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Role of Nursing Informatics Competencies in Quality Nursing Care and Patient Safety: A Review and Concept Paper

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Abstract

Nursing Informatics, which comprises nursing, computer, and information systems sciences, is crucial to improving quality and safety. Electronic health records, telemedicine, big data, and analytics have redesigned the decision-making process for clinical work and practices. Nursing Informatics involves understanding information technology systems, science, and computer literacy, preparing registered nurses to use healthcare technology effectively. This paper reviews the historical development of Nursing Informatics, from the analytical statistics initiated by Florence Nightingale to set data standards focusing on Nursing Informatics in the contemporary nursing curriculum. Although Donabedian's Model of Quality Care and Benner's Novice-to-Expert Theory have complex approaches, one concept in each theory stresses the value of structured learning to gain experience in developing Nursing Informatics competencies. The main challenges encountered are limited resource availability, poor training, and uneven supply between the urban and rural health facilities. Research examines nursing informatics' ability to improve Healthcare, reduce errors, and improve patient care. The challenge is prioritizing policy support, infrastructure investment, and continued education to achieve sustainable success in Nursing Informatics. The paper reviews the approaches enabling healthcare systems to integrate Nursing Informatics for better quality care and safety, particularly in regions with limited resources.

Keywords: Nursing Informatics, Quality Nursing, Electronic Health Records, Patient Safety, Informatics Competencies, computer skills, informatics skills, and information knowledge

Introduction

Advanced approaches in the past few decades are Electronic Health Records (EHRs), telemedicine, and analytics, which positively alter nursing practices [1]. Nursing informatics (NI) is the nursing field that has integrated computer science, revolutionizing how a nurse acquires, processes, and uses data regarding patients in the healthcare system. NI plays a role in connecting clinically oriented professionals with technology [2]. It combines nursing science with information and analytical sciences to process and disseminate data, information, knowledge, and wisdom for use in practice. NI enables patients, nurses, and others to make decisions via information structures, processes, and technology [3].

According to the American Nurses Association, 2015, NI competencies are essential for nurses effectively utilize technology. These competencies are generally categorized into three main areas: information knowledge, informatics, and computer skills [4].

Information knowledge refers to the understanding and ability of nurses to use health information systems and data management principles to improve patient care. Informatics skills are skills related to the capacity of the nurses to navigate, organize, and operate practice management electronic systems. Computer literacy is a set of fundamental skills inherent to utilizing computer equipment and applications [1, 5, 6]. These elements involve understanding the extent of computer knowledge, for instance, knowledge of the operation of a word application or graphic interface, mathematics application using the organizer, and a tabular form of data analysis, among others. Higher-level computer competencies can work with databases, coding, and comprehending the concept of networking security [7].

The implementation of competencies in NI is now, to a large extent, integrated with the nursing profession in Ghana,

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with the capability of inaugurating considerable influence on the quality of nursing care and the enhancement of patient safety. Due to the changing landscape of the healthcare system across countries, including Ghana, the efficiency and effectiveness of NI competencies are crucial for delivering quality patient-centered care and patient safety [8]. Nevertheless, the adoption and acquisition of these competencies by the nurses practicing in Ghana and their effects on personal work and the quality of services they deliver still constitute an important research question [9].

The NI is essential for quality nursing care and patient safety in Ghana. NI competencies influence the quality of nursing care, emphasizing the imperative for improved technology proficiency, data management skills, and informatics integration to realize better clinical outcomes and reduce errors [10]. As much as technological advancements continue to be realized, the applicability of informatics competencies among nurses in Ghana is becoming more imperative. It helps ensure that care processes are optimized, clinical decisions are made accordingly, and patient well-being risks are minimized [11]. However, in areas facing several healthcare challenges, including resource and workforce shortages, the influence of NI competencies on quality nursing care and patient safety is under-researched and incompletely understood [12].

Thus, implementing NI in the culture of the Ghanaian state can address the systematic difficulties and improve the nursing degree. Any claim of developing this potential is hinged on the willingness of several factors, such as policymakers, health care administrators, teachers, and most importantly, frontline nurses. Through infrastructure, education, training, and policy support related to NI, the country can transform Healthcare for a better patient experience and save more lives [13].

