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RESEARCH **Open Access**

Plugging the Gap and Niching the NICHE: Nursing Informatics Competencies for Higher Education

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Abstract

Despite the rapid advancement and evolution of nursing informatics applications in healthcare, the incorporation and refurbishing of undergraduate informatics competencies in the curriculum has been organized. the integration of informatics in the Philippine curriculum began decade ago. However, it is still not identified whether these initiatives are successful in enhancing NI skills among graduates considering the low rate of technology utilization by most hospitals in the country. As a result, it requires a global need for nursing informatics competencies to be updated and revisited into the nursing curriculum. The objective of this study is to gather accord from the literature and to determine the definition of fundamental nursing informatics competencies for baccalaureate nursing programs in the Philippines. A review of related studies and corroboration of related literature such as different nursing curricula, perspectives of nursing informatics competencies in every country and to the resource organizations standards providing trainings, conducts research and guide HEIs was performed. International and local organizations were preparing the advancement of informatics through research, trainings, continuous quality improvement, and innovations in HIT. The identified common ground plugging the gap in nursing informatics competencies were nursing care and management proficiencies, information literacy and management, computer skills, health facilities' technology resources, and ethics and legal understanding in HIT (NICHE). The prior competencies (basic computer skills, information literacy, and information) should be adaptable to local differences and consulted to industry partners and stakeholders. These attempts at competency standardization have to be balanced with suppleness to account for local variations and conditions.

Keywords: Nursing Informatics, Competencies, Nursing Education, Caring.

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1. INTRODUCTION

The health information technology (HIT) in healthcare has swiftly advanced and evolved whereas the assimilation of undergraduate informatics concepts into nursing education has been delayed (Nygårdh, et al., 2017). It produces a gap between nursing education, nursing practice and the possibility of a catastrophe. Thus, it widens the discussion on designing nursing informatics education to enhance the safety and quality care employing effective curriculum and applying the relevant health information systems (Hübner, et al., 2019).

Nursing informatics (NI) is defined as a field of nursing which merges nursing science along with a plethora of perspectives and the science of analytics to identify, illustrate, operate, and express data, knowledge, information, and wisdom in nursing practice in accordance with the definition of the American Nurses Association, (2015). The advent of information technology, and the technological innovations in nursing care and medicine, serve as a pedestal for the healthcare industry. In association with information technology and innovations in healthcare, health informatics, based on the published article of the American Medical Informatics Association, (2011), it leads to demonstrating and concerning on public health, enhancing life science research, educating health professionals, and improving patient care.

The American Medical Informatics Association (AMIA) contends that this integrative and multidisciplinary discipline efforts on Health Information Technologies (HIT) which encompassing cognitive, social sciences, and computer for health. On the other hand, nursing informatics based on ANIA (American Nursing Informatics Association), is defined as a field which is fundamental to delivering cost-effective and high-quality nursing care and enhance the health of people, societies, individuals, and to the families by employing HIT. Thus, advancing information communications technology and management in health and healthcare is the result of informatics. Furthermore, education, research, and practice pave the way for the health care future and prepare individuals for all roles and different settings.

Today, informatics is rapidly elevating particularly in nursing, and allied health on our healthcare system (Prodelli, 2017). It has evolved into a critical component of the infrastructure for enhancing access to health information, providing safer patient care, lowering costs in healthcare, and advancing patient outcomes and recovery (Prodelli, 2017; Tellez, 2012). In all roles and contexts, healthcare stakeholders, such as physicians, nurses, patients, other healthcare workers, and stakeholders, benefited from health informatics decision-making support.

Around the world, although there have been several resources for informatics, it has existed the variations to the curriculum and competencies in nursing informatics. There is no comprehensive list addressing the specific knowledge and skills required at the undergraduate level in a developing country's local context. Hence, this study owns an objective that is to collect accord from the literature and define the fundamental nursing informatics competencies for baccalaureate nursing programs in the Philippines.

