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Advanced Informatics Competencies of Nurses at Sutter Maternity and Surgery

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California State University, Northern California Consortium Doctor of Nursing Practice

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Abstract

Today, the profession of nursing requires the integration of many sciences and skill sets in order to care for the increasing acute and chronic illness in our patient populations. In order for nurses to safely care for patients in highly technological environments, they must integrate knowledge from Nursing Informatics (NI), to advance the profession, deliver safe high-quality patient care and effective documentation that drives improvement in patient outcomes. When nurses have an understanding of advanced NI skills, they are better equipped to become super users that train and lead teams in optimization of electronic health records (EHRs) to support them in enhancing patient safety.

The purpose of this research was to measure the level of advanced nursing informatics competencies of nurses at Sutter Maternity and Surgery Hospital in order to better understand gaps that exist in education and training, which could be an impediment to enhanced care and patient safety. Results showed that respondents rated themselves as beginner in all categories.

Chapter 1

Introduction

Over the last two decades, healthcare systems have undergone enormous change brought on by increasing pressures to improve quality, value, affordability, and most importantly safety. The burgeoning complexity of healthcare delivery systems, as well as regulatory forces from the Federal Government, has resulted in demands to digitize the entire industry, one that makes up over 18 percent of the Gross Domestic Product of the United States (CMS, 2018). These demands have forced the healthcare industry to become ever more facile at managing and manipulating a spellbinding volume of data, while requiring that health information technology (HIT), be precipitously incorporated into direct patient care at a rate that is faster than the majority of bedside clinicians can adapt resulting in medical errors(IOM, 2012). In 2016, researchers at Johns Hopkins determined that medical error is the third leading cause of death in the United States (Makary & Daniel, 2016).

The landmark 1999 Institute of Medicine (IOM) report, *To Err is Human*, made public the fact that medical errors kill as many as 98,000 people every year (IOM, 2000). As a result of the IOM report, the Health Information Technology for Economic and Clinical Health (HITECH) act of 2009 was enacted. The purpose of the HITECH act was to improve safety, quality, and efficiency, while also reducing disparities in healthcare (Health IT.gov). Minimum government standards were defined for EHR's which is referred to as meaningful use. The significance of meaningful use was the financial incentives given to hospitals to adopt EHR's as a condition of maintaining reimbursement under both Medicare and Medicaid (Healthit.gov). Consequently, healthcare systems were required to rapidly pivot and embrace an entirely new method of conducting its day-to-day operations, with the EHR as the prescribed solution.

Healthcare systems quickly adopted newly created EHRs in order to qualify for the financial incentives.

Upon implementation of these first-generation EHRs, several problems soon became evident. Initially, EHRs were comprised of a series of check boxes, compiled into lists, that failed to provide the bedside clinician with a comprehensive depiction of the patient to whom they were responsible for providing care. Additional EHR issues identified included: design, and usability along with the incompatibility of the EHR with the clinician work flow (Meeks, 2014). The parallel trajectories of HIT implementation and the rate of medical errors suggested a need for deeper understanding of the people who use the technology in order to improve patient safety (Sittig, Belmont, & Singh, 2017). Concerns about the safety of HIT emerged and led to another landmark IOM report, *Health IT and Patient Safety: Building Safer Systems for Better Care*. This report recognized that implementation of EHRs, has not led to the improvements hoped for in the HITECH act and that the “safe use” of HIT is a growing patient safety issue. (Institute of Medicine [IOM], 2012, P. 1).

“As health IT products have become more intimately involved in the delivery of care, the potential for health IT-induced medical error, harm, or death has increased significantly” (IOM, 2012, P.22)

The combination of rapid technology incorporation, poor design, and lack of training has led to a present state in which clinicians need to use workarounds in order to circumvent alterations to workflow, facilitate communication, and support interprofessional care coordination (Patterson, 2018).

Problem

The nursing workforce is 3.4 million strong and makes up the largest group of users of HIT (*Number of Nurses*, 2018). The lack of NI knowledge contributes to the lack of understanding of downstream effects and continues to be a problem for patients, healthcare systems, and populations. Nurses use workarounds when technology becomes a barrier to providing care to patients, (Rathert et. al., 2019). Nursing education, training and informatics competency development have not kept pace with the rate of HIT ascension and implementation, leading to safety concerns (Meeks et al., 2014). The issue is standardizing, validating, and implementing these competencies to create an information-literate, highly-skilled nursing workforce that drives developing technology to enhance usability and ensure patient safety (Hubner et al., 2016).