Although knowledge of NI competencies improves patient care and safety in health facilities, few empirical studies have addressed the individual levels of these competencies among nurses. While competencies have been described in developed countries like the United States and Canada, little is known and practiced in the Ghanaian healthcare sector. These countries conducted extensive research that proves the contribution of informatics competencies in patient care and safety with a strong background of training and resources [14, 15]. However, there is limited information regarding the current state of NI competencies in Ghanaian nurses, the demonstrated direct effect on clinical results, and the challenges associated with implementing informatics into routine nursing practice.

The healthcare system in Ghana presents a complicated interaction among limited resources, gaps in infrastructure, and inequities in access to care. Nurses, being on the frontlines of healthcare provision, have a leading role in quality care and the safety of patients. With the growing digitization of health care, increasing attention is being paid to NI competencies' role in equipping nurses with skills and knowledge toward effectively exploiting technology in their practice [16]. Yet, despite their potential benefit, NI competencies remain an area of incomplete understanding as to how they contribute to quality nursing care and patient safety in Ghana.

This review and a concept paper aimed to assess the current development of NI competencies and demonstrate how the competence has deeply affected the quality of nursing care offered and patient safety in health facilities. The paper highlights the importance of NI in elevating the quality of healthcare services in Ghana. By continuing to invest in informatics education, research, and technological advancements, healthcare organizations can empower nurses to deliver high-quality, patient-centered care and improve outcomes for individuals and communities. NI is a pivotal tool in promoting patient safety within healthcare settings. By integrating technology, data management systems, and informatics solutions, nurses can proactively identify, prevent, and mitigate risks to ensure the well-being and safety of patients in their care.

Historical development of NI competencies

NI competencies have a direct impact on the quality of nursing care. Informatics tools enable continuous monitoring of patient conditions, allowing for timely interventions and reducing the risk of adverse events [17]. Nurses with informatics skills can accurately record patient data, leading to more precise diagnoses and treatment plans. Based on the WHO's statistics, only 30 countries worldwide had developed national EHR systems by the year 2020, and the use of the system differs depending on the region and income level (WHO 2020). Nurses are particularly expected to be knowledgeable in EHR systems in countries where the use of EHR has taken deep root in the healthcare systems for documenting patient care, retrieving patient data, and interacting with

other healthcare professionals [18].

Florence Nightingale, who had an extraordinary understanding of analytics, already pinpointed the necessity of collecting the data according to a definite standard, even during service provision in the Crimean War in 1853 [19]. Harriet Werley was the first nursing researcher to tackle the problem of computers in the 1950s at Walter Reed Army Research Institute. She sought the help of International Business Machines (IBM) to explain the use of computers in the health sector [20].

Recognizing the importance of standardized information, Werley advocated collecting uniform data. This led to the American Nurses Association (ANA) focusing on nurses' utilization of information and communication for decision-making in the 1960s [21]. In the early 1970s, preliminary computer use in nursing improved data acquisition and better patient management. Using standardized data in home healthcare greatly emphasizes the importance of uniform data collection. Clinicians, especially nurses, identified the possibility of using these technologies in the documentation and management of data with the arrival of computers[22].

In the 1980s, when personal computers were being integrated, NI became available, incorporating NI into nursing education and defining standardized data elements [23]. NI formally emerged as an identifiable research and intervention area in the 1980s. From the American Nurses Association (ANA) and the Healthcare Information and Management Systems Society (HIMSS) in 2000, the significance of informatics competencies for nurses began [24].

SNOMED was recognized as the international standard terminology in the early 2000s due in parallel with a necessary and sufficient mandate for EHRs in 2014 along with the start of the healthcare reform process [25]. Despite these advancements, challenges in standardized language adoption persisted, underscoring the ongoing evolution of NI. NI has gained traction in nursing education programs, with many institutions incorporating informatics competencies into their curricula. Nursing students were introduced to EHRs, clinical decision support systems, and evidence-based practice using informatics tools [26].

