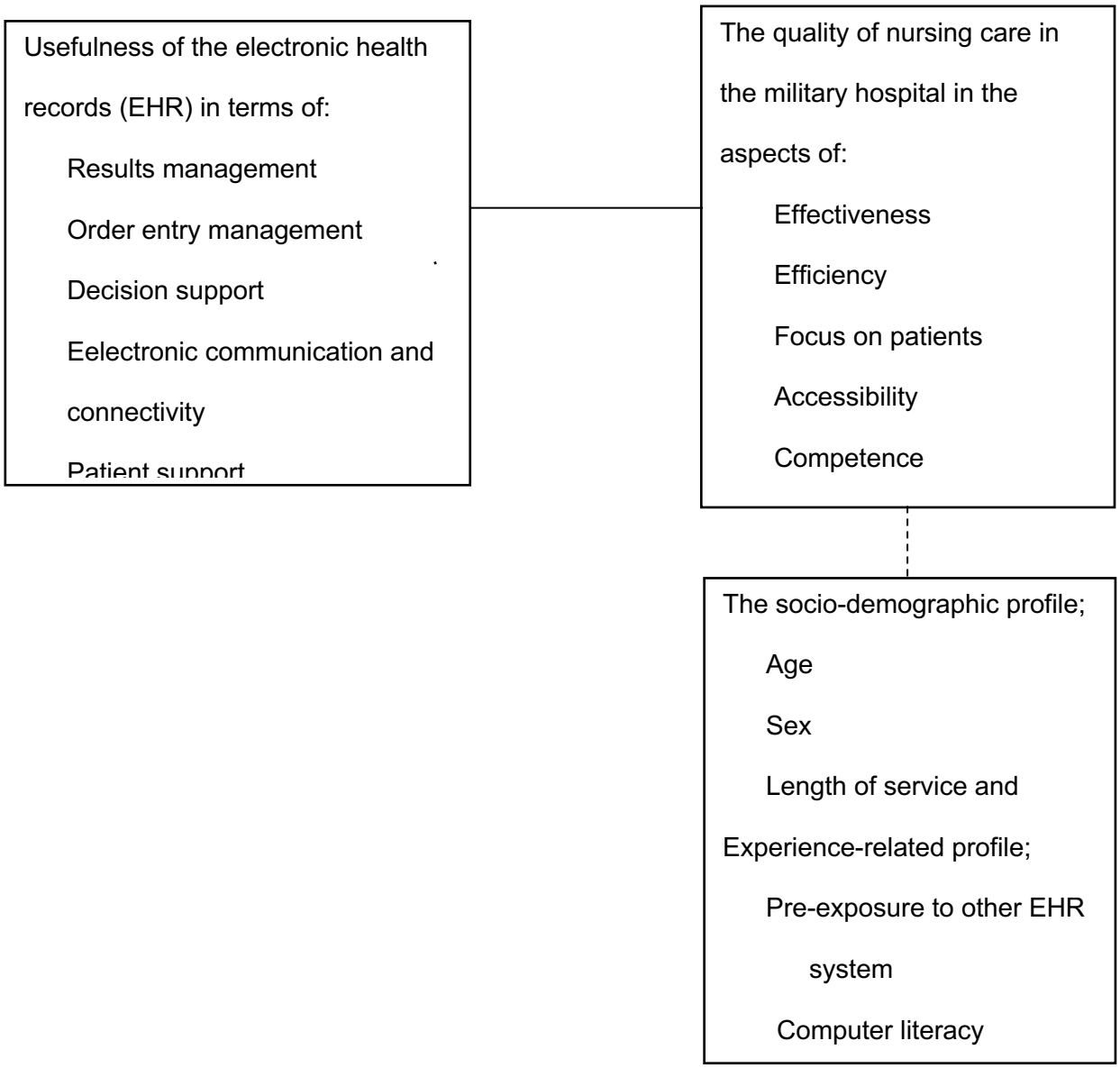
as a tool to gain a comprehensive understanding of patients. By skillfully utilizing technology, nurses can gather and analyze patient data efficiently, leading to more informed clinical decision-making. Additionally, technology facilitates seamless communication and collaboration among healthcare teams, resulting in better-coordinated care and improved patient outcomes. Furthermore, the integration of Locsin's Theory into nursing practice can create a balanced approach to using technology and caring for patients. Nurses can leverage technology to enhance their caregiving abilities, without losing sight of the humanistic aspect of nursing. The theory advocates for recognizing patients not just as individuals with medical needs but as whole persons with unique aspirations, hopes, and dreams.

Practically applying TCCN, especially in the context of Electronic Nursing Record Systems (ENRS), can revolutionize the way patient information is managed. A theory based ENRS would focus on capturing not only physical health data but also the emotional, psychological, and social dimensions of patient care. By incorporating the language of caring into ENRS, the system can provide a more comprehensive view of patients, enabling healthcare providers to offer personalized and tailored treatments.

In summary, TCCN theory offers a powerful framework for integrating technology into nursing practice while upholding the essential values of compassionate care. By embracing this theory, nurses can effectively utilize technology to enhance patient care, leading to improved healthcare services and overall patient well-being.

Conceptual Framework

Figure 2. Relationship of the Usefulness of Electronic Health Record and Quality of Nursing Care in Military Hospital



As depicted in the model, the usefulness of Electronic Health Records is measured in terms of the following dimensions: results management, order entry management, decision support, electronic communication and connectivity, patient support, administrative processes, reporting and population health management, considered as independent variables of the study. Variables like age, sex, length of service, pre-exposure to other EHR systems, and computer literacy were identified as associating variables in the study, which may influence the dependent variables.

Precisely, the quality of nursing care in the military hospital in the aspects of effectiveness, efficiency, focus on patients, accessibility, competence, and relatedness, is the dependent variable of the study.

Operational Definition of Terms

The following terms were defined operationally and conceptually for readers to understand the study better.

Administrative Processes. In this study, it incorporates the EHR system used by nurses in the hospital in KSA, which provides a fast and easy documentation process that shortens the treatment and consultation time of patients and provides the availability of all required information of the patient.

Age. Nurses' age in years.

Competence in Quality of Nursing Care. Utilized in the study as the provision of effective skills and tools for patients to succeed and patient treatment feedback by the nurses in the military hospital in KSA, enabling the patients to apply strategies and competencies toward achieving improved health.

Computer Literacy. In this study, it refers to the level of familiarity with basic hardware and software and internet concepts of the nurses in the military hospital in KSA, that allows them to use personal computers for data entry, word processing, spreadsheets, and electronic communications.

Decision Support. Refers to the support in the development of clinical decisions for data reporting, to provide high-quality nursing care.

Electronic Communication and Connectivity. In this study, it is an application of the EHR system allowing clinicians and patients to communicate effectively in the

monitoring of patient care and treatment, allowing the provision of high-quality nursing care in the hospital in KSA.

Electronic Health Record. The clinical information system of the patients in the military hospital in KSA, which serves as a repository of information about patients' health status, which can be accessed by multiple authorized users, facilitating patient care across healthcare organizations.

Effectiveness in Quality of Nursing Care. In this study, it is the achievement of improvement in diagnosis, treatment, and outcomes in patient care, due to access to medical records by the health providers and nurses in the hospital in KSA.

Efficiency in Quality of Nursing Care. It refers to the ability of the nurses in the hospital in KSA, to focus on patients and the ability to provide holistic care based on the needs of patients, increase interaction with patients and their families, and the establishment of trusting relationships.

Length of service. Refers to the length of time spent by the nurses in years working in the military hospital in KSA.

Order Entry Management. In this study, it refers to the EHR component of order entry management facilitating the electronic ordering needs of physicians and nurses in the hospital in KSA, in the provision of quality nursing care.

Patient Support. In this study, it is the support provided by the nurses in the hospital in KSA, to patients to achieve high quality patient care and outcomes.

Pre-exposure to other EHR-system. The previous experience of the nurses in the utilization of the EHR system, prior to the implementation of the Electronic Health Record system in the military hospital in KSA.

Relatedness in Quality of Nursing Care. In this study, it is the quality of nursing care provided to the patients in the military hospital in KSA, which involves the provision of care in the form of acceptance, listening, presence, genuineness, and empathy, promoting positive patient outcomes and high quality of patient care.

Reporting and Population Health Management. Used as the management of the function of reporting and population management facilitated by the EHR system in the hospital of KSA, allowing quality data to be reported to government agencies for patient utilization and healthcare costs, in which the record system streamlines the processes while supplying real-time and accurate data for reporting.

Results Management. In this study, it is the results management function provided by the Electronic Health Record used by nurses in the hospital in KSA, in managing tests and treatment results of patients.

Sex. It relates either to a male or female.

Usefulness of EHR. In this study, it is the bundle of advantages and functionalities provided by the utilization of the EHR system in the military hospital in KSA, among nurses, in the performance of their clinical jobs, and are perceived to be fulfilling the requirements for the meaningful use in the delivery of organizational clinical services.

Hypothesis

The researcher was guided by the following null hypotheses:

Ho1: There is no significant relationship between the socio-demographic profiles of respondents and the quality of nursing care.

Ho2: There is no significant relationship between the experience-related profiles of respondents and the quality of nursing care.

Ho3: There is no significant relationship between the usefulness of EHR and the quality of nursing care at the military hospital in the Kingdom of Saudi Arabia

Chapter III

RESEARCH METHODOLOGY

This chapter presents the scientific approach of the conduct of the research study and the method of systematically solving the research problem. It involves the procedure adopted to study the problem and the underlying logic behind the variables being investigated. It includes research design, sampling design, study setting, research instruments, validity and reliability of the research instrument, data collection procedure, and data analysis.

Research Design

This quantitative study employed a descriptive-correlational design because the study aimed to identify the relationship between variables. According to Diziuban et al. (2015), correlational research uses numerical data to study the relationship between two or more variables. Participants are chosen based on certain variables of interest. Additionally, this research design is frequently used to draw conclusions about potential connections or to gather initial data to support future research.

The descriptive correlational design is appropriate to use in the present study because it allowed the researcher to describe respondents' perceived usefulness of electronic health records (EHR) and their quality of nursing care in a military hospital in the Kingdom of Saudi Arabia (KSA). Conversely, the respondents in the study were randomly picked to participate in the survey only once.

Sampling Technique

In recruiting the respondents, a simple random sampling was utilized. This sample is taken in such a way that each combination of individuals in the population

has an equal chance of being selected (West, 2016). This is an appropriate sampling design to use when the population of the respondents is high (Taherdoost, 2016). The respondents were randomly selected in participating in the survey, if they are fitted or eligible to participate.

They must be nurses that work in the military hospital in the Kingdom of Saudi Arabia (KSA) and who are directly using EHR (Best Care) in their workplace with at least a year of experience in the area. The respondents are in the age range of 21 to 40 because, based on hiring requirements for military nurses in Saudi Arabia, nurses must be typically between 21 and 35 years old (Jooble, 2023). That was the only inclusion criteria for the respondents. Outside the criteria were excluded. Informed consent was given to them before the survey, and if they did not sign it, they were excluded from the study.

Sample Size

There are 920 total population of staff nurses qualified for the study. The sample size was computed with the Raosoft sample size calculator where the margin of error was set to 5%. It was derived from a sample size of 277 staff nurses who are working in King Abdulaziz Medical city. Additionally, the sample size was calculated to be a larger sample because the researcher honors following the rule of thumb of sampling, which indicates that a larger sample size increases the statistical power of the investigation of the study (Biau et al., 2008).

Research Setting

The study was conducted in a military hospital in KSA named King Abdulaziz Medical-City- Jeddah, a 751- bed capacity hospital located at the western part of Saudi Arabia. It was founded last July 1982 under the reign of late King Fahd bin Abdulaziz

and is dedicated to fulfilling its goal in providing optimum care to its eligible clients. Services offered are divided into two main services namely medical services and ancillary services. The medical services are composed of 10 departments which includes anesthesia with a recent separate clinic for pain management services; cardiopulmonary services, oral and dental surgery, obstetrics and gynecology, pathology and laboratory medicine, pediatrics, surgery and home health care. Ancillary services include dietary and clinic nutrition, medical record, pharmaceutical and social services (Arabi et al., 2022).

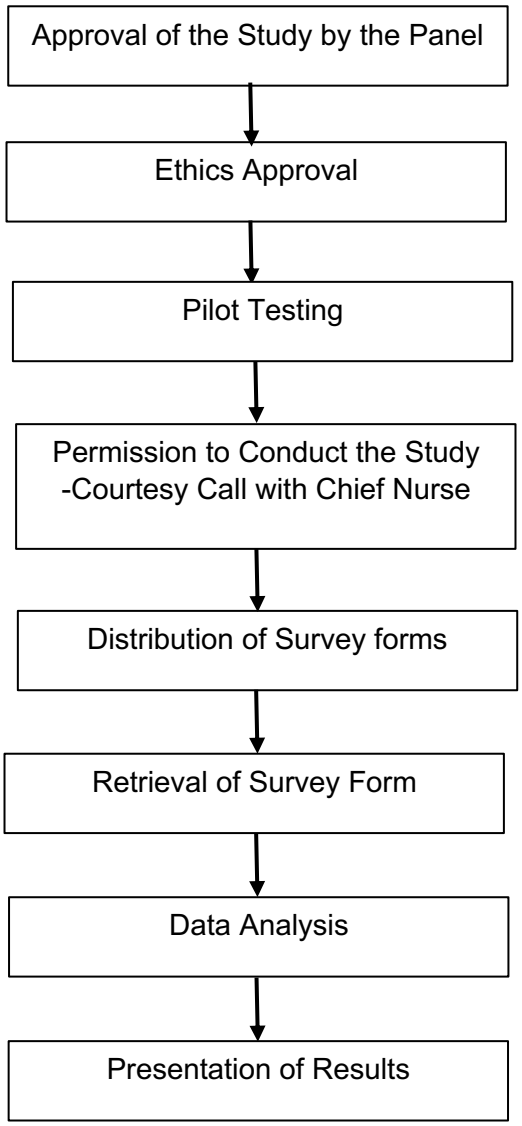
King Abdulaziz Medical City has also implemented the EHR system in order to meet the demands imposed on healthcare organizations and to comply with the government mandate for the improvement of Saudi healthcare systems and services. The system is intended to link all Saudi Arabian hospitals and enhance the hospital's healthcare delivery, patient information flow, waiting times, and removal of duplicate and incorrect records. The extension of the system's capabilities through the adoption of the Ambulatory Care Center and the integration of SMS into the system, which leads to enhanced service efficiency, stand out as benefits of the installation of EHR in the hospital. With the present full adoption of the EHR system, the hospital has a well-structured and defined roadmap for the EHR system implementation (Lovell, 2022).

The nursing department under medical services covers all specialties of in and out-patient services. Outpatient clinics are running with at least 5 consultants in the morning clinic, and 5 in the afternoon with an average of 60 patients in a day and a nurse-patient ratio of 1:20. Inpatient ratio depends on the patient’s health. The intensive care units like NICU, ICUs, PICU, CICU and alike are observing 1:1 ratio while regular wards will usually have 1:5 ratio depending on the number of patients and care needed.