2. RESEARCH METHOD

Through scoping review, the concepts on competencies, curriculum of nursing informatics were examined. The review concerned on the objective of identifying the gaps and opportunities in implementing the program which employs key words such as nursing informatics, education, technology, competencies and caring science. Search engines utilized encompassed *google scholar, research gate* and published journals in reputable repositories to extract information for analysis.

3. RESULTS AND DISCUSSION

a. Nursing Informatics: Its Position in Society, Nursing Education, and Industry

Significant advancements in nursing informatics necessitated a local context's definition of competencies, performance, and the curriculum without compromising the learning quality. The aim of this section is to review and corroborate set of articles, policies, guidelines, and standards for undergraduate nursing informatics, in investigating local resources, industry demands and nursing informatics' strengths and weaknesses.

b. Nursing Informatics Curriculum Development

In the Philippines, informatics course was instilled into the nursing curriculum of the baccalaureate degree (BSN) taking part in 2008 through the Commission on Higher Education (CHED) Memorandum Order (CMO) number 5 series of 2008. The CMO contains PSG (Policies, Standards and Guidelines) for a particular degree program of Philippine Higher Education issued through the Commission on Higher Education (CHED). The CMOs for nursing program which indicates with Nursing Informatics began from CHED Memorandum Order number 5 series of 2008, Memorandum Order number 14 series of 2009, and the most recent is the CHED Memo Order number 15 series of 2017. The first 2 CMOs were competency-based, while the present curriculum is an Outcomes-Based Education (OBE). This section also seeks to present the ongoing evolution of nursing informatics course as corroborated by the PSG of the BSN program. The basic competencies 1, 2, and 3 (presented in the table) under the key areas of responsibility in CMO No. 5, which is item I. Records Management was discussed on the utilization of a record system such as the Hospital Information System in maintaining an accurate and updated documentation and observing legal imperatives in record managing. It facilitated the adoption of basic computer and information technology concepts in the nursing curriculum.

In section 8 or the curriculum outline discovered in the CMO No. 5 s. 2008, Nursing Informatics is categorized as General Education (GE) course and classified under Mathematics, Natural Sciences, and Information Technology with three broken down units to two units for the lecture and one unit for the laboratory. Primarily, the description emphasizes the information technology system application, an introduction of nursing informatics principles and theories, and data standards. The course manner prepares the nursing students to ethically employ technology in making the nursing care rendition better. Technological advancement as expressions of unending care (Acob, 2018) plays pivotal role in the modern era particularly on the post pandemic environment. Meanwhile, telehealth nursing introduced a little earlier than COVID-19 is evidence of technology utilization to nursing care. Furthermore, it emphasizes on the application of healthcare information processes in the clinical area and corroborate in decision-making of nursing care and management. The application or laboratory component of the course should be performed for practice application. The addition identified in the CMO no. 14 series of 2009 is that it illustrates an additional performance indicator in the competency standards under the key areas of responsibility I: Records Management.

Table 1. Nursing Informatics Course in Different CMOs.

CMO	**CHED Memorandum Order No. 5 (2008)**		**CHED Memorandum Order No. 14 (2009)**		**CHED Memorandum Order No. 15 (2017)**	
Category and Total Number of Units	Part of the GE courses with three (3) units: two (2) lecture units and one (1) laboratory unit.		Part of the GE courses with three (3) units: two (2) lecture units and one (1) laboratory unit.		Part of the Professional courses and with three (3) units: two (2) lecture units and one (1) laboratory unit.	
Key Areas of Responsibility	I. Records Management		I. Records Management		CMO 15 s. 2017 is an OBE Curriculum	
Core Competencies and indicator/s Program Outcomes (CMO 15 s. 2017)	The Core Competency no. 1: Maintain an accurate and updated documentation of patient care (based on CMO).	Complete updated documentation of patient care.	The Core Competency 1: Maintain an accurate and updated documentation of patient care (based on CMO).	Complete updated documentation of patient care. Apply principles of record management. Monitor and improve accuracy, completeness and reliability of relevant data. Makes record readily accessible to facilitate client care.	PO 6. Report or document client care accurately and comprehensively.	Document the client's responses, nursing care services rendered and processes, and outcomes of the nurse client working relationship. Ensure completeness, integrity, safety, accessibility and security of information. Adhere to the protocols and principles of confidentiality in safekeeping and releasing of records and other information.
	The Core Competency no. 2: Records outcome of patient care (based on CMO).	Utilizes a records system ex. Kardex or Hospital Information System (HIS) (based on CMO).	The Core Competency no. 2: Records outcome of patient care (based on CMO).	Utilizes records system ex. Kardex or Hospital Information System (HIS) Utilize data in decision and policy	PO 12. Implement techno-intelligent care systems and processes in health care delivery	Employ appropriate technology to perform safe and efficient nursing activities. Implement system of informatics to