EHRs became the hallmark of the specialty in the second decade of the 21st century. Nurses played a key role in adopting EHRs effectively and recommended that the usability of EHRs should be quickly adopted, including formats, coherent methodology, and data safety [27]. The goal of meaningful use was important and defined, and organizations worked on using EHR effectively, focusing on the systems' interoperability and data exchange. In essence, the concept of "Informatique, the computer milieu," was initially introduced by the French in the 1970s to define the field of informatics, which primarily involves utilizing computers for managing data and information [28]. Health information systems provide improved communication between healthcare givers and increase informatics competencies among nurses, enhancing job efficiency by 20% and reducing documentation mistakes by 15% [29, 30]. In another study, Mensah (2024) noted that hospitals that use modern informatics systems record a 10% higher recovery rate among their patients than those that still adopt the conventional manual systems in Ghanaian healthcare facilities [31].

Theoretical Frameworks: Benner's Novice-to-Expert Theory and Donabedian's Model of Quality Care.

Patricia Benner's Expert theory is a widely referred nursing conceptual model that creates different levels of career progression in the nursing profession. Initially proposed in 1982 in her book "From Novice to Expert, often referred to as "From Novice to Expert: Excellence and Power in Clinical Nursing Practice" Benner's theory has revolutionized nursing education, clinical practice, and scholarly investigation [32]. Benner's structure of the professional practice model is based on the assumption that knowledge in the profession is gained by experience through practice. She posits that nurses progress through five distinct stages of proficiency: There are five stages in the career development of a profession, namely, novice, advanced beginner, competent, proficient, and expert [33, 34]. The following characteristics define each of the stages: novice, advanced beginners, competence, proficiency, and expertise; the development of each of these is related to the years of experience nurses acquire in the clinical setting [35]. Figure 1 below illustrates the various stages of Benner's Novice to Expert Theory.

Application of Benner's Novice-to-Expert Theory in Nursing Education and Practice

Benner's theory has significant implications for nursing education, clinical practice, and professional development. In nursing education, the theory underscores

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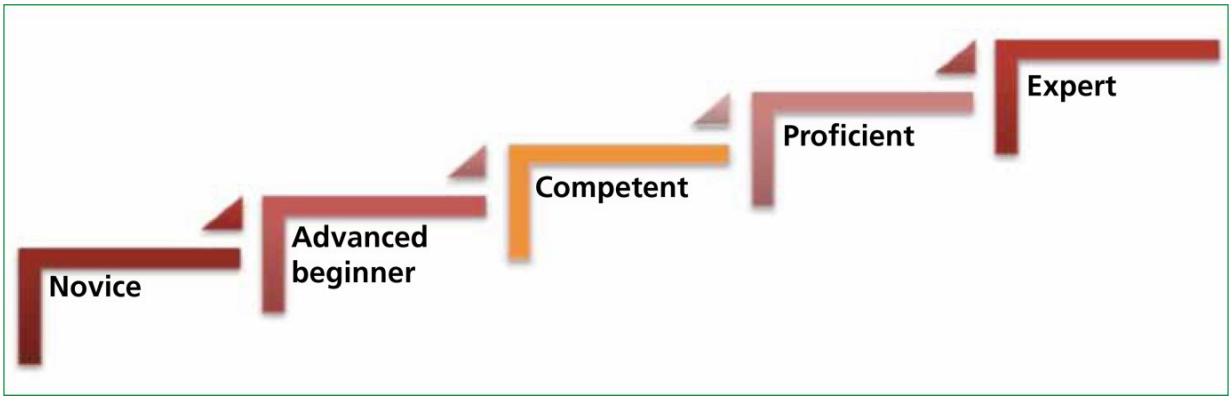

Figure 1 Diagram of Benner's Novice to Expert Theory

the importance of clinical experience and experiential learning in developing nursing competence. Teachers can apply the framework in planning the curriculum, allowing students to move from one stage to another, from the novice level to the competent one [35].

NI competencies support and enable nurses to successfully handle and analyze healthcare information. This study will help to establish whether the nurses practicing in Ghana are ready to use EHRs, CDSS, and other informatics technologies. For example, an informatics-competent nurse can quickly obtain a patient's history, medications, and results that would inform more appropriate and timely interventions[36]. The optimized decision-making process positively impacts patient outcomes and self-efficiency in clinical decision-making. Nurses with specialized skills in informatics are poised to fill leadership positions and specific roles in health system settings. Informing nurse specialists handle and implement healthcare information technology and assist in enhancing healthcare service delivery [36].