In addition to that, an electronic questionnaire was used due to Covid-19 as suggested and required by the nursing department. Respondents answered the electronic questionnaire via survey monkey at the lightest hour of their duty time at their designated units. Answering questionnaires while the respondents are at work helped them choose the most appropriate response because the questions are directly about their work while using EHR.

Data Collection Method Procedures

Figure 3. Schematic Diagram of the Data Gathering Procedure



As presented in Figure 3, the researcher sought the approval of the study from the panel, for the formal gathering of data from the selected respondents of the study. Ethical issues were considered in the study, by complying with confidentiality of responses, anonymity, privacy, informed consent, and protection of participants from harm in the conduct of the study. Approval from the ethics committee was sought, prior to the conduct of pilot testing for the validity and reliability of the data-gathering instrument.

The researcher conducted a courtesy call with the executive nursing director of the respondent's organization, to obtain the approval of the administration to conduct the study and disseminate the survey instrument (survey monkey link) using the nursing departmental email. The survey has no time limit in answering the survey but it was highly recommended that they may answer within 24 hours or as soon as they are free to do so. This ensures higher respondent rates since the researcher used electronic survey form distributed using the departmental email, the tendency of participating in this study might be forgotten due to high automatic distribution emails being circulated each day.

Once the sample size was achieved, the data gathered were retrieved. Then, the data from the responses of the survey were encoded and tallied using the Excel software for data management. Data were analyzed using the SPSS software, in which a coding system was designed to enable the gathered data to fit into the computer software applications. Findings of the study were presented, derived from the analysis of data gathered from the respondents of the study. The conclusion and recommendations were followed to finish the study.

Research Instruments

In the conduct of this study, a survey questionnaire was the main instrument of the study to gather pertinent data based on the main focus of the researcher. The questionnaire that measures respondents' use of EHR and quality of nursing care is a researcher-made tool that underwent a validity and reliability process. This instrument is specifically designed to address the problems identified in the statement of the problem.

There are three parts of the questionnaire which respondents have answered. Part I sought data on the socio-demographic characteristics of the nurses. This includes asking the respondents' age, sex, length of service, pre-exposure to other EHR systems, and computer literacy. The socio-demographic profile in terms of pre-exposure to other EHR system, and computer literacy each have a 5-items where the response ranges from: 1- Strongly disagree; 2- Disagree; 3- Neither agree nor disagree; 4- Agree; 5- Strongly agree. The scoring procedure is illustrated below.

Table 1

Scoring Procedure

Numerical Rating	**Scale Range**	**Descriptive Rating**	**Verbal Interpretation**
5	4.00 – 5.00	Strongly agree	Very High Level
4	3.00 – 3.99	Agree	High Level
3	2.00 – 2.99	Neither agree nor disagree	Moderate Level
2	1.00 – 1.99	Disagree	Low Level
1	0.00 – 0.99	Strongly disagree	Very Low level

Part II was the EHR Utilization tool which provided data pertaining to the usefulness of the Electronic Health Record. The dimensions include Result

Management, Order entry management, Decision support, Electronic Communication and Connectivity, Patient support, Administrative Process, and Reporting and Population Health Management. Each dimension has 5-items, which is equal to 35 items in total. This is a researcher-made questionnaire that was outlined based on the related literature of the study. For this reason, pilot testing of the tool was done prior to its use, and it was validated by a panel of experts. Basically, the respondents answered this through the use of 5-point Likert: 5 - Extremely Useful, 4- Very Useful, 3- Moderately Useful, 2- Slightly Useful and 1- Not at all Useful. Below is an illustration of the scoring procedure.

Table 2

Scoring Procedure of Researcher-Made Questionnaire

Numerical Rating	**Scale Range**	**Descriptive Rating**
5	4.00 – 5.00	Extremely Useful
4	3.00 – 3.99	Very Useful
3	2.00 – 2.99	Moderately Useful
2	1.00 – 1.99	Slightly Useful
1	0.00 – 0.99	Not at all Useful

Lastly, Part III determined the quality of nursing care resulting from the use of EHR, to measure the quality of nursing care. A 5-point Likert Scale determined the quality of nursing care resulting from the use of the Electronic Health Record in the dimensions of Effectiveness, Efficiency, Focus on patients, Accessibility and Relatedness. This contains 30-items and the response ranges from: 1- Strongly disagree; 2- Disagree; 3- Neither agree nor disagree; 4- Agree; 5- Strongly agree. The scoring procedure is illustrated below.

Table 3

Scoring Procedure of the use of the Electronic Health Record in the dimensions of Effectiveness, Efficiency, Focus on patients, Accessibility and Relatedness.

Numerical Rating	Scale Range	Descriptive Rating
5	4.00 – 5.00	Strongly agree
4	3.00 – 3.99	Agree
3	2.00 – 2.99	Neither agree nor disagree
2	1.00 – 1.99	Disagree
1	0.00 – 0.99	Strongly disagree

Validity and Reliability of Research Instrument

Reliability Statistics

N	Cronbach's Alpha	Items
20	0.962	65

The researcher-made questionnaire to measure the respondents' EHR Utilization tool and quality of nursing care proved to have promising internal consistency, discriminative power, and content validity. The instruments were tested for construct validity through a performance of factor analysis in two steps and for internal consistency utilizing Cronbach's alpha coefficient. It also underwent pilot testing among 20 respondents and established high reliability results, as illustrated below.

Data Analysis and Interpretations

The researcher employed descriptive and inferential statistics as data treatment to address the research question of the study. Specifically for descriptive statistics,

frequency and percentage and mean and standard deviation. While for inferential statistics, the Pearson r correlation, Spearman and Chi-square. All the pertinent statistical methods were chosen based on the type of data. As shown in table below, the collected data were consolidated, analyzed, and presented in tables and graphs. The table below provides the summary of the data analysis that was performed:

Table 4

Summary of Data Analysis

Research Objectives	Tool	Level of Measurement	Statistical Test
1. To determine the socio-demographic profile of the respondents in terms of:			
1.1 Age	Part 1	Nominal	Frequency, percentage
1.2 Sex		Nominal	Frequency, percentage
1.3Length of service (years of experience)		Nominal	Frequency, percentage
2. To determine the experience-related profile of the respondents in terms of		Nominal	Frequency, percentage
2.1 Pre-exposure to other EHR system		Nominal	Frequency, percentage
2.2 Computer literacy			

3. To determine the use of the electronic health records (EHR) in terms of:	Part II		
3.1 Result Management		Interval	Descriptive Mean, Standard Deviation
3.2 Order entry management		Interval	Descriptive Mean, Standard Deviation
3.3 Decision support		Interval	Descriptive Mean, Standard Deviation
3.4 Electronic Communication and Connectivity		Interval	Descriptive Mean, Standard Deviation
3,5 Patient support		Interval	Descriptive Mean, Standard Deviation
3.6 Administrative Process		Interval	Descriptive Mean, Standard Deviation
3.7 Reporting and Population Health Management			
4. To identify the level of quality of nursing care in the military hospital in KSA, resulting from the use of EHR in terms of:	Part III		
4.1 Effectiveness		Interval	Descriptive Mean, Standard Deviation
4.2 Efficiency		Interval	Descriptive Mean, Standard Deviation
4.3 Focus on Patients		Interval	Descriptive Mean,

4.4 Accessibility		Interval	Standard Deviation Descriptive Mean,
4.5 Competence		Interval	Standard Deviation Descriptive Mean,
4.6 Relatedness		Interval	Standard Deviation Descriptive Mean, Standard Deviation
5. To determine the relationship of the usefulness of EHR on the quality of nursing care at the military hospital in KSA?	Part II and III	IV/DV-Interval	Pearson Correlation
6. To determine the significant relationship between the quality of nursing care and socio-demographic profile:	Part I and Part II	DV-Ratio/ Nominal	
6.1 Age		Nominal	Chi – square
6.2 Sex		Nominal	Chi – square
6.3Length of service (experience)		Nominal	Chi – square
7. To determine the significant relationship between the quality of nursing care and experience-related demographic profile:		Nominal	Chi – square

7.1 Pre-exposure to other EHR system	Nominal	Chi – square
7.2 Computer literacy		

Ethical Considerations

The study observed the ethical standards set by the generic research ethics, the Data Privacy Act or Republic Act No. 10173. The researcher respects the rights, safeguards the dignity and protects and promotes the welfare of the research participants. The respondents in this study were considered first above all else. Informed consent was given to protect their anonymity and privacy. They were informed about the aims of the study and of any procedure that was done in this research. It was provided in a language that they could easily understand and made sure that the respondents willingly approved it. Respondents were also informed that they may choose to withdraw from participating at any time, without any consequence, penalties, or even if they have initially agreed to participate.

The researcher also ensured that the data obtained was used solely for research purposes only and was treated with the utmost confidentiality until this research was done. They were guaranteed that participating in this study shall not affect nor harm them in any way. Furthermore, as plagiarism was categorically prohibited, it is anticipated that the originality and authenticity of this research were upheld. All the sources of literature were acknowledged through citations and references. There were no known risks for the participants of the study, as well as incentives were provided for research participation.

Storage of data of the finished research study is under the policies and data storage processes of the library department of the university so that the data will not

be accessible to other third parties, and to protect against risk and disaster even after the thesis is done. It was stored electronically in the physically secured environment of the university, provided with controlled access.

Chapter IV

RESULTS AND DISCUSSIONS

This chapter presents the analysis and discussions of the statistical findings of the study. The findings are presented following the order of the statement of the problem. Additionally, there was no missing data, and the sample size was achieved as targeted.

Table 4

Frequency Distribution of Respondents' Socio-demographic Profile in terms of Age

Age	Frequency	Percentage
20 to 30 years old	78	30.5
31 to 40 years old	109	36.2
41 to 50 years old	68	26.1
51 years & above	22	7.2
Total	**277**	**100**

Table 4 indicates the frequency distribution of the respondent's socio-demographic profile in terms of Age. The age of respondents shows that the majority are in the age range of 31 to 40 years, with 109 respondents or 36.2%. This is followed by 78 respondents or 30.5% who are in the age range of 20 to 30 years old, 68 respondents or 26.1%, in the age range of 41 to 50 years old or 26.1%, and the smallest group of 22 respondents or 7.2%, who are in the age range of 51 years and above. Findings show that out of 277 respondents, nurse respondents are using the EHR system regardless of age range. The EHR system is used widely by the respondents, thus, assumed its contribution to the enhancement of their job performance, improving the delivery of nurses' clinical services. Since all nurses, regardless of age, are using EHR systems in clinical services' delivery, age can be assumed as not affecting EHR use in their job performance.

The implications of the findings can be related to the study conducted by Yontz et al. (2015), which stated that although age is a major contributor to the attitudes of

nurses toward acceptance and the use of technology and information system in the job context, the utilization or acceptance of computerization may not be affected by age. Still, it is true that most younger nurses have more familiarity with computers and technology than older groups and consequently, are more accepting of EHR and have more positive attitudes toward computerization.

Menachemi and Collum (2011) claim that results management in Electronic Health Record systems is a focus that directly relates to the quality of care and patient safety. Their implications suggest that effective results management through EHRs can have positive outcomes for patient safety and care. On the other hand, Yontz et al. (2015) find that age may not be a significant contributor to nurses' attitudes towards technology. This suggests that attitudes towards technology may not vary significantly across different age groups of nurses.

Table 5

Frequency Distribution of Respondents' Socio-demographic Profile in terms of Sex

Sex	Frequency	Percentage
Female	260	94.4
Male	17	5.6
Total	**277**	**100**

Table 5 shows the frequency distribution of the respondent's socio-demographic profile in terms of Sex. Findings show that out of 277 respondents, most of the respondent nurses are female, with 260 respondents or 94.4%, followed by 17 respondents, or 5.6%, who are male. Considering the difficulties associated with a documentation system that is paper based, both male and female nurses can have a more positive attitude to EHR system use. As the EHR system contributes to the effectiveness and efficiency of work performance, nurses regardless of sex can have

positive attitudes toward EHR use in the delivery of care services.

Parallel to that, Hathway et al. (2020) claim that women are more likely to achieve positions in senior management in the nursing profession and progression can be associated with work satisfaction. This is because the nursing profession is predominated largely by women, thus, the need for women to occupy a greater number of senior roles. Bonilo et al. (2019) also stated that the majority of the workers in the health sector are women and were found to be less likely to be in full-time employment than men, with a gender-sex pay gap of 28% in the health workforce. This means that nurses are found to accept computer-based documentation, regardless of sex, as the course of their work is women dominated.

The potential contradiction arises from the claim of Hathway et al. (2020) and Bonilo et al. (2019) initially suggesting that nurses, regardless of sex, accept computer-based documentation due to the profession being predominantly women-dominated. While it is true that women are significantly represented in nursing, and this trend might influence technology acceptance, it does not directly address the gender pay gap or challenges faced by women in achieving full-time roles. Hathway et al. (2020) may have primarily investigated gender representation in senior management positions and work satisfaction among women in nursing, providing insights into gender dynamics in leadership roles. Bonilo et al. (2019) might have focused on the gender pay gap and full-time employment rates in the broader health workforce, which could include various healthcare professions beyond nursing. The statement about nurses accepting computer-based documentation regardless of sex may assume that nurses, being predominantly women, might have similar attitudes towards technology adoption, irrespective of their gender. In relation to the findings of the present study, while there might be some differences in the findings of these related studies, they can collectively

provide a broader understanding of gender dynamics in the healthcare sector, including nursing. It is essential to consider each study's unique context and scope before drawing definitive conclusions and to use these findings to inform efforts toward promoting gender equality and career advancement in the nursing profession.

Table 6

Frequency Distribution of Respondents' Socio-demographic Profile in terms of Length of Service (Years of Experience)

Length of Service	Frequency	Percentage
5 years & below	48	15.9
6 – 10 years	105	34.8
11 – 20 years	109	36.2
21 years & above	15	13.0
Total	**277**	**100**

Table 6 shows the frequency distribution of the respondent's socio-demographic profile in terms of Length of Service (Years of Experience). Findings show that out of 277 respondents, the majority of them have 11 to 20 years and 6 to 10 years in service to the organization, with 109 respondents or 36.2% and respondents or 34.8%, respectively. Followed by groups that have 5 years and below years of experience, with 48 respondents or 15.9%. The smaller groups have 21 years and above years of experience, with 15 respondents or 13%, respectively. Findings show that the majority of the respondents have long years of experience in the organization and have been using the EHR system for long periods, enhancing their work performance. The increased number of years of experience in using the system provides them with the ability and skill in the use of the EHR system for the improvement of their clinical nursing service delivery. Findings imply that respondent nurses have completed advanced computer-training courses, having developed appropriate competencies in the use of technology and in dealing with computer software applications in the use of electronic communication tools, and in the creation and sharing of professional

documents.