CMO	**CHED Memorandum Order No. 5 (2008)**		**CHED Memorandum Order No. 14 (2009)**		**CHED Memorandum Order No. 15 (2017)**	
				making activities	(based on CMO).	support the delivery of health care.
	The Core Competency no. 3: Observes legal imperatives in record keeping (based on CMO).	Observe confidentially and privacy of the patient's records. Maintain an organized system of filing and keeping patients' records in a designated area. Refrain from releasing records and other information without proper authority.	The Core Competency no. 3: Observe legal imperatives in record keeping (based on CMO).	Maintain integrity, safety, access, and security of records. Document/monitor proper record storage, retention and disposal. Observe confidentiality and privacy of the clients' records. Maintain an organized system of filing and keeping clients' records in a designated area. Follow protocol in releasing records and other information.		

Table 1 presents the summarized implementation and course description of nursing informatics course based on the approved curriculum of the Commission on Higher Education (CHED). Currently, with the CMO no. 15 series of 2017 as implemented by the HEIs, Nursing Informatics is categorized as part of the professional courses with a code of NCM 110 – Nursing Informatics in accordance with the mentioned curriculum. The course encompasses the introductory concepts, relevant theories and principles, and procedures of informatics in the practice of nursing, nursing education, and research in nursing. Life-long learning opportunities for this course are the

implementation and the utilization of available technology in healthcare industries and understanding the applicable nursing responsibilities in the nursing informatics utilization.

The objective of BSN program is to develop professional nurses who are capable of holding entry-level employment in hospitals, community settings, and other health care settings. The CMOs provide adequate time for HEIs who offer BSN to amend their core curriculum while adhering to basic requirements.

c. Model of Nursing Informatics Education

The model is depicted as a jigsaw puzzle, with the components completing the system. It imposes the interlocking and connections of irregularly shaped interlocking and parts, which results in a finished picture once completed. If one component is lacking or removed, the system suffers, and turmoil and disarray ensue.

The BSN program is designed to formulate a professional nurse for entry-level work in hospitals or community settings (Commission on Higher Education Republic of the Philippines Officer of the President, 2017). The program's goal is to create professional nurses for health promotion, disease prevention, curative, and rehabilitative aspect of care, and afford end-of-life care to patients of varying ages, genders, and status of health and illness; healthy or at-risk families and communities; populace and communities; singly or in collaboration with other health care providers (Commission on Higher Education Republic of the Philippines Officer of the President, 2017).

The nursing curriculum is the product of collaboration and consultation with higher education institutions, nursing organizations, and health care facilities (in hospital, community, etc.). This model was developed and constructed after a thorough assessment of literature as well as the industry needs in the country and global interest.