The Avedis Donabedian Model

Essentials of the structure were conceptualized by a healthcare quality assessment expert called Avedis Donabedian, a physician and health services researcher at the University of Michigan, who initially introduced the original model known as the Donabedian model in 1966 (Donabedian, 1985). His works have shaped the assessment and enhancement of healthcare quality worldwide from the 1960s onward [37]. The components of the Avedis Donabedian Model are structure, process, and outcome.

The structure encompasses physical, organizational, and human resources within healthcare facilities, such as staffing levels, facilities, equipment, policies, and governance structures. It sets the foundation for healthcare delivery, influencing the availability, accessibility, and appropriateness of care. Well-designed structures are essential for ensuring the delivery of safe, effective, and efficient healthcare services [38].

Process refers to the activities and interactions in delivering patient healthcare services. It encompasses the actions taken by healthcare providers, patients, and other stakeholders throughout the care delivery process, from initial assessment to diagnosis, treatment, and follow-up [39]. Effective processes ensure that evidence-based practices are followed, patient preferences are considered, and care is delivered promptly and coordinated [40]. Healthcare processes include clinical assessments, diagnostic tests, treatment protocols, medication administration, surgical procedures, patient education, communication between healthcare providers, and care coordination across different specialties and settings [41].

Outcome encompasses desired outcomes, such as improved health, symptom relief, and functional recovery, and undesired outcomes, such as complications, adverse events, and patient dissatisfaction [42]. Positive outcomes indicate effective, safe, and patient-centered care, while adverse outcomes may suggest deficiencies in the structure or process of care delivery. Healthcare outcomes include mortality rates, morbidity rates, patient satisfaction scores, functional status, quality of life measures, disease-specific outcomes (e.g.blood pressure control, glycemic control), complication rates, hospital readmission rates, and healthcare-associated infection rates [38]. Figure 2. below is a theoretical model used to assess the quality of

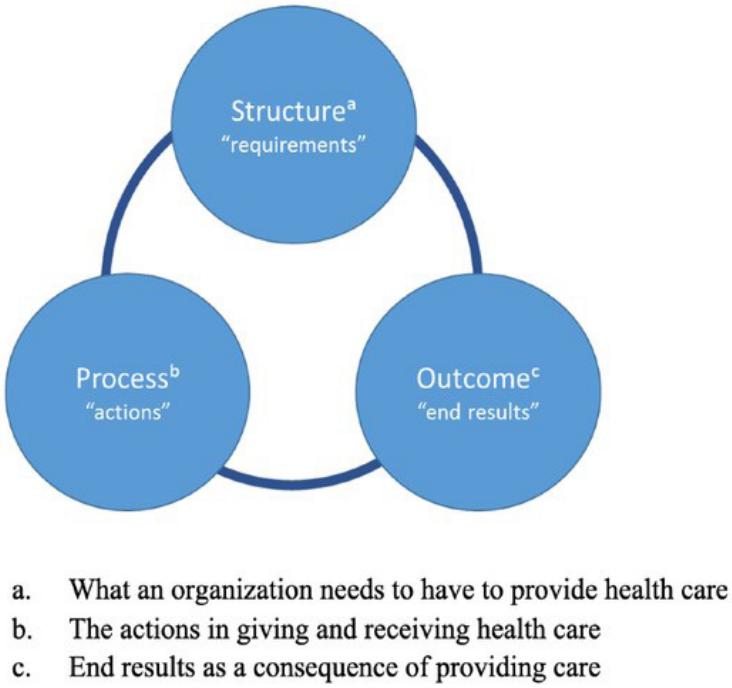

Figure 2. Donabedian Model.

healthcare services.