Kummer et al. (2013) also stated that positive job experiences from the number of years of service rendered in the healthcare organization are linked to positive attitudes toward EHR implementation and use and thus, achieving high-quality nursing care. Notably, with long years of service, nurses gain more experience in technology use, thus, develop favorable attitudes toward EHR implementation that contribute to the enhancement of the quality of nursing care (De Veer & Francke, 2010). The implications of the findings of the study are that the long years of experience in the usefulness of the EHR system could have expanded respondents' effective and efficient delivery of nursing services, which can require continuous training for learning advances in EHR technology.

Table 7

Frequency Distribution of Respondents' Experience-related Profile in terms of Pre-exposure to other EHR Systems

Pre-exposure to EHR Systems Items	**Frequency**	**Percentage**
I have pre-exposure to satisfactory clerical skills and medical terminology.	146	52.65
I have knowledge on computer- assisted coding systems.	140	50.70
I have exposure to in-service training programs for technology in healthcare systems.	134	48.30
I have orientation on the use of technology for understanding clinical data and used in clinical decision making.	136	49.27
I have prior knowledge on collaboration and data sharing using technology in healthcare provision.	120	43.47

Table 7 shows the frequency distribution of the respondent's experience-related profile in terms of Pre-exposure to EHR Systems. Findings show that most of respondents with frequency of 146 (52.65%) have pre-exposure to satisfactory clerical

skills and medical terminology, while 131 out of 277 respondents do not have. 140 (50.70%) respondents answered “yes” that they have knowledge on computer-assisted coding systems and 134 (48.30%) respondents have exposure to in-service training programs for technology in healthcare systems. 136 (49.27%) respondents have orientation on the use of technology; and 120 (43.47%) respondents out of 277 have prior knowledge on collaboration and data sharing using technology, respectively. These findings reveal the confidence of the nurse respondents in the use of EHR systems due to pre-exposure to EHR, which enhances their job performance in the delivery of care.

This is in contrast with the study of McCrorie et al. (2019), which claims that medical staff with prior exposure to EHR utilization are efficient in performing little tasks, using the electronic health record system, however, were anxious into integrating the use of EHR into their health work practices. Hence, the findings in the present study show that pre-exposure to EHR systems of respondents provides them with the skills to address their fear for mistakes associated with technology use.

Table 8

Frequency Distribution of Respondents’ Experience-related Profile in terms of Computer Literacy

Computer Literacy Items	Frequency	Percentage
I possess basic computer skills essential to operation of the EHR system.	178	64.28
I utilize computers at work and at home.	171	61.9
I have achieved proficiency in the use of EHR system.	132	47.6
I have gained expertise in using the EHR system.	132	47.6
I am involved in the hospital’s EHR system design and selection.	103	37.14

Table 8 shows the mean distribution of the respondent's experience-related

profile in terms of Computer Literacy. Findings show that out of 277 respondents, 178 (64.28%) nurses possess basic computer skills essential to operate the EHR system, while 99 of them do not. 171 (61.9%) of them use computers at work and at home and 106 do not use it. 132 (47.6%) have both achieved proficiency in the use of the EHR system, and gained expertise in the use of the system, respectively. However, 103 (37.14%) of them are only involved in the hospital's EHR system design and selection, while the rest 174 out of 277 respondents, are not involved.

Findings show the overall computer literacy developed among nurses in the respondent hospital, derived from their knowledge, skills, and competencies acquired and developed over the years of clinical service in the healthcare organization. The ability of nurse respondents to read, write and communicate using computers and the use of computers in the nursing practice. With a high level of computer literacy, nurses are confident in their utilization of computer and information technology as contributing to the quality of nursing care services delivery in the healthcare setting.

However, a disagreement of the respondents on their involvement in the hospital's EHR system design and implementation may be attributed to their knowledge because according to Kuek and Hakkenes (2019), as personnel in healthcare delivery, they are responsible for the optimization of health service outcomes, extending beyond the provision of safe care, but to their participation in broader organizational structures such as EHR system design and implementation. Respondents expressed their disagreement on the hope of making organizational reforms involving their involvement in providing EHR system quality, which can influence the quality of the provision of care.

Table 9

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Results Management

No.	Results Management Items	Mean	Std.	Description
1	EHR displays results for healthcare professionals to develop improvements in efficiency and effectiveness of treatment, making cost reductions through elimination of duplicate testing.	3.77	.894	Very Useful
2	EHR provides formats for comparing and trending treatment and diagnosis results.	3.79	.797	Very Useful
3	EHR provides basis in the analysis of the cost-efficiency and effectiveness of the health record system.	3.61	.808	Very Useful
4	EHR helps in analyzing outcomes of patients.	3.86	.928	Very Useful
5	EHR provides support for the conduct of assessment on the effectiveness of the use of technology in healthcare delivery.	4.19	.944	Very Useful
Arithmetic Mean		**3.84**	**.874**	**Very Useful**

Table 9 shows the mean distribution of the respondent's usefulness of EHR in terms of Results Management. Findings revealed the agreement of respondents on the usefulness of the EHR system in the management of laboratory tests and results of patients, reports, and electronic images, ensuring the avoidance of duplication and errors in data management, rated by the respondents as "Very Useful". EHR was found to be useful in the provision of support for the conduct of assessment on the effective

use of technology in the delivery of healthcare services, with the highest mean of 4.19 (SD=.944). EHR is useful in displaying healthcare results for development of treatment and reducing costs; provision of formats to compare treatment and diagnosis results; analysis of health record system, and in analyzing patient outcomes, with mean values of 3.77(SD=.894)., 3.79 (SD=.797)., 3.61(SD=.808)., and 3.86 (SD=.928)., respectively. A low standard deviation (0.874) indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 3.84. The low standard deviation in this context implies that there is a strong consensus among the respondents that Results Management is perceived as "Very Useful." The relatively tight clustering of responses around the mean indicates that there is little variability in these perceptions, and respondents largely agree on the high level of usefulness of Results Management in EHR.

The grand mean of 3.84, shows the overall usefulness of the EHR system, supported by the average standard deviation of .874. This finding implies the belief of the respondents on the usefulness of the system in providing security and effectiveness in the management of patient records in order to facilitate patient treatment, medications' provisions, diagnoses, and tests and laboratory results. Perceptions reveal the ability of the system to integrate healthcare information from multiple sources to effectively manage information of results allowing the capability for the delivery of high-quality patient care.

The findings were related to the study of Menachemi and Collum (2011), which claims that results management in the aspect of clinical results is a focus of electronic health record systems as it is related to the quality of care and patient safety. A well-designed EHR system that focuses on results management allows healthcare providers to access comprehensive patient information, including test results, in real-

time. This facilitates more informed decision-making, leading to better treatment plans, follow-ups, and overall improved quality of care.

However, according to Goodman et al. (2012), an Electronic Health Record system is linked to knowledge resources to display information during clinical decision-making. Hence, the physician finds details of medical results in the system with all relevant facts, allowing the making of remedial actions. The findings in the present study implied that respondents are in agreement of the usefulness of the system in EHR in the provision of information for patient care in a secured way to multiple users.

Table 10

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Order Entry Management

No.	Order Entry Management Items	Mean	Standard Dev.	Description
1	EHR system permits entry of clinical orders for laboratory, radiology, and pharmacy services electronically.	3.96	.775	Very Useful
2	The EHR system provides complete service ordering, results reporting, customized order sets, and alerting capability.	4.02	.653	Very Useful
3	Computerized physician order entry systems in EHR incorporates data on current medications, patient diagnosis, and history of drug interactions that significantly reduce errors in prescriptions.	4.04	.716	Very Useful
4	The system allows increased clinician compliance with standards of care guidelines which eliminate care variations, thereby improving quality of care.	3.99	.675	Very Useful
5	EHR eliminates the need for re-entry into the hospital	3.97	.747	Very Useful

	information system in making orders for medication, radiology, and laboratory.			
Arithmetic Mean		**3.99**	**.713**	**Very Useful**

Table 10 shows the mean distribution of the respondent's usefulness of EHR in terms of Order Entry Management. Findings show that order entry management capability of the EHR is “Very Useful” to the respondent nurses in the performance of their healthcare jobs. Perceptions show that EHR is “Very Useful” in the incorporation of data in medications and diagnosis, with the highest mean of 4.04 (SD=.716). The EHR system is useful in permitting entry of clinical orders; provision of complete service; allowing increased clinician compliance with standards; and eliminating the need for re-entry into hospital information systems, with mean values of 3.96 (SD=.775)., 4.02 (SD=.653)., 3.99 (SD=.675)., 3.97(SD=.747), respectively. All individual statements about Order Entry Management have mean ratings between 3.96 and 4.04, indicating that respondents overwhelmingly find Order Entry Management to be "Very Useful." The low SD provides confidence that the majority of respondents consistently rate Order Entry Management as very useful, and there is not much disagreement or variability in their assessments.

The grand mean of 3.99 (SD=.713) shows the overall agreement of the respondents that the EHR system is “Very Useful” in ordering electronically, provision of laboratory, pharmacy, and radiology services, providing accuracy of orders, ensuring appropriate arrival of patients, and the easy identification of performed tests by healthcare professionals. The essential tools of order entry management in the EHR system provide decision support and order sets and entry of orders that reduces medical errors, thus, providing efficiency improvement and enhancement of health care quality of services. Perceptions of very useful EHR systems imply the belief of

respondent nurses of the capability of the order entry system to effectively eliminate transcriptions' errors, compliance to protocols, determination of accurate dose, and effectively serving health care procedures.

This may be because computerized physician order entry is an application required in the EHR system used in the ordering of pharmacy, laboratory, and radiology services by physicians allowing them to order tests electronically and ensuring orders' accuracy (Seymour et al., 2012). Findings revealed the agreement of the respondents on the high level of usefulness of the order entry system due to its developed algorithms that enable the system to provide warnings on tests lying outside average range, the presence of defects in patients' characteristics, and features for weight-based dosing. The EHR system was found to be effective in the provision of relevant information at the order entry time that allow the development of informed decisions and appropriate actions, thus, the rating of "Very Useful".

Table 11

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Decision Support

No.	Decision Support Items	Mean	Standard Dev.	Description
1	EHR provides decision support tools which are fully integrated into the process of care delivery, enabling patients and care providers to have access to medical knowledge relevant to patient care.	3.93	.626	Very Useful
2	Clinical data repository database of the EHR platform for decision support collects and stores information for patient care which are vital in clinical decision making.	3.91	.658	Very Useful

3	Event monitor in the EHR system combines clinical rules in the generations of alerts, reminders, and messages crucial in decisions for cared delivery.	3.99	.606	Very Useful
4	Health record documentation of the EHR system helps clinical care professionals to make informed decisions about patient treatment and diagnosis.	3.94	.639	Very Useful
5	The real time clinical decision support provided by EHR eliminates errors in prescriptions.	3.99	.757	Very Useful
Arithmetic Mean		**3.95**	**.657**	**Very Useful**

Table 11 shows the mean distribution of the respondent's usefulness of EHR in terms of Decision Support. Findings show that the decision support function of the EHR system is “Very Useful”, for nurses in job performance using the EHR system. Perceptions of respondents show that the EHR system is “Very Useful” in making decisions for care delivery and in the elimination of errors in prescriptions, with the highest mean value of 3.99 (SD=.757)., respectively. EHR is perceived as very useful in providing access to medical knowledge for patient care; in serving as a clinical data repository database vital in clinical decision making; and in the development of decisions about patient treatment and diagnosis, with mean values of 3.93(SD=.626)., 3.91(SD=.658)., and 3.94(SD=.639)., respectively. The low SD suggests a relatively high level of agreement or consistency among the respondents regarding the perceived usefulness of Decision Support in EHR. Thus, the low SD provides confidence that the majority of respondents consistently rate Decision Support as very useful, and there is not much disagreement or variability in their assessments.

The grand mean of 3.95, shows the overall perceptions of “Decision Support” as “Very Useful” in the performance of jobs among the respondents, supported by the homogeneity of responses, indicated by the average standard deviation of .657. Findings revealed the agreement of respondents that EHR is very useful as decision support is provided at the point of care, which can be done when clinicians are making decisions or in the formulation of the assessment of patients’ conditions.

According to Lin (2012), the decision support system, which gives patient recommendations, has been found to be a very durable and effective instrument for changing the behavior of clinicians. It saves time for clinicians. However, the design and deployment of decision support systems are difficult since they call for computing infrastructure, modifications to the current workflow, and machine-readable patient data. In the study, findings imply the belief of respondents that decision support provided by the EHR allows physicians to take control of the final decision for patient treatment and diagnosis. In another study, Patterson et al. (2019) conducted a study evaluating the impact of decision support systems integrated into Electronic Health Records. Their findings suggested that while decision support systems can be helpful in certain clinical scenarios, they might not always lead to significant behavior change among clinicians. The study indicated that physicians often override or ignore decision support recommendations, especially if they perceive them to be time-consuming, disruptive to workflow, or not aligned with their clinical judgment.

In contrast to Lin's (2012) claim that decision support systems are durable and effective in changing clinician behavior. Patterson et al. (2019) suggest that clinicians might not always follow the system's recommendations, and there might be instances where physicians prioritize their own clinical judgment over the system's suggestions. This implies that the impact of decision support systems can vary depending on factors

such as workflow integration, usability, and perceived alignment with clinical practice. Furthermore, while the present study supported by Lin (2012) emphasized that decision support systems save time for clinicians, Patterson et al. (2019) indicate that if the system's recommendations require extensive data input or disrupt the existing workflow, physicians may be less likely to adopt them, potentially leading to limited time savings. Instead, their research might highlight cases where physicians feel that the decision support system restricts their autonomy and control, leading to resistance or avoidance of its use.

In relation to the findings of the present study, the contradiction lies in the differing perspectives on the effectiveness of decision support systems in changing clinician behavior and the extent to which physicians embrace or resist their recommendations in clinical decision-making. Because despite the presence of supportive recommendations, physicians may override or ignore them for various reasons. This suggests that the mere presence of decision support does not guarantee its acceptance and implementation in real-world clinical settings. One of the key reasons cited for clinicians bypassing decision support recommendations is the perception that using the system might be time-consuming and disruptive to their workflow. If clinicians believe that the extra steps required by the DSS slow down their workflow or hinder their efficiency, they may be less likely to rely on its guidance. This contributes valuable insights to the complex nature of decision support systems' implementation and their impact on clinical practice.

Table 12

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Electronic Communication and Connectivity

No.	Electronic Communication and Connectivity Items	Mean	Standard Dev.	Description
1	EHR provides communication technologies essential for communications among clinicians and patients in the delivery of quality care, ensuring continuity of patient services.	3.97	.727	Very Useful
2	Communication technology enables the development of information and communication networks that increase connectivity and information exchange among the dispersed care team and patients.	3.96	.695	Very Useful
3	Communication system of the EHR ensures confidentiality and security of the transmission of health care data through wireless links which improves patients and health care providers' connectivity.	3.94	.705	Very Useful

4	Clinical information system in EHR provides the mechanism for sharing the data collected from different sources, making patient data available at the point of care.	4.04	.736	Very Useful
5	Detailed information stored in the record system allows healthcare providers to develop assessments and manage risks in patient care delivery.	4.09	.762	Very Useful
Arithmetic Mean		**4.00**	**.725**	**Very Useful**

Table 12 shows the mean distribution of the respondent's usefulness of EHR in terms of Electronic Communication and Connectivity. Findings revealed that communication and connectivity in EHR is perceived to be “Very Useful” in job performance of respondents allowing them to develop assessments and manage risks in the delivery of patient care, with the highest mean of 4.09 (SD=.762). A low standard deviation (0.725) indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 4.00. Consistently, the low SD suggests a relatively high level of agreement or consistency among the respondents regarding the perceived usefulness of Electronic Communication and Connectivity in EHR.