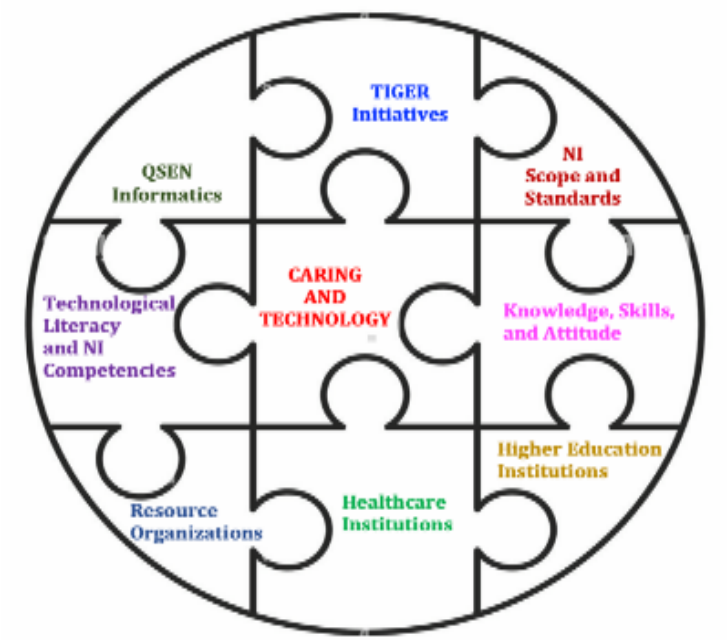

Figure 1. The model outline in filling the gap of nursing informatics in the Local Context.

d. TIGER (Technology Informatics Guiding Education Reform) Initiative

TIGER program was launched in 2006 which goal is to nurture cooperation and community growth and international collaboration and development by integrating technology and informatics into seamless practice, education, and research resource

creation (Saba & McCormick, 2021, Healthcare Information and Management Systems Society, 2022). It is presently hosted by the HIMSS (Hospital Information and Management Systems Society, 2022) (Saba & McCormick, 2021).

The TIGER recognized nursing care management, IT management, quality improvement (QI) management, care collaboration, and nursing practice as prior informatics competencies of health care professionals. The objective of international efforts is to develop a framework for core informatics competencies, generating educational recommendations, and demonstrating best practice examples in implementing these recommendations (Shaw, et al., 2020).

The prior goal is to design and address skills which all nurses require in the 21st century and concern on the development of a clinical workforce which employ technology to enhance the delivery of care (Saba & McCormick, 2021). Professional healthcare workers particularly nurses will be necessary to possess a basic comprehension of informatics, ranging from basic computer abilities to advanced information technology and literacy.

The objective of this initiative is to assist nurses adopt informatics technologies, theories, concepts, and practices which makes health care better, more capable, patient-centered, and reasonable services for all parties involved (Dulong, 2008). The three elements of the NI skills model designed are computer competencies (basic), information literacy and understanding, and information and data management (Saba & McCormick, 2021).

The TIGER initiative has identified the following information literacy skills in accordance with the article by Hubner et al., (2019); Shaw et al., (2020) in understanding the nature and scope of the information required; effectively and efficiently approaching vital information; critically assessing information and its sources, and incorporating selected data into the knowledge base and value system; individually or as part of a group, efficiently using information to fulfill a specified task; and examining the effects of information use (Hübner, et al., 2019; Shaw, et al., 2020).

The HIMSS (Hospital Information Management System Society) identified the following concepts for computer abilities, which comprise of: information and communication technology (ICT) ideas; file management and computer use; spreadsheets; database use; word processing; presentation; and the TIGER defines computer abilities encompassing web browsing and communication (Hübner, et al., 2019; Shaw, et al., 2020).

The International Competency Synthesis Project of the Technology Informatics Guiding Education Reform (TIGER) developed a Global Health Informatics Competency Recommendation Frameworks in April 2020 (Healthcare Information and Management System Society, (2022). The TIGER International Task Force began a series of efforts to generate a list of proposed core international informatics competencies in accordance with input from a variety of countries, scientific societies, and research programs.

This international guideline framework for nurses' key areas of competency in health informatics attempts to provide a grid encompassing comprehension on competencies, professional functions, main concern, and sensible experience (Healthcare Information and Management Systems Society, 2022). In reflecting its roots in nursing informatics and its directness to other healthcare professionals and their interactions with nurses, the framework employs the phrase health informatics in nursing (Hübner, et al., 2019). On an individual level, the organization believes that learning and teaching are processes of active construction of educational space.