Novice to Expert Theory and Donabedian's Model

NI is a developing specialty that applies nursing science to information technology. Current research studies in NI have begun to rely on theoretical frameworks such as Patricia Benner's Novice to Expert Theory and Avedis Donabedian's Model of Quality Care to assess and build nurse skills. Bruce (2020) discovered that enhanced EHR training in nursing education resulted in competence in informatics among students. Incorporating Benner's stages for the study showed that students had moved from novices to an advanced beginner stage after going through the EHR training, which improved how they handled patient information [43]. Another study by Asegid (2021) showed that simulation-based training enhanced the nurses' informatics competencies in data entries and retrievals. This study highlighted the progression from competent to proficient stages, demonstrating that hands-on, experiential learning facilitates the development of higher-level informatics competencies [44]

The novice-to-expert theory and Donabedian's model have emphasized the importance of structured training and experience in improving NI competencies. Studies have shown that training programs designed to advance nurses through Benner's stages result in better informatics skills and patient care processes [45]. Donabedian's model complements the novice-to-expert theory by providing a framework to assess the quality of nursing care and patient safety. Research conducted using this model has shown that it is possible to identify links between changes in NI competencies and alterations in care procedures and outcomes; therefore, research examining the efficacy of training interventions targeting specific skills such as those presented in this model will be credible [38].

Conceptual Framework

The conceptual diagram visually maps these relationships. The independent variable (NIC) is divided into three domains: informatics skills, computer skills, and informatics knowledge. Arrows point from NIC toward quality nursing care and patient safety as dependent variables, showing a direct impact. A moderating pathway is introduced by nursing demographics, which affect the strength of the relationship between competencies and outcomes. For example, the effect of informatics knowledge on patient safety may be stronger in highly educated nurses or those with certification.

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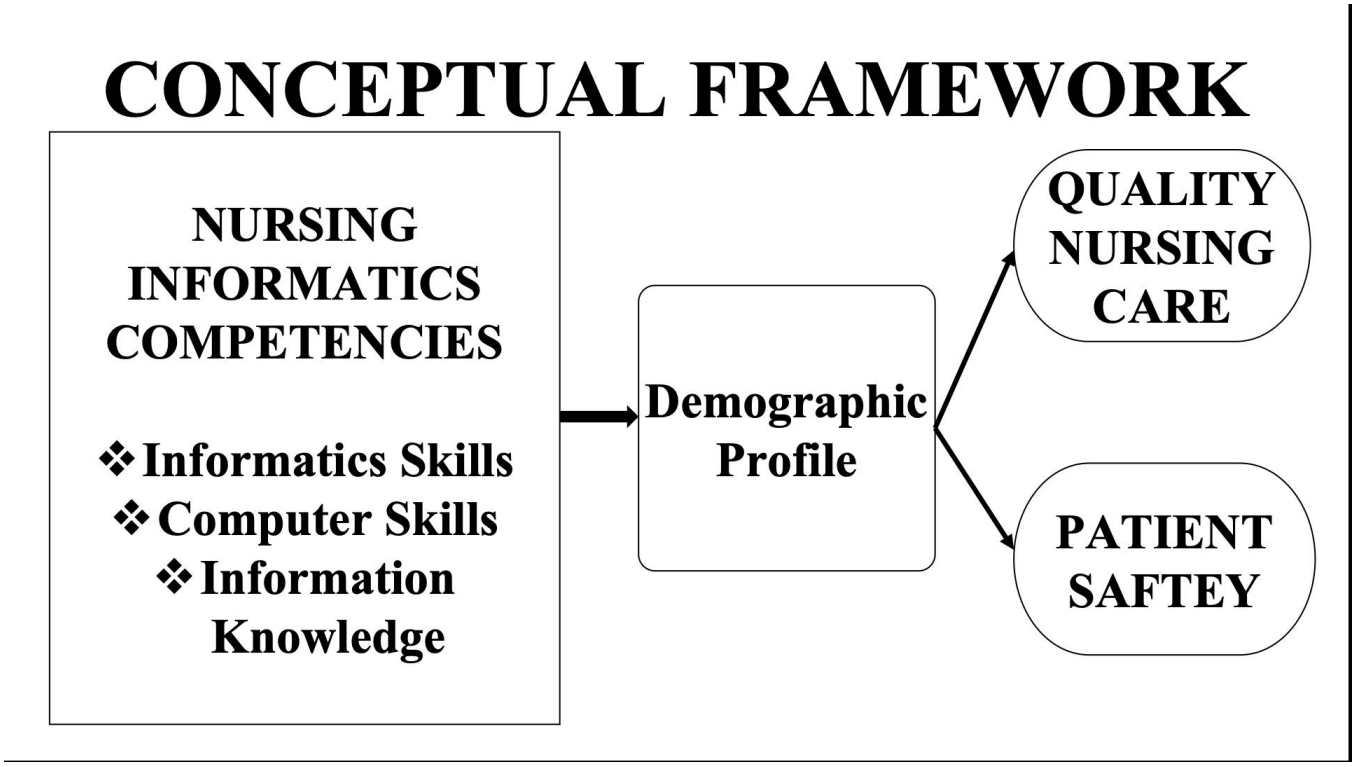