Communication and connectivity function of the EHR system is believed to be very useful as clinicians and patients are able to effectively communicate, ensuring the

delivery of quality care and continuity of patient services; information and communication networks are developed; ensure confidentiality and security of healthcare data transmission; and in the sharing of clinical data at the point of care, with mean values of 3.97 (SD=.727)., 3.96 (SD=.695)., 3.94 (SD=.705)., and 4.04 (SD=.736)., respectively.

The grand mean of 4.0, shows the overall usefulness of the electronic communication and connectivity dimension of EHR, supported by the homogeneity of responses, indicated by the average standard deviation of .725. This finding implies the agreement of the respondents on the effectiveness of EHR's communication and connectivity dimension making EHR very useful in communicating clinical information and medications, thus, developing clinical decisions based on accurate information. Respondents are in agreement of the usefulness of the EHR dimension, to a high level, enabling the respondents to implement asynchronous communication about patient care which is essential in achieving effective and safe delivery of healthcare services.

As pronounced by Hovenga (2022), EHR communication and connectivity dimension is adequate for the effective communication of medical information. Systems communication and connectivity are essential for EHR to effectively and efficiently communicate, thus, providing support for the EHR widespread adoption. The EHR system allows instant messaging, enhanced communication within the team for health care services, and increased access to patient information. In the study, findings showed the usefulness of EHR communication and connectivity in supporting communication in the delivery of healthcare services.

Other studies, like Tsai et al. (2020) conducted a comprehensive study evaluating the implementation of EHR communication and connectivity in healthcare settings. Their findings suggested that while EHR systems provide instant messaging and

enhanced communication features, there were significant barriers to effective communication. Technical glitches and system downtime were reported as common issues that hindered real-time communication among healthcare teams. Furthermore, some healthcare providers expressed concerns about the security and privacy of patient information when using EHR-based communication channels.

While Hovenga (2022) emphasized the adequacy and usefulness of EHR communication and connectivity in supporting effective communication, Tsai et al. (2020) demonstrated practical challenges faced by healthcare teams when utilizing EHR systems for communication. Technical problems and system disruptions may impede seamless and timely communication, potentially affecting patient care and decision-making. Moreover, concerns about data security and privacy could lead to hesitancy among healthcare providers to fully embrace EHR-based communication channels.

The contradiction in relation to the findings of the present study suggests that even though EHR communication and connectivity offer valuable features for communication, there are practical obstacles that need to be addressed to ensure their effective use in the delivery of healthcare services. Presenting opposing viewpoints from both Hovenga (2022) and Tsai et al. (2020) contribute valuable insights into the complexities of EHR communication and the challenges that healthcare organizations may encounter during its implementation.

Table 13

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Patient Support

No.	Patient Support Items	Mean	Standard Dev.	Description

1	Health records from the EHR assist clinicians in the conduct of analysis of various illnesses in the formulation of guidelines for clinical practice and in the evaluation of quality of patient care.	3.91	.680	Very Useful
2	EHR allows effective management of all activities related to healthcare services provided to patients.	3.89	.710	Very Useful
3	EHR provides support for activities associated with the handling of healthcare resources and communication of information to different clinical units.	3.94	.662	Very Useful
4	EHR stimulates patient's active involvement in the management of own health to become primary user of health record.	3.99	.717	Very Useful
5	EHR documentation system provides support to health care professionals in the analysis of the severity of patients' illness.	4.01	.675	Very Useful
Arithmetic Mean		**3.95**	**.689**	**Very Useful**

Table 13 shows the mean distribution of the respondent's usefulness of EHR in terms of Patient Support. Findings show that the EHR documentation system is very useful in providing support to health care professionals in the analysis of the severity of patients' illness, with the highest mean of 4.01 (SD=.675). This shows that all individual statements about Patient Support have mean ratings between 3.89 and 4.01,

indicating that respondents overwhelmingly find Patient Support to be "Very Useful." The low SD provides confidence that the majority of respondents consistently rate Patient Support as very useful, and there is not much disagreement or variability in their assessments.

EHR is very useful in assisting clinicians in the conduct of analysis of various illnesses in the formulation of guidelines for clinical practice and in the evaluation of quality of patient care; allowing effective management of all activities related to healthcare services provided to patients; providing support for activities associated with the handling of healthcare resources and communication of information to different clinical units; and in stimulating patient's active involvement in the management of own health to become primary user of health record, with mean values of 3.91(SD=.680), 3.89 (SD=.710)., 3.94 (SD=.662)., and 3.99 (SD=.717)., respectively.

The grand mean of 3.95, shows the overall agreement of the respondents on the usefulness of the EHR system in the aspect of patient support, supported by the homogeneity of respondents' responses, indicated by the average standard deviation of .689. This finding revealed the awareness of the respondents on the ability of the EHR system in providing access to medical information to clinicians and patients, establishing more collaborative relationships between clinicians and patients, thus, allowing patients to experience greater empowerment in partnering with healthcare providers and in the control of their own care.

Indeed, EHR implementation allows patients, physicians, and clinicians to make healthcare decisions together, providing them with access to medical records, thus, providing patients the opportunity to have quality control of documented information. The EHR system establishes mutual understanding between the care provider and the patient, increasing the involvement of the patient in the provision of care and enabling

the patient to become better prepared. The system allows enhanced access of clinical information, involvement of patients in providing care, and enhances understanding between the patient and care providers (Walker-Czyz, 2016).

Table 14

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Administrative Processes

No.	Administrative Processes Items	Mean	Std.	Description
1	EHR facilitates admission, registration, transfer, and discharge processes.	4.21	.677	Very Useful
2	The system incorporates vital information for effective and accurate patient assessment and identification.	4.06	.705	Very Useful
3	The system provides a unique patient identifier which is unidentifiable outside of the institution it serves, linking all clinical tests, observations, complaints, procedures, diagnoses, and evaluations to the patients.	4.12	.676	Very Useful
4	Health record system documents patients' illness and treatment and all information, enabling the healthcare organization to determine payment for reimbursement system.	4.00	.728	Very Useful
5	EHR data provides assistance in the management and reporting of costs.	4.02	.795	Very Useful
Arithmetic Mean		**4.08**	**.716**	**Very Useful**

Table 14 shows the mean distribution of the respondent's usefulness of EHR in terms of Administrative Processes. Findings show that the EHR system is very useful

in facilitating admission, registration, transfer, and discharge processes, with the highest mean of 4.21(SD=.677). Perceptions show that EHR is very useful in incorporating vital information for effective and accurate patient assessment and identification; providing a unique patient identifier which is unidentifiable outside of the institution it serves, linking all clinical tests, observations, complaints, procedures, diagnoses, and evaluations to the patients; documenting patients' illness and treatment and all information, enabling the healthcare organization to determine payment for reimbursement system; and providing assistance in the management and reporting of costs, with mean values of 4.06 (SD=.705)., 4.12 (SD=.676)., 4.00 (SD=.728)., and 4.02 (SD=.795)., respectively. A low standard deviation (0.716) indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 4.08. The low SD provides confidence that the majority of respondents consistently rate Administrative Processes as very useful, and there is not much disagreement or variability in their assessments.

The grand mean of 4.08(SD=.716), shows the overall agreement of the respondents on the usefulness of the EHR system, evaluated to be "Very Useful", in the dimension of administrative processes. The findings imply the full awareness of the respondent nurses on the usefulness of the EHR system in aiding on scheduling of hospital admissions and patient procedures and visits, thus, improving the efficiency of the healthcare systems and providing better and timely clinical services to patients. Respondents have full knowledge of the availability of patients' information in the EHR system which assists in the speedy and accurate patients' record validation, improvement in health services accessibility, and the reduction of paperwork. Very useful evaluation of the EHR system indicates the beliefs of the respondents on the ability of the system to provide assistance in reducing medical errors, thereby,

achieving effective care coordination, reducing health care costs, and improvement in care quality and patient safety. The EHR system is perceived as effective and very useful in providing ease and speedy documentation process and the ability of the system to document face-to-face encounters in the healthcare settings.

Shortliffe and Chiang (2021) also stated that the EHR system provides valuable information on the utilization of resources on different types of diseases, the severity of diseases, and other information vital in making informed decisions associated with increased healthcare costs. Thus, with the availability of patients' information in the system, ordering duplicate procedures and tests can be avoided, thus, reducing the expenditures of patients on health care services. The findings of the study imply that the availability of patient information in the EHR system, in digital form, results in reduced expenditures for administrative processes associated with the retrieval, storage, and transportation of patients' health records.

Table 15

Mean Distribution of Respondents' Perceived Usefulness of EHR in terms of Reporting and Population Health Management

No.	Reporting and Population Health Management Items	Mean	Std.	Description
1	EHR's process management system ensures recording and reporting of clinical results in each phase of the treatment.	4.04	.629	Very Useful
2	Health information stored in the EHR system allows reporting of health data to government agencies for management and monitoring of public health.	3.99	.675	Very Useful

3	EHR allows reporting of health information for allocation of government resources to the healthcare system.	3.99	.748	Very Useful
4	Health record documentation in the EHR provides data to a third party for the payment of patient bill.	3.86	.733	Very Useful
5	EHR data allows reporting to government agencies for the conduct of strategic planning for the healthcare system.	3.91	.680	Very Useful
Arithmetic Mean		**3.96**	**.691**	**Very Useful**

Table 15 shows the mean distribution of the respondent's usefulness of EHR in terms of Reporting and Population Health Management. Findings show the perceptions of the respondents on the EHR's process management system which ensures recording and reporting of clinical results in each phase of the treatment, with the highest mean of 4.04(SD=.629). EHR system is perceived as "Very Useful" with health information stored in the EHR system allowing reporting of health data to government agencies for management and monitoring of public health; EHR allows reporting of health information for allocation of government resources to the healthcare system; health record documentation in the EHR provides data to a third party for the payment of patient bill; and EHR data allows reporting to government agencies for the conduct of strategic planning for the healthcare system, with mean values of 3.99(SD=.675)., 3.99(SD=.748)., 3.86(SD=.733)., and 3.91(SD=.680)., respectively. The low SD suggests a relatively high level of agreement or consistency among the respondents regarding the perceived usefulness of Reporting and Population Health

Management in EHR. The low SD also provides confidence that the majority of respondents consistently rate Reporting and Population Health Management as very useful, and there is not much disagreement or variability in their assessments.

The grand mean of 3.96, shows the agreement of the respondents of the overall usefulness of the EHR system in the dimension of reporting and population health management, supported by the homogeneity of respondents' responses indicated by the average standard deviation of .691. The findings imply the full awareness of the respondents on the usefulness of the EHR system in improving the overall efficiency and quality of the healthcare system and population health. Respondents have full knowledge of the capability of the system to analyze and organize large amounts of information of patients, allowing the system to provide access to public health, and surveillance of population health issues. Respondents believe that the EHR system provides the networked communication that reaches all care providers and patient homes, useful in making patient care decisions, thus, connectivity to the patient's home becomes vital in the monitoring of the patient's health.

According to Waithera et al. (2017), the essential function of an electronic health record system is the provision of health information and reporting to improve the reporting and utilization of health information. To support the function, the electronic health record system is provided with the capability to generate reports for quality improvement from the clinical data, thus, the generation of the aggregate reports which are submitted to government health ministries and other organizations. The system has the capability to comply with the requirements of reporting and population health management at the local and national levels to maintain quality patient care and patient safety. Hence, the EHR system is a tool for health information technology that is useful in the enhancement of healthcare efficiency and quality of the population, as well as

disparities in population health.

Table 16

Mean Distribution of Respondents' Quality of Nursing Care from Usefulness of EHR in terms of Effectiveness

No.	Effectiveness of Quality of Nursing Care Items	Mean	Std.	Description
1	EHR results in improvement of diagnosis, treatment, and patient care results due to easy access to health records anytime and anywhere.	3.97	.618	High Level
2	Accessibility of EHR data facilitates the development of evidence-based nursing practice.	3.91	.612	High Level
3	Nursing care provides patient safety and safe clinical processes.	4.04	.695	High Level
4	EHR system use results in high degree of compliance of the patient following correctly medical advice & treatment.	3.93	.714	High Level
5	Nursing care improves continuity of patient care, access to prescription, test results, and patient	4.04	.651	High Level

appointments.			
Arithmetic Mean	**3.98**	**.659**	**High Level**

Table 16 shows the mean distribution of the respondent's quality of nursing care from usefulness of EHR in terms of Effectiveness. Findings show the high level of effectiveness of the quality or nursing care provided in the military hospital, as patient safety and safe clinical processes are provided and the improvement of continuity of patient care, access to prescription, test results, and patient appointments, with highest mean value of 4.04(SD=.695)., for both indicators. Effectiveness of quality of the nursing care is at “High Level”, as EHR results in improvement of diagnosis, treatment, and patient care results due to easy access to health records anytime and anywhere; Accessibility of EHR data facilitates the development of evidence-based nursing practice; and EHR system use results in high degree of compliance of the patient following correctly medical advice & treatment, with mean values of 3.97(SD=.618)., 3.91(SD=.612)., and 3.93(SD=.714)., respectively. Although the SD (0.659) is slightly higher compared to previous sections, it still indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 3.98. So while the standard deviation is slightly higher in this section compared to others, it still implies that there is a consensus among the respondents that the Effectiveness of Quality of Nursing Care due to EHR is perceived to be at a "High Level." The clustering of responses around the mean indicates that there is relatively little variability in these perceptions, and respondents generally agree on the high level of effectiveness of Quality of Nursing Care attributed to EHR.

The grand mean of 3.98 reveals the overall high level of effectiveness of the quality of nursing care in the military hospital, supported by the homogeneity of

responses, indicated by the average standard deviation of .659. Findings show the agreement of the respondents that the effectiveness of the quality of nursing care provided by the hospital is at a high level with the ability of nurses to integrate the knowledge and skills in collaborating and communicating with patients and other healthcare members in the delivery of coordinated care to the patient, resulting in patient satisfaction.

Willis et al. (2013) stated that the effectiveness of the quality of nursing care is linked to services consistent with patient preferences, care processes that achieve health outcomes, and the establishment of standards for care processes and structure. This is consistent with the findings of the study that show the effective collaborative systems created by the nurses and the creation of patient-centered care services which define the quality of nursing services in the organization.