The guiding essence of TIGER is to expand the assimilation of informatics and technology into uniform training, instruction, research, and resource development (Healthcare Information and Management Systems Society, 2022). It advances the addition of health informatics through facilitating in enhancing patient care and developing a learning health system, informatics and technology which are utilized (Shaw, et al., 2020).

e. QSEN (Quality and Safety Education for Nurses) Competencies

The QSEN teaching body have produced undergraduate and graduate quality and safety proficiencies for nursing, and planned objectives for knowledge, abilities, and attitudes to be established in nursing pre-licensure programs, by employing the Institute of Medicine (IOM) standards generated for nursing. The overarching objective of the QSEN initiative is to encounter the task of training nurses with the KSAs (knowledge, skills, and attitudes) required to enhance the safety and quality of the health care systems in an institution they are in charge.

According to the QSEN's definition of informatics, it is "the use of technology to communicate, manage knowledge, mitigate error, and support decision making". In the table are the QSEN pre-licensure KSAs (knowledge, skills, and attitudes) providing as standards to curricular development for conventional academic programs, growth to practice, and sustainable learning programs for nurses.

Table 2. Quality and Safety Education for Nurses (QSEN) Knowledge, Skills, and Attitude (KSAs)

Knowledge	**Skills**	**Attitude**
Explain why information and technology skills are crucial for safe patient care.	Identify education on how information is managed in care settings before providing care. Apply technology and information management tools to enhance safe processes of care.	Appreciate the necessity for all health professionals to investigate lifelong, sustainable learning of information technology skills
Identify essential information which is available in a common database to corroborate patient care. Contrast benefits and limitations of different communication technologies and the impact on safety and quality.	Navigate the electronic health record. Document and plan patient care in an electronic health record. Employ communication technologies to perform patient care.	Value technologies which support clinical decision-making, error prevention, and care coordination. Protect confidentiality of protected health information in electronic health records.
Elaborate examples of how technology and information management are associated	Respond appropriately to clinical decision-making supports and alerts.	Value nurses' involvement in design, selection, implementation, and evaluation of information

Knowledge	**Skills**	**Attitude**
with the quality and safety of patient care. Recognize the time, effort, and skill required for computers, databases and other technologies in being reliable and effective tools for patient care.	Utilize information management tools to monitor outcomes of care processes. Employ high quality electronic sources of healthcare information.	technologies to enhance patient care.

Note: List of achievable informatics competencies relevant to all pre-licensure nursing education. Adapted from "Quality and Safety Education for Nurses" (https://qsen.org/competencies/pre-licensure-ksas/)

Nurses must possess an access to information and communication technologies in providing safe and quality nursing care in this digital set-up. New ethical and legal issues arise due to written and electronic documentation in the health care facilities (Nygardh, et al., 2017). Meanwhile, healthcare information technology has cultivated rapidly, the integration of nursing informatics education has been incremental based on the published study of Nygårdh et al (2017).

f. The American Association of Colleges of Nursing (AACN) Competencies

The AACN endorsed detailed aptitudes which have to be accomplished by nurses to warrant safe and superior quality patient care, that are: communication, illness and disease management, ethics, and information and healthcare technologies, and critical thinking (American Association of Colleges of Nursing, 2008).

The baccalaureate program of nursing, in accordance with the American Association of Colleges of Nursing (2008), aims to prepare graduates to learn the way utilizing patient-care technology, information systems, and communication devices in providing safe nursing care. Its objective is also to employ information technology in enhancing caring attitude of nurses and create a safe environment for patients (American Association of Colleges of Nursing, 2008). Among several enhancements to the basics in nursing education were a greater emphasis on patient safety and healthcare IT.

g. 2012 NCCS (National Core Competency Standards) 2012 for the Filipino Nurses

The Bachelor of Science in Nursing attempts to develop a nurse in demonstrating initial professional competencies and the assumption of responsibility for patient care. In exhibiting nurse competence, key areas of responsibility are being adhered and the bases for core competency standards for Filipino Nurses. These encompass (a) safe and high-quality nursing care, (b) communication, (c) collaboration and teamwork, (d) health education, (e) legal responsibility, (f) ethic-moral responsibility, (g) personal and professional development, (h) records management, (i) resource and environmental management, (j) quality improvement, and (k) research.