Figure 3: A mind map of the Conceptual Framework

NI and Quality Nursing Care

Quality healthcare delivery is the effective use of healthcare services that meet or exceed set specifications, guidelines, and recommendations, as well as patient satisfaction and enhanced population health [46]. This includes clinical outcomes, safety, patient orientation, efficiency, neutrality, and timely services. Thus, by promoting these principles, healthcare institutions and providers can strive to deliver high-quality care that meets patients' needs and expectations, promotes positive health outcomes, and strengthens the well-being of patients and populations [47, 48].

NI positively affects the quality of nursing care. Uba et al. (2021) have argued that when nurses are trained on strong informatics competencies, they are fully prepared to manage and utilize health information, enhancing the patients' health theories. The study revealed that these competencies improve the documentation of patient information, facilitate proper and efficient decision-making, and minimize mistakes, enhancing care quality [49]. Furthermore, Musen et al. (2021) examined, through a systematic review, the role of informatics competencies in promoting Evidence-Based Practices (EBP). The review also established that nurses with advanced informatics skills are likely to incorporate EBP in their practice more quickly than those without, an element key to optimal care. The capability to get, make sense of, and use clinical data in real mode leads to better patient care management [50] Kleib et al. (2021) conducted a cross-sectional survey across the globe and identified that NI competencies are crucial to organize the rapidly evolving healthcare setting. This study also focused on the realization that these competencies are essential not only in the care of patients but also in the communication between the health care professionals, which is crucial to integrated and safe patient care [51].

A recent study by Amoah et al. (2024) explored the current state of NI competencies in Ghana and their impact on nursing care quality. This study identified that Ghanaian nurses perform moderately in informatics-related competencies with specific deficiencies in leveraging HIT to advance patient care. A survey revealed that nursing

students had limited exposure to informatics training courses and few integrated informatics components into patient care curricula as key resurgence [52]. Furthermore, Dzomeku et al. (2021) pointed out that technology use varies from region to region in Ghana. They pointed out that nurses working in urban health facilities are more likely to have enhanced informatics competencies because they enjoy access to resources and training than their counterparts in other areas. At the same time, those in rural areas have poor equipment, old technology in health facilities, and a lack of continuous professional training, affecting the quality of services offered [53]. A study by Amoo et al. (2022) revealed that nurses' acquisition of competency regarding informatics enhances effective client outcomes, especially where long-term diseases require management and prevention. The study recommends that those targeted areas of weakness be government [54].

NI and Access to Technology

Advanced technology, including EHRs, telehealth, and clinical decision support systems (CDSS), is critical in modern nursing practice. These technologies facilitate efficient patient care and improve communication among healthcare providers. Advanced health information technologies have been observed to effectively impact the quality of nursing care [52]. Wang et al., in 2021, studied the use of mobile health applications in nursing care. The study revealed that the nurses could observe the patients' status and remotely manage the data through the conceptual M-health applications in ward management. The study also showed that, through mobile health applications, the nurses were immediately connected to the patient data, which was important for clinical decision-making [55].

However, according to a study by Kaihlenan et al. in 2021, the identified barriers were lack of training, organizational resistance, and less access to technology in certain healthcare institutions. The study highlighted the requirement for ongoing education and support to facilitate the implementation of health information technologies [56]. Further, Agbeyangi et al. (2021) indicated that inadequate financial resources and infrastructure constraints in low-resource settings pose significant challenges to implementing advanced health information technologies. The study suggested investments in technology and infrastructure to enhance the quality of nursing care and patient security [57].