Table 17

Mean Distribution of Respondents' Quality of Nursing Care from Usefulness of EHR in terms of Efficiency

No.	Efficiency of Quality of Nursing Care Items	Mean	Standard Dev.	Description
1	The use of EHR reduces patient care cost per patient.	3.79	.677	High Level
2	Completeness and accuracy of patient data in the use of EHR speed up decision making resulting in efficiency of service operations.	3.86	.692	High Level
3	Healthcare data stored in the EHR can be accessed for a long time.	3.96	.695	High Level

4	EHR delivers healthcare services which maximize the utilization of resources and avoids wastes.	3.96	.652	High Level
5	Patients' needs are met quickly at low cost with the quick communication provided by the EHR system.	3.87	.567	High Level
Arithmetic Mean		**3.89**	**.656**	**High Level**

Table 17 shows the mean distribution of the respondent's quality of nursing care from use of EHR in terms of Efficiency. Findings show the "High Level" of efficiency in the quality of nursing care as the delivery of healthcare services minimizes the utilization of resources while avoiding wastes with the adoption of EHR, with the highest mean of 3.96 (SD=.652). The level of quality of nursing care is at "High Level", as the use of EHR system reduces patient care cost; speed up of decision making due to completeness and accuracy of patient data resulting in efficiency of operations; access of healthcare data for a long time; and meeting quickly patients' needs at low cost, with mean values of 3.79 (SD=.677), 3.86 (SD=.692), 3.96 (SD=.652), and 3.87 (SD=.567), respectively. The SD of 0.656 indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 3.89. The low to moderate SD suggests a relatively high level of agreement or consistency among the respondents regarding the perceived efficiency of Quality of Nursing Care due to EHR.

The grand mean of 3.89, shows the overall high level of quality of nursing care, in the dimension of efficiency, supported by the homogeneity of responses, indicated by the average standard deviation of .656. Findings revealed the overall agreement of

the respondents of the high level of quality of nursing care in terms of efficiency, with the EHR functions found to be useful in the improvement of work efficiency gained from reduction of time spent in administrative and time-consuming tasks, quick information retrieval, and elimination of wastes on resources.

This is because EHR is a significant step in encouraging care coordination because of its function of electronic communication and connectivity. The patient data can be updated and exchanged continually by physicians using the record system, and the data can be logically presented in clinical groupings. The EHR system can be used to store data, manage results, manage order input, as decision and patient support, and sustain connectedness and communication between healthcare professionals and patients (Chiara, 2018).

This was even supported by Patterson et al. (2019), who shed light that If clinicians believe that the extra steps required by the DSS slow down their workflow or hinder their efficiency, they may be less likely to rely on its guidance. It is believed that efficiency is more crucial than the presence of supportive recommendations. This suggests that the mere presence of decision support does not guarantee its acceptance and implementation in real-world clinical settings. Since there might be an alignment of the system's recommendations with their own clinical judgment and expertise. If clinicians perceive the DSS suggestions as contradicting their professional judgment or patient-specific factors, they might choose to disregard the recommendations.

As a result, the findings of the present study revealed the respondents' overall agreement on high quality of nursing care in terms of efficiency is due to reduced time spent in administrative and time-consuming tasks, quick information retrieval, and elimination of wastes on resources.

Table 18

Mean Distribution of Respondents' Quality of Nursing Care from Usefulness of EHR in terms of Focus on Patients

No.	Focus on Patients of Quality of Nursing Care Items	Mean	Std.	Description
1	Utilization of EHR increases nurses' focus on interactions with patients and their families.	3.71	.842	High Level
2	EHR facilitates effective communication with patients vital in maintaining a trusting relationships between nurses and patients.	3.79	.797	High Level
3	Close contact with patients is facilitated with EHR making patients feel valued and cared, resulting in higher quality of nursing care.	3.73	.765	High Level
4	EHR system keeps transparency in service to patients eliminating the rise of negative prejudices to nurses.	3.84	.719	High Level
5	The use of EHR provides care which considers aspirations and preferences of individual patient.	3.79	.632	High Level

Arithmetic Mean	**3.77**	**.751**	**High Level**

Table 18 shows the mean distribution of the respondent's quality of nursing care from use of EHR in terms of Focus on Patients. Findings show “High Level” of quality of nursing care, focusing on patients, as the EHR system keeps transparency in service to patients eliminating the rise of negative prejudices to nurses, with the highest mean of 3.84 (SD=.719). Focus on patients is perceived to the high level of quality, as EHR utilization increases nurses’ focus on interactions with patients and their families; EHR facilitates effective communication with patients vital in maintaining a trusting relationships between nurses and patients; close contact with patients is facilitated with EHR making patients feel valued and cared, resulting in higher quality of nursing care; and the use of EHR provides care which considers aspirations and preferences of individual patient, with mean values of 3.71 (SD=.842), 3.79 (SD=.797), 3.73 (SD=.765), and 3.79 (SD=.632), respectively. The SD of 0.751 indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 3.77. While the SD is somewhat moderate, it still provides confidence that the majority of respondents consistently rate the Focus on Patients of Quality of Nursing Care as being at a high level, and there is not a significant amount of disagreement or variability in their assessments.

In summary, the standard deviation, although slightly higher compared to some other sections, still implies that there is a consensus among the respondents that the Focus on Patients in the context of Quality of Nursing Care due to EHR is perceived to be at a "High Level."

The grand mean of 3.77, show the overall “High Level” of quality of care, focusing on patients, supported by the homogeneity of respondents’ responses, indicated by

the average standard deviation of .751. The finding revealed the full awareness of the respondents on the provision of quality care with the implementation of an EHR system that improves nursing care quality of patient services, through emphasis on the focus on patients. In the provision of patient care, findings show that nurses have the ability to balance the provision of direct care to patients and other work demands that require performance of unrelated clinical workloads, thus resulting in a high level of quality care in the aspect of focus to patients. The EHR system is perceived to provide support to the documentation work and in the management of health information that enable nurses to deliver high quality of nursing care.

According to Hasman and Mantas (2013), a patient support system in the Electronic Health Record system integrates clinical applications for providing patient support and functions in the provision of patient health data and information, which are managed effectively and efficiently to provide high-quality patient care. The system organizes patients' record keeping and medical information to provide timely access to clinical information and reduce redundancy to improve the quality of healthcare service delivery. Medical errors and drug adverse effects on patients are eliminated in the use of the EHR system, with the availability of medical information and decision support systems at the point of healthcare service delivery. Patient information can be shared among users, through a secured electronic health record system.

Findings imply that using the EHR system, health workers need not to spend more time in documentation and experience difficulty in communication, thereby, allowing nurses to provide a high level of quality of patient care. Nurses can effectively manage documentation and health information of patients with the EHR system, thus, have more time in the application of therapeutic communication for patients. Hence, improvement in nursing service quality considers focusing on patients, effectiveness,

and efficiency in the provision of patient care.

Table 19

Mean Distribution of Respondents' Quality of Nursing Care from Usefulness of EHR in terms of Accessibility

No.	Accessibility of Quality of Nursing Care Items	Mean	Standard Dev.	Description
1	The use of EHR provides improved access to essential patient information, better communication, and integration of patient care between healthcare providers.	3.93	.671	High Level
2	The system provides real time healthcare clinical decision support, reducing prescribing of errors in diagnosis and treatment.	3.92	.649	High Level
3	EHR allows tracking and monitoring of adverse patient outcomes resulting in enhanced patient care.	3.93	.671	High Level
4	The use of the record system provides critical patient data that improves and ensures safety outcomes of patients.	3.99	.675	High Level
5	Patient care processes are improved enabling precise and fast sharing of information among healthcare structures, resulting	3.94	.705	High Level

	in improved quality of nursing care.			
Arithmetic Mean		**3.94**	**.674**	**High Level**

Table 19 shows the mean distribution of the respondent's quality of nursing care from use of EHR in terms of Accessibility. Findings show “High Level” of accessibility of the nursing care with EHR implementation as the record system provides patient data that ensures safety outcomes of patients, with the highest mean of 3.99 (SD=.675). EHR system provides improved access to patient information, better communication, and integration of patient care between healthcare providers; provides real time healthcare clinical decision support, reducing prescribing of errors in diagnosis and treatment; allows tracking and monitoring of adverse patient outcomes resulting in enhanced patient care; and patient care processes are improved enabling precise and fast sharing of information among healthcare structures, resulting in improved quality of nursing care, with mean values of 3.93 (SD=.671), 3.92 (SD=.649), 3.93 (SD=.671), and 3.94 (SD=.705), respectively. All individual statements about the Accessibility of Quality of Nursing Care have mean ratings between 3.92 and 3.99, indicating that respondents perceive this aspect to be at a "High Level." The SD, while slightly moderate, still provides confidence that the majority of respondents consistently rate the Accessibility of Quality of Nursing Care as being at a high level, and there is not a significant amount of disagreement or variability in their assessments.

The grand mean of 3.94, shows the overall high level of quality of nursing care in the aspect of accessibility of information, supported by the homogeneity of responses, indicated by the average standard deviation of .674. The findings imply the strong beliefs and awareness of respondents on the adoption of EHR system that allows them

to adequately address the complex needs of patients through the access of good sources of information, thus, can establish good relationships in the healthcare system, including accessibility to a multidisciplinary team of healthcare specialists and professionals. The electronic system is perceived to be useful in accessing information and resources pointing primarily to the best approach to various health conditions encountered in the nursing practice, including the avoidance of duplication and tasks and costs. Respondents believe in the capability of the EHR system to provide accessibility of healthcare information that facilitates documentation of longitudinal records of care, which is comprehensive, easily accessible, and timely. The EHR system is believed to be an essential tool for the improvement of access to relationships and healthcare information, resulting in “High Level” of quality of nursing care through accessibility of the needed information.

The EHR system provides to health providers healthcare information for improvement in the management of diseases, screening of targets, and prevention, demonstrating high level of quality care services. This may be attributed to the benefits of EHR implementation, which include improved access to patient records and information resulting in improved job performance, and speeding up and supporting care processes that lead to efficiency of healthcare services. This highlights the benefits of EHR implementation, which include improved access to patient records and information. Having all relevant patient data in one centralized system streamlines workflows, reduces paperwork, and ensures that healthcare providers have a comprehensive view of a patient's medical history (Chae et al., 2011). So, the implementation of EHR systems provides numerous benefits to healthcare providers and patients alike. The easy access to patient information and improved care processes contribute to higher-quality care services, more efficient healthcare

management, and improved patient outcomes. EHRs play a crucial role in modern healthcare, promoting data-driven decision-making, care coordination, and patient safety, ultimately leading to better healthcare outcomes and experiences.

Findings imply accessibility to patient information, radiology images, and laboratory results could have triggered the enhancement of nursing job performance resulting in efficiency in the quality of nursing care. The implications of enhanced accessibility to patient information, radiology images, and laboratory results for nursing job performance are far-reaching. Improved access leads to more informed decision-making, better care coordination, increased patient safety, and efficient nursing workflows. Overall, these factors contribute to higher-quality nursing care and improved patient outcomes, making it essential for healthcare organizations to invest in and optimize their Electronic Health Record systems.

Table 20
Mean Distribution of Respondents' Quality of Nursing Care from Usefulness of EHR in terms of Relatedness

No.	Relatedness of Quality of Nursing Care Items	Mean	Standard Dev.	Description
1	EHR provides interpersonal interaction between the patient and the nurse, promoting positive patient outcomes.	3.88	.697	High Level
2	The use of EHR provides guidance from self-determination theory, in which patients feel free to talk and respond openly, enhancing the quality of nursing care.	3.83	.617	High Level

3	Patients become empowered and motivated to carry out treatment with the care provider resulting in high quality of nursing care.	3.89	.622	High Level
4	The system allows nurses to adopt patient centered approach, which build trust among patients and the feeling of safety in the treatment process.	3.78	.639	High Level
5	Patients develop relatedness to become self-directed in mastering tasks involving health behavior choices and feel connected with the care provider.	3.71	.667	High Level
Arithmetic Mean		**3.82**	**.648**	**High Level**

Table 20 shows the mean distribution of the respondent's quality of nursing care from usefulness of EHR in terms of Relatedness. Findings show “High Level” of relatedness of the nursing care quality, as patients become empowered and motivated to carry out treatment with the care provider resulting in high quality of nursing care, with the highest mean of 3.89 (SD=.622). Relatedness of the quality of nursing care is at “High Level”, as EHR provides interpersonal interaction between the patient and the nurse, promoting positive patient outcomes; the use of EHR provides guidance from self-determination theory, in which patients feel free to talk and respond openly, enhancing the quality of nursing care; the system allows nurses to adopt patient centered approach, which build trust among patients and the feeling of safety in the

treatment process; and patients develop relatedness to become self-directed in mastering tasks involving health behavior choices and feel connected with the care provider, with mean values of 3.88(SD=.697)., 3.83(SD=.617)., 3.78(SD=.639)., and 3.71(SD=.667)., respectively. The low to moderate SD suggests a relatively high level of agreement or consistency among the respondents regarding the perceived relatedness of Quality of Nursing Care due to EHR. The SD, while slightly moderate, still provides confidence that the majority of respondents consistently rate the Relatedness of Quality of Nursing Care as being at a high level, and there is not a significant amount of disagreement or variability in their assessments.

The grand mean of 3.82, shows the overall “High Level” of relatedness of nursing care quality, supported by homogeneity of responses, indicated by the average standard deviation of .648. Findings revealed respondents’ belief on the high level of nurses’ engagement in caring for patients, utilizing technical skills, providing support toward healing, giving encouragement for health improvement, and establishing relationships with patients. Respondents view relatedness of quality care as important and relevant for attainment of health and patient outcomes, thus, the high level of perceptions on relatedness of quality nursing care.

Relatedness in the quality of care allows patients to feel the human connection in the healthcare and technological environment. Nurses can do a lot in bringing the relatedness concept in meeting patients’ needs such as talking and listening actively to them, feeding patients, allowing patients to talk, and providing them treatment, which can make patients feel better emotionally and mentally (Arabi et al., 2022).

The study's findings highlight a positive belief among respondents regarding the high level of nurses' engagement in caring for patients, their use of technical skills, supportive approach, and ability to build strong relationships. The relatedness of

quality nursing care to health and patient outcomes is perceived as vital and relevant. Such positive perceptions can serve as motivation for nurses to continue delivering patient-centered care and continuously improve their practice to ensure better health outcomes and enhanced patient experiences. The respondent's belief in nurses' proficient use of technical skills implies that nurses are well-trained and competent in their clinical abilities. Technical expertise is essential for accurate assessments, diagnosis, treatment, and monitoring of patients, contributing to better health outcomes and patient satisfaction. This highlights the importance of not only addressing patients' physical needs but also their emotional and psychological well-being. A supportive and empathetic approach can positively impact patient morale, compliance with treatment plans, and overall health improvement.