Stakeholders revisited, modified, consulted, and validated the Nursing Core Competency Standards (NCCS) 2012 during the revision process. The National Core Competency Standards (NCCS) for Filipino Nurses displays that there are only two nursing informatics competencies outlined:

Table 3. The National Core Competency Standards (NCCS) of the Professional Regulatory Board of Nursing with the Nursing Informatics Competencies

Key Area of Responsibility	Core Competency	Indicators
Communication	Core competency 5: Utilizes appropriate information technology to facilitate communication (CMO no. 14 s. 2009)	1. Utilizes telephone, mobile phone, electronic media. 2. Utilizes informatics to support the delivery of healthcare.
Records Management	Core competency 2: The Records outcome of client care (CMO no. 14 s. 2009)	1. Employs records system ex. Kardex or Hospital Information System (HIS). 2. Utilizes data in their decision and policy making activities.

Note: List of key area of responsibility, core competencies, and indicators based on the CHED Memorandum Order No. 14 series of 2009 and National Core Competency Standards (NCCS) of Professional Regulation Commission (PRC) (2012).

The NCCS was utilized to enhance the following: Basic Nursing Education Program in the Philippines through the Commission on Higher Education (CHED); Competency-based Test Framework as the basis for developing course syllabi and test questions for entry level nursing practice in the NLE; Standards of Professional Nursing Practice in a variety of settings; and the National Career Progression Program (NCPP) for nursing practice in the Philippines.

h. 2014 NNCCS (National Nursing Core Competency Standards)

Global and local advances in health and professional nursing encouraged the PRBON in assessing the Core Competency Standards of Nursing Practice in the Philippines after several years of implementation (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labor Organization, 2014). The PRBON (Professional Regulatory Board of Nursing) formulated a task force on Nursing Core Competencies Revisiting Project in 2009, collaborating with the Commission on Higher Education-Technical Committee on Nursing Education and a group of nursing leaders from numerous different nursing professional organizations, with the primary objective of identifying the relevance of current nursing core competencies to become the expected nurse roles, and current and future work settings (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labour Organization, 2014).

The Philippine Professional Nursing Practice Standards (PPNPS) were disseminated through the PRBON Resolution no. 22 series of 2017 to promote, lead, and direct professional nursing practice in the country. The different nursing competencies and its performance indicators were emphasized to serve as a reference for developing competency standards (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labour Organization, 2014).

The 2014 NNCCS illustrate three major beginning roles and corresponding responsibilities in client care, leadership and management, and research (Commission on Higher Education; Professional Regulatory Board of Nursing; International Labor

Organization, 2014). Under the client care, the third responsibility was specified into the maintaining comprehensive, precise and current recording and reporting system. It elaborates the specified competencies and performance indicators on the methods and systems employed in electronic documentation systems. Informatics was incorporated in the implementing system and the NNCCS delineated the implementing system of informatics in health care delivery presented in Table 6:

Table 4. The Nursing Informatics Competencies of the National Nursing Core Competency Standards (NNCCS)

Competencies	**Performance Indicators**
3.3 Implement system of informatics to corroborate the delivery of health care	1. Demonstrate competencies in the use of informatics. 2. Utilize appropriate, up-to-date and available system of informatics.

The 2014 NNCCS conceptual framework and description help understand the informatics competencies sought of nurses based on industry needs and the types of clients they serve.

i. Nursing Informatics Knowledge, Skills, and Attitude

1). NI Knowledge and Skills

The article published by Davies et al., (2021) asserted that information management, data, human aspects, research skills or knowledge, project management leadership and management, systems development and evaluation, and health and healthcare are among the eight primary domains in the prior competencies for clinical informaticists. Nursing informatics, for instance, appears to be further along in terms of acquiring comprehensive competency standardization. Attempts at competency standardization should be in accordance with suppleness to account for local variations and conditions (Davies, et al., 2020).