Lindsay et al., in 2022, evaluated the use of EHR and its effect on the nursing processes and the patients. The study revealed that when nurses had sufficient access to EHRs, they managed patient information in less time and more time on the care of patients. These changes in the workflow helped to increase overall patient safety and quality of care [58]. Telehealth has also emerged as a useful tool, particularly highlighted during the COVID-19 pandemic. As noted by Idoko in 2024, adapting telehealth allowed nurses to offer continuous care to patients while minimizing exposure risks. The study highlighted that telehealth improved patient outcomes by ensuring timely and accessible care, particularly for chronic disease management [59].

Adopted Instruments to be Used to Measure NI Competencies, Quality of Nursing Care, and Patient Safety

Instrumentation for the study will utilize a quantitative data collection tool in English to gather comprehensive insights into the research objectives. A standardized questionnaire (Appendix A) will be adapted from various sources and divided into the following sections:

Section 1

This section will collect demographic data such as age, sex, educational level, nursing category, department, and hospital.

Section 2

A standardized questionnaire with 34 NI Competency Assessment Scale (NICAS) items will be adapted to assess NI competencies. The NICAS evaluates nurses' proficiency in information and communication technologies (ICT) within Healthcare to support nursing practice, improve patient care, and ensure patient safety. It is often administered through self-assessment surveys or structured interviews, where nurses rate their proficiency or agreeableness with each item on a Likert scale [60]. An evidenced-based Doctor of Nursing Practice (DNP) project implemented the NICAS to identify and address informatics competency gaps among practicing nurse informaticists. The study found positive outcomes and improvements in competencies following the implementation of a professional development program [61].

Section 3

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Patient safety data collection will be done using the Hospital Survey on Patient Safety Culture (HSOPS). To measure patient safety culture, the HSOPS was derived by the Agency for Healthcare Research and Quality (AHRQ). It evaluates healthcare staff satisfaction concerning multiple factors and offers relevant data for enhancing patient safety interventions [62]. The survey may be entered on paper, computer, or online. Currently, it is available for circulation to all the members of the hospital's workforce, clinical or nursing staff, and support staff. By providing insights into the safety culture, HSOPS helps hospitals implement targeted interventions to improve patient safety, reduce errors, and enhance overall healthcare quality. A study applied the HSOPS to assess patient safety culture among HCWs in the operating room. This study identified gaps in safety culture perceptions depending on staff positions and areas of communication and teamwork that should be enhanced. The findings assist in determining the specific avenues for improving patient safety, revealing the challenges in evolving organizational culture, and following the changes over time [63].

Section 4

A questionnaire adapted from Ravi et al. (2020), used in the Clinician Survey on Quality Improvement, Practice Guidelines, and Information Technology (QI-PGIT), will be adapted. The QI-PGIT assesses clinicians' perceptions, attitudes, and experiences related to quality improvement initiatives, adherence to practice guidelines, and utilization of information technology in healthcare settings [64]. As stated by Rural Health Information Technology Cooperative (2023 the QI-PGIT measures the perceived impact of EHR across a health system by clinicians. Therefore, it was found that, among the critical success factors for EHR adoption, user interfaces need to be easily navigable, and users must receive sufficient training. The findings contribute to designing high-level interventions, training, quality improvement activities, and patient care delivery systems to support clinical practice and healthcare outcomes [64].

NI Competencies and Training Opportunities

Essentials of training and development to support NI competencies consist of training programs. Informatics has academic foundations that one can learn in a classroom, an NI course, or an NI certification program. Nurses who graduated from the established informatics education programs were better equipped to use the HIT. These programs offered the participants exhaustive training and education on EHRs and other informatics tools, improving healthcare delivery and patient safety. Another method of building NI competencies is on-site training [65]. Bozic et al. 2024 stated that hands-on experiences learning with health information systems apply knowledge to nurses. Their research revealed that the nurses who underwent on-the-job training were more confident about using informatics and that there was better patient care. The simulation courses are helpful because they establish a protected atmosphere for nurses to work close to actual conditions and enhance their informatics skills [66]. One study by Jeffries et al. (2022) pointed out that the simulation of training programs advanced the competencies of nurses when it comes to utilizing HIT, especially in emergencies and conditions with high-stress levels. Type two of training puts the nurses in a better position to handle complicated aspects of patient care, improving [67].