Table 21

Mean Distribution of Respondents' Quality of Nursing Care from Usefulness of EHR in terms of Competence

No.	Competence of Quality of Nursing Care Items	Mean	Standard Dev.	Description
1	EHR system results in the provision of nurses with effective patient input and feedback of treatment.	3.71	.729	High Level
2	Nurses provide patients with the tools and skills to succeed, and support that enable patients to develop the right attitudes that achieve positive health outcomes.	3.62	.729	High Level
3	Nurses are able to provide patient-	3.83	.727	High Level

	centered coaching for positive health preferences.			
4	Nurses provide assistance that allow patients to experience mastery and competence toward high degree of willingness toward improved health and develop necessary health behaviors.	3.79	.797	High Level
5	The use of EHR develops in nurses the belief to achieve behavior change and positive health outcomes of their patients.	3.74	.760	High Level
Arithmetic Mean		**3.74**	**.749**	**High Level**

Table 21 shows the mean distribution of the respondent's quality of nursing care from use of EHR in terms of Competence. Findings revealed a “High Level” of competence in the quality of nursing care, as nurses are able to provide patient-centered coaching for positive health preferences, with the highest mean of 3.83 (SD=.727). Findings revealed “High Level” of competence of the quality of nursing care with the EHR system results in the provision of nurses with effective patient input and feedback of treatment; nurses are able to provide patients with the tools and skills to succeed, and support that enable patients to develop the right attitudes that achieve positive health outcomes; provision of patient-centered coaching for positive health preferences; provision of assistance that allows patients to experience mastery and competence toward a high degree of willingness toward improved health and develop necessary health behaviors; and the development of belief to achieve behavior change

and positive health outcomes of their patients, with mean values of 3.71(SD=.729), 3.62(SD=.729), 3.83(SD=.727), 3.79(SD=.797), and 3.74(SD=.760), respectively. The SD of 0.749 indicates that the responses to these statements tend to cluster relatively closely around the mean rating of 3.74. The low to moderate SD suggests a relatively high level of agreement or consistency among the respondents regarding the perceived competence of Quality of Nursing Care due to EHR. All individual statements about the Competence of Quality of Nursing Care have mean ratings between 3.62 and 3.83, indicating that respondents perceive this aspect to be at a "High Level." The SD, while slightly moderate, still provides confidence that the majority of respondents consistently rate the Competence of Quality of Nursing Care as being at a high level, and there is not a significant amount of disagreement or variability in their assessments.

The grand mean of 3.74 reveals the overall high level of competence of the quality of nursing care, supported by the homogeneity of respondents' responses, indicated by the average standard deviation of .749. Findings show the full awareness of the respondents on the high level of characteristics and attributes of the respondent nurses in terms of educational attainment, professional development, nursing experience, and work satisfaction making up the competence of nurses resulting in high quality of service delivery. High level of competence in the quality of nursing care implies the use of nurses with their acquired and developed nursing competencies in the management of clinical situations and in ensuring that service quality is at a high level.

Indeed, the use of Electronic Health Records is designed to improve the quality of nursing care and patient outcomes (Yanamadala et al., 2016). Utilizing the Electronic Health Record system, patients obtained the lowest rates of mortality and readmissions. The use of the system has the potential of decreasing medical errors

through the provision of improved access to vital information, integration of care with different providers, better communication, and more efficient monitoring and documentation. Prescribing of errors is decreased through real-time clinical decision support. The system allows nurses to monitor and track patient outcomes, which provides critical information for the improvement of the safety outcomes of patients. The study provides evidence of the relationship between EHR system implementation, and the improved quality of nursing care delivered in the inpatient setting.

Table 22

The Relationship Between the Usefulness of EHR and the Quality of Nursing Care

	Quality of Nursing care		
Usefulness of EHR Variables	**Correlation Coeff (r)**	**Interpretation**	**p-value**
Results Management	.727**	Strong Relationship	.000 (S)
Order Entry Management	.718**	Strong Relationship	.000 (S)
Decision Support	.773**	Strong Relationship	.000 (S)
Electronic Communication & Connectivity	.727**	Strong Relationship	.000 (S)
Patient Support	.744**	Strong Relationship	.000 (S)
Administrative Processes	.664**	Strong Relationship	.000 (S)
Reporting & Population Health Management	.659**	Strong Relationship	.000 (S)

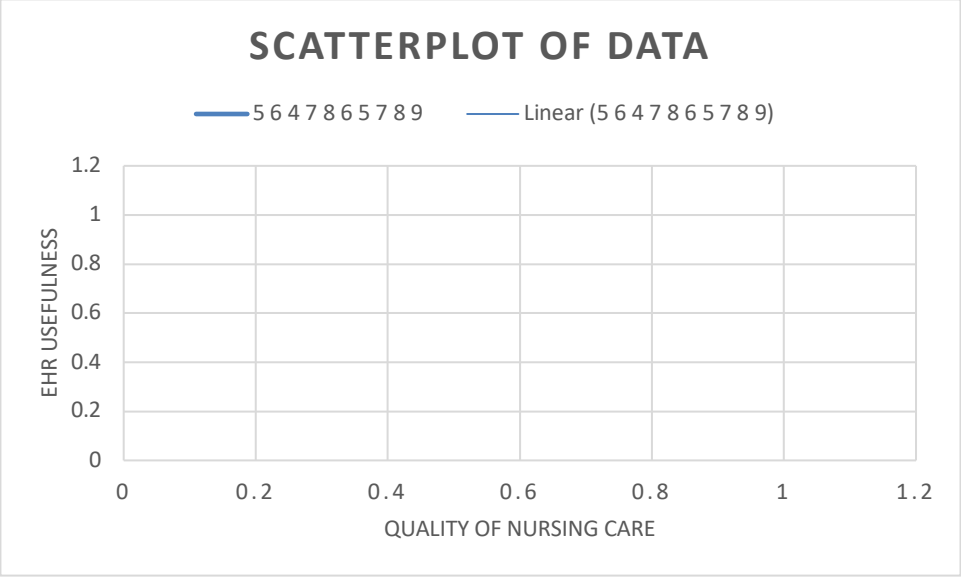
** Correlation is significant at the 0.01 level (2-tailed).

Table 22 shows the Pearson r Correlation between the Usefulness of EHR and the Quality of Nursing Care. Findings show a strong positive correlation between the

use of EHR and the quality of nursing care, indicating a “Strong Positive”, or having a “Significant Relationship” between the two variables. Results management has a pearson correlation of .727 and ρ value of 0.000, significant at the 0.01 level. Order-entry management, decision support, electronic communication and connectivity, patient support, administrative processes, and reporting and population health management, have Pearson Correlation of .718, .773, .727, .744, .664, and .659, respectively, with all variables have ρ-value of 0.000, all significant at the 0.01 level. The variables of the usefulness of EHR in terms of results management, order entry management, decision support, electronic communication and connectivity, patient support, administrative processes, and reporting and population health management, have a strong positive or significant relationship with the quality of nursing care. A change in the effectiveness or level of the use of EHR will significantly cause change in the quality of nursing care.

The chart below illustrates the preliminary test for linearity, the scatterplot of data before applying the Pearson r correlation.

Figure 4. Scatterplot of Data



Based on the scatterplot, it appears that the linearity assumption is reasonably

met for all the aspects of EHR. The data points show a positive linear trend, suggesting that as the perceived usefulness of EHR increases, the quality of nursing care tends to increase as well. Given this visual assessment of linearity, the researcher has proceeded with conducting a Pearson correlation analysis to quantify the strength and significance of the linear relationship between these two variables. The chart shows that as the "Usefulness Score" (HER usefulness) increases, there seems to be a tendency for the "Quality Score" (Quality of nursing care) to increase as well. The data points exhibit a positive linear trend, suggesting that as the perceived usefulness of EHR's Results Management increases (Usefulness Score on the X-axis), there is a tendency for the quality of nursing care to increase (Quality Score on the Y-axis).

In each of these aspects of EHR usefulness, the visual inspection of the scatterplots suggests a positive linear relationship, indicating that as the perceived usefulness of the corresponding EHR aspect increases, there is a tendency for the quality of nursing care to increase as well. While these visual assessments are valuable, it's essential to perform Pearson correlation analyses to quantify and confirm the strength and statistical significance of these linear relationships for each aspect, which would provide more rigorous evidence of the relationships observed. After all, there are no clear indications of a curved or nonlinear relationship, such as a U-shape or inverted U-shape in the chart.

Having said that, the Pearson r correlation analysis revealed that the variables of the usefulness of EHR in terms of results management, order entry management, decision support, electronic communication, and connectivity, patient support, administrative processes, and reporting and population health management, have a “strong positive” or significant relationship with the quality of nursing care. As there is an increase or decrease change in the effectiveness or level of the use of HER, it will

significantly cause a change in the quality of nursing care as well.

The significant relationship between Results Management and Quality of Nursing may be related to the study of Menachemi and Collum (2011), which claims that results management in the aspect of clinical results is a focus of electronic health record systems as it is related to the quality of care and patient safety. The significant relationship between Order Entry Management and Quality of Nursing may be because computerized physician order entry is an application required in the EHR system so that physicians may order tests electronically and ensure that the orders are accurate for patient safety (Seymour et al., 2012). However, the significant relationship between Decision Support and the Quality of Nursing was contrasted in the study of Lin (2012), because the design and deployment of decision support systems are difficult as they call for computing infrastructure, modifications to the current workflow, and machine-readable patient data.

The significant relationship between Electronic Communication and Connectivity and the Quality of Nursing was supported by Hovenga (2022) who emphasized that the EHR communication and connectivity dimension is adequate for the effective communication of medication information. Additionally, the significant relationship between Patient Support and the Quality of Nursing may be attributed to the usefulness of EHR since the system allows enhanced access of clinical information, involvement of patients in providing care, and enhances understanding between the patient and care providers (Walker-Czyz, 2016). Shortliffe and Chiang (2021) also supported the significant relationship between Administrative Processes and the Quality of Nursing because the EHR system provides valuable information on the utilization of resources on different types of diseases, the severity of diseases, and other information vital in making informed decisions associated with increased healthcare costs, reducing

mistakes and the expenditures of patients on health care services.

Lastly, the significant relationship between Reporting and Population Health Management and Quality of Nursing may be because the system has the capability to comply with the requirements of reporting and population health management at the local and national levels to maintain quality patient care and patient safety. Hence, as stated by Waithera et al. (2017), the EHR system is a tool for health information technology that is useful in the enhancement of healthcare efficiency and quality of the population, as well as disparities in population health.

Therefore, the null hypotheses for all the variables were rejected. These findings imply the great influence of the adoption and implementation of the EHR system, as it is found to directly affect the level of quality of nursing care. The different functions provided by the EHR system, improve the job performance of nurses in care delivery to patients, as well as enhance organizational performance. The influence of EHR is positive, thus, with increased effectiveness of the implementation of the functions of EHR, high-quality nursing care can be achieved.

The relationship between the usefulness of Electronic Health Records (EHR) and the quality of nursing care can be influenced by various demographic characteristics of nurses. Factors like age, sex, years of experience, technological proficiency or computer literacy, and pre-exposure can impact how nurses perceive and utilize EHR systems. For instance, younger and more tech-savvy nurses might adapt more easily to EHR, leading to enhanced quality of care. On the other hand, older or less experienced nurses might face challenges in using EHR effectively, potentially affecting the quality of care. Additionally, specific training and support tailored to different demographic groups can also play a role in maximizing the benefits of EHR for nursing care. Nurses with varying demographic characteristics may have different

attitudes toward technology adoption. Some may embrace EHR enthusiastically, while others might resist change. This can impact the successful integration and utilization of EHR, subsequently affecting the quality of nursing care. So when considering military nurses, the implications of demographic characteristics on the relationship between the usefulness of EHR and the quality of nursing care can be particularly relevant due to the unique nature of their work environment. Understanding and addressing these implications can help optimize the use of EHR systems among military nurses, enhancing their ability to deliver high-quality care in challenging and dynamic environments. It requires a comprehensive approach that considers the unique needs and characteristics of military healthcare settings and the nurses who serve in them.

Table 23

The Relationship Between the Quality of Nursing Care and Socio-Demographic Profiles of Respondents

Socio Demographic profiles	**Quality of Nursing Care**		
	chi squared	**Interpretation**	**P-value**
Age	x2 1.5	Positive Weak	0.19 (NS)
Sex	x2 2.7	No Relationship	0.848 (NS)
Length of Service	x2 1.1	Positive weak	0.36 (NS)

**significant level at >.05*

Table 23 shows the relationship between the Quality of Nursing Care and the Socio-Demographic Profiles of Respondents. Findings show that there is no significant relationship between the socio-demographic variables of age, sex, length of service, and computer literacy with quality of nursing care, as observed at a significance level of 0.05. However, there is a significant relationship with pre-exposure to EHR systems with quality of nursing care. Therefore, hypothesis 1 is accepted.

Age has a very weak correlation with the quality of nursing care, with Chi-Square statistics of 1.5, and ρ-value of .19. However, Sex does not correlate with the quality of nursing care, with a Chi-Square statistic of x2 2.7 and ρ value of 0.848. Hence, the null hypothesis is accepted. Length of service has a positive weak correlation with the quality of nursing care, with a Chi-Square statistic of 1.1, and ρ value of .36.

The correlation between Age and Quality of Nursing Care can be related to the study conducted by Yontz et al. (2015), which stated that although it is true that most younger nurses have more familiarity with computers and technology than older groups, the utilization or acceptance of computerization may not be affected by age. Thus, Sex has no correlation with the Quality of Nursing Care may be attributed to the nursing profession being predominated largely by women because Hathway et al. (2020) claim that women are more likely to achieve positions in senior management in the nursing profession and progress can be associated with work satisfaction. This means that nurses are found to accept computer-based documentation, regardless of sex, as the course of their work is women dominated. For the Length of service correlation with the quality of nursing care, it may be connected to what Kummer et al. (2013) stated that positive job experiences from the number of years of service rendered in the healthcare organization are linked to positive attitudes toward EHR implementation and use. Even with long years of service, nurses develop favorable attitudes toward EHR implementation that contribute to the enhancement of the quality of nursing care (De Veer & Francke, 2010).

Hence, the null hypothesis 1 was accepted as age, sex and length of service has no significant relationship with the quality of nursing care and implies that their ability to provide nursing care is not compromised regardless of their age, sex and length of service.

Table 24

The Relationship Between the Quality of Nursing Care and Experience-related Profiles of Respondents

Experience-related profiles	Quality of Nursing Care chi squared	Interpretation	P-value
Pre-exposure to EHR Systems	x2 2.4	Positive Weak	*0.04 (S)
Computer Literacy	x2 2.2	No Relationship	0.064(NS)

**significant level at >.05*

Table 24 shows the relationship between the Quality of Nursing Care and the Experience-related Profiles of Respondents. Findings show that there is no significant relationship between the experience-related variables of computer literacy with quality of nursing care, as observed at a significance level of 0.05. However, there is a significant relationship with pre-exposure to EHR systems with quality of nursing care. Therefore, hypothesis 2 is accepted.

Findings show a weak correlation between the experience-related variable of pre-exposure to EHR systems with quality of nursing care, with a Chi-Square statistic of 2.4, and ρ value of .04, significant at the 0.05 level. However, Computer literacy does not correlate with the quality of nursing care, with Chi-Square statistics of 2.2 and ρ-value of .064.