Davies et al., (2020) in their article about core competencies for clinical informaticist elaborated that skills should be adaptable to local differences; a consultation to former students and industry partners or stakeholders by course and curriculum designers to identify the recent industry advances which have to be incorporated in the course and curriculum content; it is essential to consider on how people working in a further specialized sector of informatics obtain wider ability no matter where they are working; and it is also important to think about how people are working in a more specialized sector.

2). The Attitudes of Health Care Staff towards IT

Ward et al., (2008) identified several major challenges in their study, encompassing the need for flexibility and usability, adequate education and training, and software which is "fit for purpose," demonstrating that organizations should plan carefully when integrating IT-based systems into the process of their work. Moreover, involving users with more prior IT experience, who possess more positive views, could be useful to such businesses.

Health care workers' education in utilizing technology at the undergraduate level is an essential aspect influencing their attitudes (Ward, et al., 2008). Furthermore, the healthcare worker’s attitudes may possess a considerable effect in the reception and effectiveness of IT utilization in practice, in accordance with the reviewed studies. There

do not appear to be any consistent indications of their likely attitude other than experience and comfort with technology (Ward, et al, 2008).

Nurses resisting information technology in the workplace has elaborated and examined on nurses' resistance to the implementation and utilization of computer systems. He discovered that 'technophobia' cannot account for the majority of opposition in this situation. Instead, the nurses' comments display that system failure is a far more viable explanation. Systems ignored the nurses' practices, which were frequently deeply ingrained, long-standing, and totally justified in the nurses' eyes. Resistance cannot be reduced to a single dimension in this setting. Rather, it was a complicated and variable occurrence (Ward, et al., 2008). Clinicians' needs for flexibility should be accommodated by information technology (IT) systems. Regarding the efficient deployment, education and training in general IT and the specific software being installed is essential (Ward, et al., 2008).

3). Technological Literacy in Nursing Education

The capacity to successfully utilization technology to access, assess, integrate, produce, and transmit knowledge in enhancing the learning process through problem-solving and critical thinking," is in accordance with the definition of technological literacy. Nes et al. (2021) asserted that nursing students are necessary to be technologically literate in order to become proficient and competent while also developing their critical thinking abilities in regard to the utilization of technology in education and the profession. As a result, nurse educators, experts, and learners need to learn how to manage the vast amount of new information, concepts, and talents which come with technological innovation (Nes et al., 2021).

Nes et al., (2021) argued that simulated electronic documentation, different teaching methods, and assessment as a learning importance enhanced the development of technological knowledge and skills in nursing education. Such approaches are in accordance with constructive alignment concepts which encompass addressing learning outcomes and determining how to achieve them by implementing a variety of teaching and learning tactics.

The study of Nes et al., (2021) unveiled a statistically substantial relationship between nursing informatics and patient safety proficiencies. It indicates that incorporating informatics aptitudes into nursing education is able to encourage students in obtaining the knowledge and skills they require to render a reliable and useful nursing care (Nes, et al., 2021).

4). NI Core Competencies

Nurses are the health workers who possess the most frequent and close contact with patients, and the most knowledge of their daily needs. Nurses possess a unique set of skills which can be implemented to the technology advancement, such as the utilization of "machine" learning and prognostic analytics to better comprehend patients' situations and for the enhancement in rendering treatment and nursing care (Nes, et al., 2021). Nursing informatics is the vehicle which produces evidence of nursing interventions' impacts to be associated with care outcomes in respect to the patient by employing health information technologies (HIT). Nursing informatics is also concerned with the organization and managing of data, information, and familiarity to enhance nursing practice and the delivery of care (Honey, et al., 2017).

5). Nurse Leaders Nursing Informatics Proficiencies

Strudwick et al. (2019) argued that identifying the nurse leader's informatics competencies is a vital initial step in safeguarding that nurse utilize health information technology systems supporting nursing practice and, as a result, practice the best feasible care and outcomes for patients. Furthermore, nurse leaders play a critical role in the procurement, operation, and optimization of information technology for health (Strudwick, et al., 2019). As a result, nurse leaders should possess distinct skills than direct care nurses in order to involve in making these decisions (Strudwick, et al., 2019). Many nations are still in the early phases of developing informatics curriculum, and as an outcome, nurse leaders may not be adequately prepared to participate in health informatics projects as examined in the study of Strudwick, et al., (2019). Given the increasing prominence of health information technology in the clinical context, nurse leader education programs should ensure students to acquire these skills (Strudwick, et al., 2019).