The NI competencies are essential in defining the nursing profession and ensuring the safety of patients, especially in the present technologically enhanced environment. Contemporary research proves the need to increase nurses' informatics, computer, and information literacy competencies. I ultimately agreed with this proposition; it implies that different educational experiences, such as education, on-the-job training, simulation training, and continuing education, substantially contribute to acquiring these competencies. To that end, healthcare organizations can benefit from increasing education and training in NI to advance clinical efficacy, ensure the delivery of high-quality nurse care and patient safety, and develop the career progress of the nurses [68].

Corresponding Challenges

Data collection is one of the most essential parts of the research process, and it contains many troubles that may affect the quality of the results and the participants' attitude to the research. The following challenges may be encountered concerning this study to establish the NI competencies and the effect on the quality of nursing care and patient safety among nurses in Ghana. Preventing or minimizing difficulties and problems during data collection is critical for validity, reliability, and successful research. These strategies include informed consent, flexible data collection methods, data collectors training,

and participant engagement. The above strategy will also enhance participants' trust and cooperation, especially with sensitive issues such as NI competencies, quality nursing care, and patient safety.

That is why several methods can be helpful to achieve a high response rate to the questionnaires. Using participants' names in communication and focusing on the value of the participant's input can help increase response rates dramatically. Furthermore, confirming to the respondents that their answers will be kept anonymous and confidential helps boost response rates where the research topics can be very sensitive, for instance, in the healthcare sector. The method of obtaining support from the organization or institution where the research is conducted increases the reliability and encourages people to participate.

Success factors for implementing the proposed framework

A NI Framework's various components include an effective and sustainable technological foundation. A suitable foundation ensures the availability of correct software versions, adequate connectivity, and fairly good hardware in healthcare facilities. However, using the available informatics tools is difficult when these elements are missing [69]. Another important factor is the extensive ongoing training and education programs for all members of the health professions. The following program includes informatics competencies, including data handling, EHRs, and CDS. The CPD training facility keeps nurses and other healthcare professionals updated regarding technological skills and knowledge [70].

Robust leadership and standard policies. When an organization has set goals and policies to implement nursing informatics, it sets the tone to support adoption and integration. Those at the helm of organizations must support and fund the framework to ensure the staff embraces the informatics tools [71]. Healthcare teamwork consisting of clinical staff, IT staff, and informatics officers tightens integration and optimally utilizes the framework. Moreover, program monitoring and evaluation processes are implemented to assess the program's attainment of its goals, to respond to hitches, and, in particular, to modify measures when required. By attending to these success factors, healthcare systems can realize the informatics frameworks that augment care delivery and patients' success [72].

Strengths and Limitations

The present review article and a concept paper have several key advantages. This study offers a detailed review of the contribution of NI in increasing quality nursing care and patient safety. Using conceptual theories like Benner's Novice-to-Expert Theory and the Donabedian Model, the article creates a theoretical concept to comprehend the importance of NI competencies. Integrating factors influencing the success of NI framework implementation as part of the study enhances research. Furthermore, the historical view on developing NI competencies adds value to the paper.

There are some limitations, such as a lack of practical studies and case presentations. The structure of some sections is also somewhat duplicated, for instance, concerning training and informatics competencies. Concerning the funding of NI frameworks and work necessities, there is a lack of evidence to address such challenges.

Conclusion

NI is an important factor in raising the standards of quality nursing and patient safety. NI competencies that incorporate technology, data, and evidence-based processes facilitate decision-making and produce effective patient care. NI implementation has described valuable frameworks, including Benner's Novice-to-Expert Theory and the Donabedian Model. Nevertheless, resource scarcity, staff development, and the ability to provide infrastructure are essential considerations. Education, IT, and leadership support should be implemented to improve the health profiles and quality care.

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