The weak correlation between Pre-exposure to EHR systems with Quality of Nursing Care is contrasted with the study of McCrorie et al. (2019), which claims that medical staffs with prior exposure to EHR utilization are efficient in performing little tasks, using electronic health record system, however, were anxious into integrating the use of EHR into their health work practices. The implications of the findings of the study are that the long years of experience in the use of the EHR system could have expanded respondents' effective and efficient delivery of nursing services, which can

require continuous training for learning advances in EHR technology. However, Computer literacy does not correlate with the Quality of Nursing Care may be because respondents expressed their disagreement on the hope of making organizational reforms involving their involvement in providing EHR system quality. As according to Kuek and Hakkenes (2019), the personnel in healthcare delivery are responsible for the optimization of health service outcomes and extends beyond the provision of safe care, but their participation in broader organizational structures such as EHR system design and implementation is lacking, which can influence the quality of the provision of care.

Therefore, the null hypothesis 2 was accepted. Although pre-exposure has a correlation with the quality of nursing care, hypothesis 2 was still accepted as there is no significant relationship between computer literacy with the quality of nursing care. Computer literacy has no correlation with the quality of nursing care, indicating that there is a disagreement among the respondents on their involvement in the hospital's EHR system design and implementation.

Chapter V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of findings of the study in relation to the objective of the study, conclusions, and the proposed recommendations.

Summary of Findings

The study determined the relationship of the usefulness of the Electronic Health Record (EHR) to the quality of nursing care among nurses in a military hospital in the Kingdom of Saudi Arabia (KSA). Specifically, the researcher addressed the 7 research question as follow: 1) To determine the socio-demographic profile of the respondents in terms of Age, Sex and Length of Service (years of experience); 2) To determine the experience-related profile of the respondents in terms of Pre-exposure to other EHR system and Computer Literacy; 3) To determine the usefulness of electronic health records (EHR), in the areas of results management, order entry management, decision support, electronic communication and connectivity, patient support, administrative processes, and reporting and population health management; 4) To identify the level of quality of nursing care in the military hospital in KSA, resulting from the use of electronic health records, in the dimensions of Effectiveness, Efficiency, Focus on patients, Accessibility, Relatedness, and Competence; 5) To determine the significant relationship of the perceived usefulness of EHR and the quality of nursing care in a military hospital in KSA; 6) To determine the relationship between the quality of nursing care and the socio- demographic profiles of respondents; and lastly, 7) To determine the relationship between the quality of nursing care and the experience-related profiles of respondents in terms of:

Findings revealed the following:

1. The age of respondents shows that the majority are in the age range of 30 to 40 years, with 109 respondents or 36.2%, and the smallest group of 22 respondents or 7.2%, who are in the age range of 51 years and above. Most nurses are female, with 260 respondents, or 94.4%, followed by 17 respondents, or 5.6%, who are male. Most of them have 11 to 20 years and 6 to 10 years in service to the organization, with 109 respondents or 36.2% and respondents or 34.8%, respectively. While the smaller groups have 21 years and above years of experience, with 15 respondents or 13%, respectively.

2. Findings show that most of respondents with frequency of 109 have pre-exposure to satisfactory clerical skills and medical terminology, while 98 out of 207 respondents do not have. 105 respondents answered “yes” that they have knowledge on computer-assisted coding systems and 100 respondents have exposure to in-service training programs for technology in healthcare systems. 102 respondents have orientation on the use of technology; and 90 respondents out of 207 have prior knowledge on collaboration and data sharing using technology, respectively. While for computer literacy, findings show that out of 207 respondents, 135 nurses possess basic computer skills essential to operate the EHR system, while 72 of them do not. 130 of them use computers at work and at home and 77 do not use it. 100 have both achieved proficiency in the use of the EHR system, and gained expertise in the use of the system, respectively. However, 78 of them are only involved in the hospital’s EHR system design and selection, while the rest 129 out of 207 respondents, are not involved.

3. Overall, all the dimensions in EHR utilization were rated by the respondents as “Very Useful”. The usefulness of electronic health records (EHR) in terms of results management obtained the highest mean of 4.19, which stated that EHR was found to

be useful in the provision of support for the conduct of assessment on the effective use of technology in the delivery of healthcare services. In terms of order entry management, results indicate the highest mean value of 3.99 where most respondents believe EHR to be useful in making decisions for care delivery and in the elimination of errors in prescriptions. Findings also revealed that communication and connectivity in EHR are perceived by respondents to be useful in job performance which allows them to develop assessments and manage risks in the delivery of patient care, with the highest mean of 4.09. For the administrative processes, it obtained the highest mean of 4.21 where respondents perceived that the EHR system is very useful in facilitating admission, registration, transfer, and discharge processes. Lastly, the reporting and population health management obtained the highest mean of 4.04, where respondents perceived that the EHR's process management system is useful in ensuring records and reports of clinical results in each phase of the treatment.

4. Findings show the high level of effectiveness of the quality of nursing care provided in the military hospital, as patient safety and safe clinical processes are provided and the improvement of continuity of patient care, access to prescription, test results, and patient appointments, with the highest mean value of 4.04, for both indicators. Findings also show the "High Level" of efficiency in the quality of nursing care as the delivery of healthcare services minimizes the utilization of resources while avoiding waste with the adoption of EHR, with the highest mean of 3.96. There is a "High Level" of relatedness of the nursing care quality, as patients become empowered and motivated to carry out treatment with the care provider resulting in high quality of nursing care, with the highest mean of 3.89. Lastly, findings revealed a "High Level" of competence in the quality of nursing care, as nurses are able to provide patient-centered coaching for positive health preferences, with the highest mean of 3.83.

5. Findings show a strong positive correlation between the usefulness of EHR and the quality of nursing care, indicating a “Strong Positive”, or having a “Significant Relationship” between the two variables. Results management has a Pearson Correlation of .727 and ρ value of 0.000, significant at the 0.01 level. Order-entry management, decision support, electronic communication and connectivity, patient support, administrative processes, and reporting and population health management, have Pearson Correlation of .718, .773, .727, .744, .664, and .659, respectively, with all variables have ρ-value of 0.000, all significant at the 0.01 level. Therefore, hypothesis 3 is rejected.

6. Findings show that there is no significant relationship between the socio-demographic variables of age, sex, length of service, and computer literacy with quality of nursing care, as observed at a significance level of 0.05. Age has a very weak correlation with the quality of nursing care, with Chi-Square statistic of 1.5, and ρ-value of .19. However, Sex does not correlate with the quality of nursing care, with a Chi-Square statistic of x2 2.7 and ρ value of 0.848. Hence, the null hypothesis is accepted. Length of service has a positive weak correlation with the quality of nursing care, with a Chi-Square statistic of 1.1, and ρ value of .36. Hence, hypothesis 1 is accepted.

7. Findings show that there is no significant relationship between the experience-related variables of computer literacy with quality of nursing care, as observed at a significance level of 0.05. There is a weak correlation between the experience-related variable of pre-exposure to EHR systems with quality of nursing care, with a Chi-Square statistic of 2.4, and ρ value of .04, significant at the 0.05 level. However, Computer literacy does not correlate with the quality of nursing care, with Chi-Square statistic of 2.2 and ρ-value of .064. The p-value indicates that the relationship between

computer literacy and nursing care quality is not statistically significant at the significance level of 0.05, reaffirming the acceptance of hypothesis 2.

Conclusion

In conclusion, there is an overall agreement of the findings, and it revealed that the usefulness of the EHR system has a positive significant relationship with quality of nursing care. Regarding level of use of EHR, respondents agree on the overall usefulness of the EHR system, which implies their belief on the usefulness of the system in providing security and effectiveness in the management of patient records in order to facilitate patient treatment, medications' provisions, diagnoses, and tests and laboratory results. In terms of quality of care, there is an overall high level of effectiveness of the quality of nursing care in the military hospital, showing the agreement of the respondents that the effectiveness of the quality of nursing care provided by the hospital is at high level with the ability of nurses to integrate the knowledge and skills in collaborating and communicating with patients and other health care members in the delivery of coordinated care to the patient, resulting in patient satisfaction. Lastly, on the demographic profile of the respondents, regardless of age range, sex, nurse respondents are using the EHR system, as it contributes to the effectiveness and efficiency of work performance. There is also an overall agreement on the high level of computer literacy and pre-exposure to the EHR system which reveal their confidence in the use of the EHR system that enhances their job performance in the delivery of care. Majority of the respondents have long years of experience in the organization and have been using the EHR system for a long period of time, enhancing their work performance.

Findings revealed a significant strong positive correlation between the usefulness of EHR and the quality of nursing care. Hence, hypothesis 3 was rejected. The study

also explored the influence of variables such as age, sex, length of service, pre-exposure to EHR systems, and computer literacy on the quality of nursing care. Findings indicate that age, sex, and length of service have no significant relationship with nursing care quality. However, there is a significant relationship with pre-exposure to EHR systems. Specifically, pre-exposure to EHR systems is positively associated with higher quality nursing care. The study also found no significant relationship between computer literacy and nursing care quality. Hence, hypothesis one and two is accepted. These insights provide a valuable understanding of factors impacting nursing care quality, particularly the importance of prior exposure to EHR systems in enhancing nursing practice. Thus, as the majority of earlier studies have concentrated on the advantages of EHR for both patients and healthcare professionals. Only a few research like the present study have looked at how using an EHR affects the patient's quality of care. Hence, this study may be a reliable source of consultative information regarding formulating policies, intervention programs, plans, projects, or making changes to improve the use of EHR in the nursing profession.

Some challenges that the present study might have encountered include a biased perception of respondents in answering the questionnaire, as their high self-efficacy could be influenced by their prior experience with QCPR technology, leading to an overestimation of their abilities with the BestCare EHR application. They may also have a learning curve where users with previous training on EHR systems might find it easier to adapt to the new application, while others without such experience could struggle initially. Military nurses may have varying levels of familiarity with EHR systems, depending on their previous experience and exposure to such technology. Adequate training is essential to ensure all nurses can effectively utilize the EHR for delivering high-quality care. Although some users might resist transitioning to the new EHR

application due to their familiarity and comfort with the previous technology, or there might be some respondents who lacked sufficient training or support with the BestCare EHR application might have difficulty using it effectively. Regardless, the study has only focused on a specific user group, the military nurses, which may neglect the perspectives and challenges faced by other potential users of EHR, especially if the user interface of the BestCare EHR application was significantly different from the previous system, users might have found it difficult to navigate and use efficiently. These challenges could have influenced the outcomes of the study and should be considered in further studies when interpreting the results of high self-efficacy among participants.

Recommendations

Based on the findings of the study, certain recommendations were proposed to the healthcare industry, nurses, patients, nursing informatics, nursing administrators, and future researchers for further enrichment of the findings of the study.

Healthcare industry – As findings revealed that the majority of the respondents are women, but sex has no correlation with the use of EHR, the research recommended that the healthcare industry may plan to develop incentives and computer training that will increase positive attitudes of nurses in different sex and age groups toward utilization of EHR systems in the enhancement of quality nursing care. They may also incorporate the requirement of pre-exposure to the EHR system among applicant nurses in the hospital organization or hiring policies, since pre-exposure to the EHR system is positively related to the enhancement of quality care. Moreover, taking ownership of the responsibility to provide the best care for patients and recognizing the benefits EHR brings to care delivery can further encourage the adoption of this technology. These factors play a significant role in the successful implementation and

utilization of EHR systems in healthcare settings. After all, recognizing the significance of a positive attitude and ownership in EHR adoption can help healthcare organizations design strategies to increase the adoption rates of EHR systems among their staff and stakeholders. Thus, promoting positive attitudes and ownership can facilitate better interoperability and integration of EHR systems with other healthcare technologies, streamlining data exchange and overall healthcare processes. By implementing these recommendations and understanding the implications, healthcare organizations can foster a positive EHR adoption environment, leading to improved patient care, streamlined processes, and better overall healthcare outcomes.

Nurses – Since there is a significant correlation between the use of EHR and quality of nursing care in all dimensions associated, the researcher recommended to the nurses that they may continuously enhance the usefulness and effectiveness of the EHR for improving the safety and outcome of the patients. They may utilize the order entry management function of the EHR system as they perceive it to be very useful and continuously improve their familiarity with the use of EHR. The additional knowledge gained from the idea is that a positive attitude toward the use of Electronic Health Records (EHR) can motivate the adoption of EHR applications. Emphasizing the potential benefits of EHR in improving patient care and outcomes can lead to a more patient-centric approach, encouraging healthcare providers to leverage the technology effectively. A positive attitude towards EHR can also positively impact workflow efficiency, as healthcare professionals are more likely to embrace the technology and integrate it into their daily routines.

Patients – The researcher recommended to the patients that they may learn to participate in inputting their data and double-check every information in medical records to reduce an incidence of medical error, duplication of tests, and delays in

treatment. It is recommended that patients become well-informed to make better decisions, as the nurses perceived that EHR is meant to be used to improve the quality of nursing care and bring lots of advantages to the patients.

Nursing informatics – It is recommended that nursing informatics may develop advanced training and education among nurses for managing the medical systems, data supporting nursing practice, and the improvement of patient outcomes, since the findings of the study revealed a positive correlation between the usefulness of EHR and quality of nursing care. They may also facilitate building a good environment for learning to maximize the use of EHR and provide nurses some incentives and motivation to engage them to be more qualified nurses and make them stay in the organization for a long term, so they can learn to use the EHR effectively for high-quality delivery of nursing services. When they take ownership of providing the best care and see EHR as a valuable tool, they may be more diligent in maintaining accurate and updated patient records, leading to improved data accessibility and continuity of care. They must also ensure adequate technical support and resources are available to assist healthcare providers in effectively using EHR systems, addressing any challenges they encounter promptly. Furthermore, to implement robust data security measures to safeguard patient information and address any concerns related to data privacy, building trust in the EHR system among all stakeholders.

Nursing administrators – The researcher highly recommends to nursing administrators that they may provide continuous training and education on computer literacy and advancements in technology among nurses to maintain the high level of quality care since computer literacy has been found to have no relationship with the use of EHR. It is also recommended to monitor and guide newly hired nurses for them to gain work experiences on the job and accumulate knowledge and skills for high-

quality delivery of nursing services since the length of services and usefulness of EHR have a significant correlation. They can also foster a positive organizational culture that encourages open communication, continuous learning, and appreciation for the role of technology in enhancing patient care. To do so, it is recommended as well that nursing administrators be provided comprehensive training and education to healthcare professionals to familiarize them with EHR systems, highlight the benefits, and address any concerns they may have.

Future researchers – As there is a limitation on the conduct of the study with regards to scope and contrasts findings about sex and computer literacy, the researcher recommended to the future researcher that they may use or explore this study as a reference that aims at determining the utilization of advanced technologies that will improve primary care practices, healthcare decision-making, and the provision of timely and relevant information in healthcare systems. It is recommended that they may conduct further studies with similar topics of interest.

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Appendices

APPENDIX A

Questionnaire

RESEARCH TOOL

Your honest opinion in answering the following questions will be very much appreciated. All responses will be used for the purpose of this research only.

Directions: Please answer the following by putting a check mark on the appropriate answer. Write complete answer when it requires factual data.