6). The Telehealth Competencies

Nurses should enrich the necessary knowledge, skills and attitudes (KSAs) before they are trusted to undertake one of the responsibilities. The explanation of fourteen (14) NT-EPAs (Nursing Telehealth Entrustable Professional Activities) can also be utilized to help build nursing curriculum by connecting their education to practice. The communication abilities, coaching proficiencies, the ability to employ telemedicine in conjunction with clinical experience, clinical expertise, awareness of ethical issues, and a positive mindset are the most critical skills for telehealth nurses to possess (Houwelingen, et al., 2016).

Nurses utilize technology to provide health care to patients who are in distance by various ways, from videoconferencing for psychosocial support to complete an independent double-check on high-risk medication. All of these NT-EPAs appear to specify a collection of abilities, attitudes, and knowledge (Houwelingen, et al., 2016). This problem emphasizes the necessity of identifying telehealth competencies regarding the specific telehealth tasks instead of offering a broad picture. The NT-EPAs and related skills examined in the study of Houwelingen, et al., (2016) can be utilized to construct effective training and education in home care settings, rural and remote areas or in the colleges of nursing (Houwelingen, et al., 2016).

7). Resource Organizations and Stakeholders

The expanding mandate for global electronic health information systems, shared with the growing density of healthcare services and practice, has elevated the specialty for nursing professionals. All undergraduate, graduate, and doctoral nursing programs recently require some informatics competencies (American Nurses Association, 2015). International organizations encourage the nursing informatics specialty in providing trainings, research, and guiding HEIs in setting standards.

8). The Higher Education Institutions (HEIs)

The baccalaureate program in nursing is a CHED-designed outcomes-based education (OBE) program. The PSG (Policies, Standards, and Guidelines) program was outlined in CMO 15 (Commission on Higher Education Republic of the Philippines Officer of the President, 2017). CMO 15 s. 2017 reported that the BSN curriculum owns 192 units. The Nursing Informatics course is a 3-unit professional course with two units lecture and one unit for the laboratory. The CHED Memorandum Order no. 15 highlights

14 program outcomes. One of the mentioned program outcomes concerns on the implementation of knowledge in technology and care systems and methods in health care delivery. Utilizing applicable technology in performing a prudent and effective nursing care; and developing an informatics system to assist the delivery of nursing care are the indicators of performance (Commission on Higher Education Republic of the Philippines Officer of the President, 2017).

4. CONCLUSION

During a literature review, the following set of skills surfaced: nursing care and management proficiencies, information literacy and management, computer skills, technology resources of healthcare facilities, and ethics and legal understanding in health information technology. To emphasize the importance of competencies in advancing a safe and quality care, the integration of the various competencies mentioned in it should be underlined. The core competencies in NI (nursing informatics) were primarily basic knowledge of computers, literacy (information), and management of information. Second, the inherent compassion of nurses serves as the guiding attitude in the implementation of technological skills. Finally, the technology resources required in nursing informatics help provide safe and effective patient care.

The evidence discovered the way nursing informatics has progressed over time and the necessary skills and NI standards transformed in a particular country. Only a few published studies in the Philippines to corroborate how nursing informatics education and implementation are portrayed. The majority of hospitals still utilize paper-based documentation, and hospital information management systems merely possess limited capability. However, in the field of nursing informatics, many promising initiatives arises encompassing hosting seminars, conducting trainings and workshops on how to teach informatics, organizing orientation as part of the employment process and establishing a presence on social media and in the scientific community through published articles. It is hereby recommended to continue disseminating the importance of employing technology, computers in the healthcare settings. Trainings, in-house discussion to better enhance clinical or community-based care are very much encouraged. Nurse managers and policy makers should also ensure adequate support in the period of enhancements such that health workers are more motivated to engage in the mentioned development.

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