Part 1. Sociodemographic profile

1. What are the sociodemographic characteristics of the nurses in terms

of:

1. Age:

20- 30 years old [ ]
31-40 years old [ ]
41-50 years old [ ]
51 years old and above [ ]

1.2Gender

1. Male [ ]
2. Female [ ]

1.3 Length of Service (Experience): _____(actual; in year/s)

Experience related demographics:
Instruction: Please put a check mark (✓) on the space provided corresponding your answer:

2. Pre-exposure to other EHR Systems of Nursing Professionals

		YES	NO
1	I have pre-exposure to satisfactory clerical skills and medical terminology.		
2	I have knowledge on computer- assisted coding systems.		
3	I have exposure to in-service training programs for technology in healthcare systems.		
4	I have orientation on the use of technology for understanding clinical data and used in clinical decision making.		
5	I have prior knowledge on collaboration and data sharing using technology in healthcare provision.		

2.1 Computer Literacy of Nursing Professionals

		YES	NO
1	I possess basic computer skills essential to operation of the EHR system.		
2	I utilize computers at work and at home.		
3	I have achieved proficiency in the use of EHR system.		
4	I have gained expertise in using the EHR system.		
5	I am involved in the hospital's EHR system design and selection.		

Source: (World Health Organization, 2006).

3. What is the use of electronic health records (EHR)?

Instruction: Please rate your answers according to the following guide by putting a check mark on the rating space provided:

Score	Verbal Interpretation
5	Strongly Agree
4	Agree
3	Moderately Agree
2	Disagree
1	Strongly Disagree

Part II. EHR Utilization Tool:

3.1Use of EHR in Results Management

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR displays results for healthcare professionals to develop improvements in efficiency and effectiveness of treatment, making cost reductions through elimination of duplicate testing.					
2	EHR provides formats for comparing and trending treatment and diagnosis results.					

3	EHR provides basis in the analysis of the cost-efficiency and effectiveness of the health record system.					
4	EHR helps in analyzing outcomes of patients.					
5	EHR provides support for the conduct of assessment on the effectiveness of the use of technology in healthcare delivery.					

Source: (Homan, 2007)

3.2 Use of EHR in Order Entry Management

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR system permits entry of clinical orders for laboratory, radiology, and pharmacy services electronically.					
2	The EHR system provides complete service ordering, results reporting, customized order sets, and alerting capability.					
3	Computerized physician order entry systems in EHR incorporates data on current medications, patient diagnosis, and history of drug interactions that significantly reduce errors in prescriptions.					
4	The system allows increased clinician compliance with standards of care guidelines which eliminate care variations, thereby improving quality of care.					
5	EHR eliminates the need for re-entry into the hospital information system in making orders for medication, radiology, and laboratory.					

Source: (Woo & Pfeffer, 2013; Waleet et al., 2016).

3.3 Use of EHR in Decision Support

No.	Indicators	Rating				
		5	4	3	2	1

1	EHR provides decision support tools which are fully integrated into the process of care delivery, enabling patients and care providers to have access to medical knowledge relevant to patient care.					
2	Clinical data repository database of the EHR platform for decision support collects and stores information for patient care which are vital in clinical decision making.					
3	Event monitor in the EHR system combines clinical rules in the generations of alerts, reminders, and messages crucial in decisions for cared delivery.					
4	Health record documentation of the EHR system helps clinical care professionals to make informed decisions about patient treatment and diagnosis.					
5	The real time clinical decision support provided by EHR eliminates errors in prescriptions.					

Source: (Homan, 2007; Yanamadala et al., 2016).

3.4 Use of EHR in Electronic Communication and Connectivity

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR provides communication technologies essential for communications among clinicians and patients in the delivery of quality care, ensuring continuity of patient services.					
2	Communication technology enables the development of information and communication networks that increase connectivity and information exchange among the dispersed care team and patients.					
3	Communication system of the EHR ensures confidentiality and security of the transmission of health care data through wireless links which improves patients and health care providers' connectivity.					
4	Clinical information system in EHR provides the mechanism for sharing the data collected from different sources, making patient data available at the point of care.					
5	Detailed information stored in the record system allows healthcare providers to develop assessments and manage risks in patient care delivery.					

Source: (Dever et al., 2013; Homan, 2007)

3.5 Use of EHR in Patient Support

No.	Indicators	Rating				
		5	4	3	2	1
1	Health records from the EHR assist clinicians in the conduct of analysis of various illnesses in the formulation of guidelines for clinical practice and in the evaluation of quality of patient care.					
2	EHR allows effective management of all activities related to healthcare services provided to patients.					
3	EHR provides support for activities associated with the handling of healthcare resources and communication of information to different clinical units.					
4	EHR stimulates patient's active involvement in the management of own health to become primary user of health record.					
5	EHR documentation system provides support to health care professionals in the analysis of the severity of patients' illness.					

Source: (Homan, 2007;)

3.6 Use of EHR in Administrative Processes

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR facilitates admission, registration, transfer, and discharge processes.					
2	The system incorporates vital information for effective and accurate patient assessment and identification.					
3	The system provides a unique patient identifier which is unidentifiable outside of the institution it serves, linking all clinical tests, observations, complaints, procedures, diagnoses, and evaluations to the patients.					
4	Health record system documents patients' illness and treatment and all information, enabling the healthcare organization to determine payment for reimbursement system.					
5	EHR data provides assistance in the management and reporting of costs.					

Source: (Homan, 2007; Dever et al., 2013)

2.7 Use of EHR in Reporting and Population Health Management

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR's process management system ensures recording and reporting of clinical results in each phase of the treatment.					
2	Health information stored in the EHR system allows reporting of health data to government agencies for management and monitoring of public health.					
3	EHR allows reporting of health information for allocation of government resources to the healthcare system.					
4	Health record documentation in the EHR provides data to a third party for the payment of patient bill.					
5	EHR data allows reporting to government agencies for the conduct of strategic planning for the healthcare system.					

Source: (Homan, 2007)

Part 3 Quality of nursing care resulting from the use of EHR

3. What is the level of quality of nursing care in the military hospital in KSA, resulting from the use of electronic health records?

Direction: Please rate your answers according to the following guide by putting a check mark on the rating space provided:

Rating	Verbal Interpretation
5	Very High Level
4	High Level
3	Moderate Level
2	Low Level
1	Very Low Level

3.1 Effectiveness of Quality of Nursing Care

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR results in improvement of diagnosis, treatment, and patient care results due to easy access to health records anytime and anywhere.					
2	Accessibility of EHR data facilitates the development of evidence-based nursing practice.					
3	Nursing care provides patient safety and safe clinical processes.					
4	EHR system use results in high degree of compliance of the patient following correctly medical advice & treatment.					
5	Nursing care improves continuity of patient care, access to prescription, test results, and patient appointments.					

Source: (Sarawasta&Hariyati, 2018; Ugoriji, 2014; Ndifa et al., 2016).

3.2 Efficiency of Quality of Nursing Care

No.	Indicators	Rating				
		5	4	3	2	1
1	The use of EHR reduces patient care cost per patient.					
2	Completeness and accuracy of patient data in the use of EHR speed up decision making resulting in efficiency of service operations.					
3	Healthcare data stored in the EHR can be accessed for a long time.					
4	EHR delivers healthcare services which maximize the utilization of resources and avoids wastes.					
5	Patients needs are met quickly at low cost with the quick communication provided by the EHR system.					

Source: (Sarawasta&Hariyati, 2018; Kazley et al., 2014; Nidifon et al., 2016).

3.3 Focus on Patients of Quality of Nursing Care

No.	Indicators	Rating				
		5	4	3	2	1
1	Utilization of EHR increases nurses' focus on interactions with patients and their families.					
2	EHR facilitates effective communication with patients vital in maintaining a trusting relationships between nurses and patients.					
3	Close contact with patients is facilitated with EHR making patients feel valued and cared, resulting in higher quality of nursing care.					
4	EHR system keeps transparency in service to patients eliminating the rise of negative prejudices to nurses.					
5	The use of EHR provides care which considers aspirations and preferences of individual patient.					

Source: (Sarawasta&Hariyati, 2018; Schenk et al., 2018; .Kazley et al., 2014; Alkureishi et al., 2018

3.4 Accessibility of Quality of Nursing Care

No.	Indicators	Rating				
		5	4	3	2	1

1	The use of EHR provides improved access to essential patient information, better communication, and integration of patient care between healthcare providers.					
2	The system provides real time healthcare clinical decision support, reducing prescribing of errors in diagnosis and treatment.					
3	EHR allows tracking and monitoring of adverse patient outcomes resulting in enhanced patient care.					
4	The use of the record system provides critical patient data that improves and ensures safety outcomes of patients.					
5	Patient care processes are improved enabling precise and fast sharing of information among healthcare structures, resulting in improved quality of nursing care.					

Source: (Yanamadala et al., 2016)

3.5 Competence of Quality of Nursing Care

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR system results in the provision of nurses with effective patient input and feedback of treatment.					
2	Nurses provide patients with the tools and skills to succeed, and support that enable patients to develop the right attitudes that achieve positive health outcomes.					
3	Nurses are able to provide patient-centered coaching for positive health preferences					
4	Nurses provide assistance that allow patients to experience mastery and competence toward high degree of willingness toward improved health and develop necessary health behaviors.					
5	The use of EHR develops in nurses the belief to achieve behavior change and positive health outcomes of their patients.					

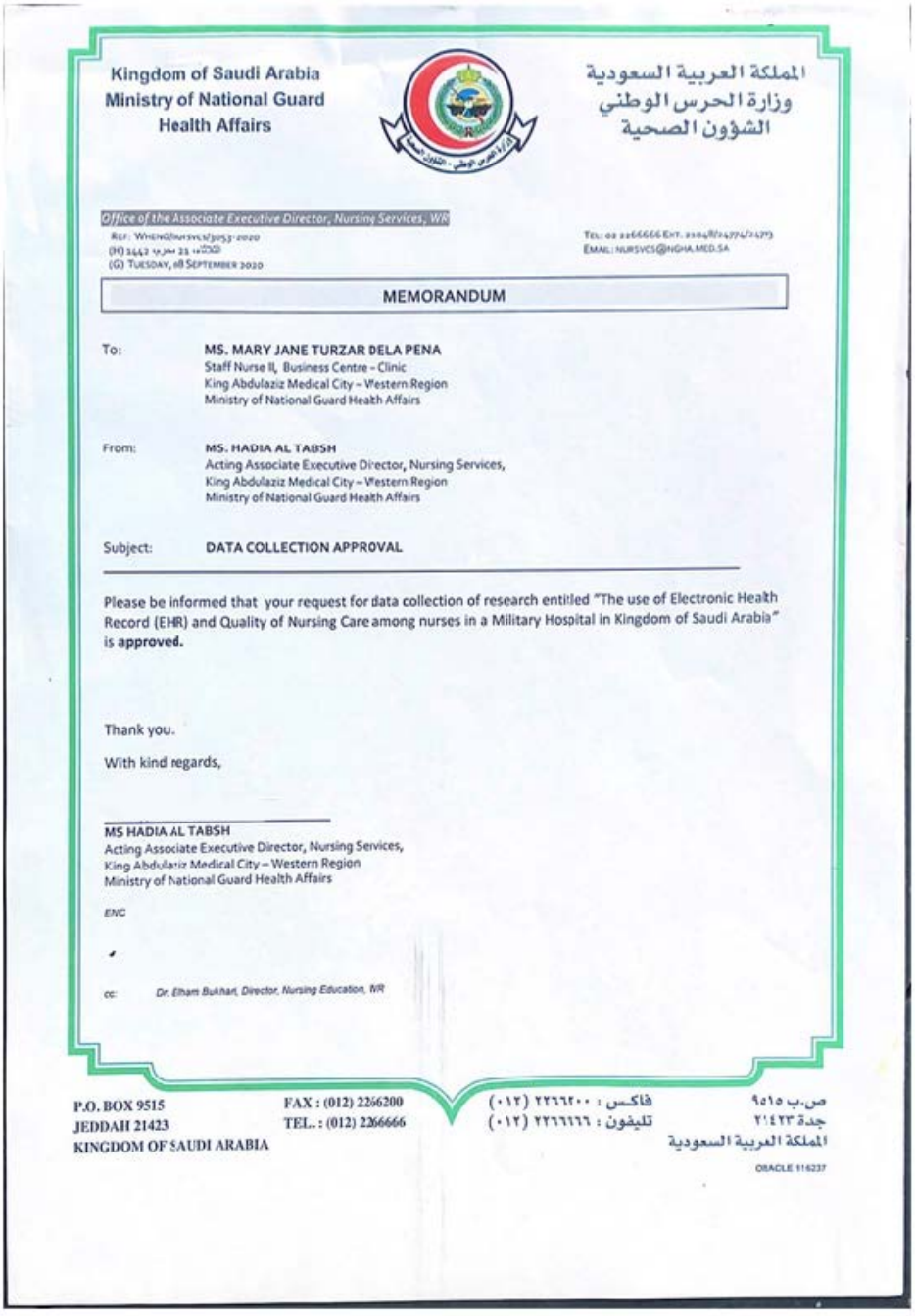
Source: (Crary, 2016; Ross & Barnes, 2018).

3.6 Relatedness of Quality of Nursing Care

No.	Indicators	Rating				
		5	4	3	2	1
1	EHR provides interpersonal interaction between the patient and the nurse, promoting positive patient outcomes.					
2	The use of EHR provides guidance from self-determination theory, in which patients feel free to talk and respond openly, enhancing the quality of nursing care.					
3	Patients become empowered and motivated to carry out treatment with the care provider resulting in high quality of nursing care.					
4	The system allows nurses to adopt patient centered approach, which build trust among patients and the feeling of safety in the treatment process.					
5	Patients develop relatedness to become self-directed in mastering tasks involving health behavior choices and feel connected with the care provider.					

Source: (Crary, 2016)

Appendix B
Data Collection Approval



Kingdom of Saudi Arabia
Ministry of National Guard
Health Affairs

المملكة العربية السعودية
وزارة الحرس الوطني
الشؤون الصحية

Office of the Associate Executive Director, Nursing Services, WR

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(G) Tuesday, 08 September 2020

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MEMORANDUM

To: **MS. MARY JANE TURZAR DELA PENA**
Staff Nurse II, Business Centre - Clinic
King Abdulaziz Medical City – Western Region
Ministry of National Guard Health Affairs

From: **MS. HADIA AL TABSH**
Acting Associate Executive Director, Nursing Services,
King Abdulaziz Medical City – Western Region
Ministry of National Guard Health Affairs

Subject: **DATA COLLECTION APPROVAL**

Please be informed that your request for data collection of research entitled "The use of Electronic Health Record (EHR) and Quality of Nursing Care among nurses in a Military Hospital in Kingdom of Saudi Arabia" is **approved.**

Thank you.

With kind regards,

MS HADIA AL TABSH
Acting Associate Executive Director, Nursing Services,
King Abdulaziz Medical City – Western Region
Ministry of National Guard Health Affairs

ENC

cc: Dr. Elham Bukhari, Director, Nursing Education, WR

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