Purpose

As healthcare delivery systems transition to increasingly technology-rich environments, the profession of nursing has struggled to keep pace with the speed of information technology that is being incorporated into healthcare (Clark & Mitchell, 2014). Nursing informatics, defined as the use of information and technology to reinforce all parts of nursing practice (Hebda & Czar, 2013), is critical to increase patient safety and improve patient outcomes. The major issue, however, is to understand the current state of nursing informatics within healthcare delivery in order to develop, educate, and transform a highly-skilled nursing workforce and improve patient safety. The Institute of Medicine report in *Health IT and Patient Safety: Building Safer Systems for Better Care* discussed the issues that the rapid adoption of technology has created “concerns about harm from the use of health IT” (IOM, 2012, p. 1). *Lessons from the Literature on Electronic Health Record Implementation* further support the need for best practice training

facilitating “super-users, champions and clinical leaders” whose NI skills can assist in assessing needs and skills of end users (Blavin et al., 2013).

Classically, clinicians were not incorporated into the development and design of these systems, nor were the systems built in such a way that clinicians could seamlessly apply the tools in clinical care. This state has given rise to well-intended nurses having to adapt by developing workarounds, to reduce the inefficiencies and disruption in their daily practice in order to deal with inefficient EMR workflow design (Dudding, 2018). In healthcare, the term workaround is used to define a deviation from the intended workflow in order to alleviate barriers and increase efficiency (Patterson, 2018). Nurses employ workarounds in order to avoid changes to previously engrained workflow, enable interdisciplinary communication, coordinate activities, and have real-time portable access to summarized and synthesized information instead of HIT (Patterson, 2018). The unintended consequences of deviating from established protocols and formal policies can lead to errors in complex environments (Patterson, 2018).

Nurses with a high level of informatics competency are then able to assist IT partners in designing better HIT systems that decrease workarounds, as well as more effectively utilize technology tools that remove barriers to providing high-quality, value-driven care (Al-Hawamdih & Ahmad, 2017). Therefore, this study aimed to assess the level of advanced informatics competencies among nurses working at Sutter Maternity and Surgery hospital, with the intent of informing future decisions regarding EHR training and education in order to reduce the risk of patient harm.

Theoretical Framework

Nursing Informatics (NI) has only been recognized as a nursing specialty since 1992 by the American Nurses Association (ANA), therefore applicability and usability of NI frameworks

has been fairly recent. The Institute of Medicine reports *To Err is Human: Building a Safer Health System* (1999), *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001), and *Keeping Patients Safe: Transforming the Work Environment of Nurses* (2004), all discuss the need for a combination of technology, and a competent nursing workforce to increase patient safety and improve healthcare delivery. Lewin's Change Theory is often applied to informatics due to the constant evolution of technology (Kaminski, 2011). Continuous change from upgrades and optimization is the reality of healthcare in the digital age. While change management is often a focus of informatics, this research emphasized information theory, specifically the Data, Information, Knowledge, Wisdom (DIKW) framework that has been adopted by the American Nurses Association (ANA) scope and standards of practice (ANA, 2015).

Bruce Blum's information theory was the starting point for Graves and Corcoran's conceptual framework in the study of nursing information that incorporated data, information and knowledge in the context of nursing informatics (Graves and Corcoran, 1989). Blum's definitions of data, information and knowledge are as follows:

Data as discrete entities that are described objectively without interpretation, information as data that re interpreted, organized or structured and knowledge as information that has been synthesized so that interrelationships are identified and formalized (Graves & Corcoran, 1989, p. 227).

The framework continued to be modified and, in 1989, Nelson and Joos added wisdom to the framework (Nelson, 2002). The DIKW framework is a concept to examine nursing knowledge that originated in knowledge management and is applicable to nurses in their everyday work (Matney, Avant, Staggers, 2015). When a nurse collects data about a patient, the

data become information when interpreted. Nurses make clinical nursing decisions based on factual knowledge and knowledge is derived from the synthesis of that information when relationships are formalized (ANA, 2015). The American Nursing Association defines wisdom as the “appropriate use of knowledge to manage and solve human problems” (ANA, 2015, p. 118). Wisdom is demonstrated through effective communication with physicians in order to implement appropriate interventions that deliver safe patient care. Competency in NI produces an understanding of how nurses will use information systems and assists in the assessment, building and processing of information for clinical decision support (Nelson, 2002).

CHAPTER 2

Literature Review

Before Staggers, Gassert and Curran completed a conceptual framework to guide development of informatics competencies in 2002, research on nursing informatics competencies did not exist. Three areas of competency were analyzed: computer skills, informatics knowledge and informatics skills to determine the four levels of practice beginner, experienced, specialist, and innovator. The ability to use computer software and hardware is the definition of computer skills (Staggers, Gassert Curran, 2002). Informatics knowledge is the ability to use “methods, tools and techniques” and informatics knowledge incorporates concepts and theory (Staggers, Gassert, Curran, P. 385 2002). This formative research was the foundation for informatics competencies and the groundwork for other research in this area (Staggers, Gassert, & Curran, 2002). Using a Delphi method, a master list of 305 competencies were determined for four levels of practice (Staggers et al., 2002).

The IOM report *Health IT and Patient Safety: Building Safer Systems for Better Care*, was an independent review of the evidence by a committee of experts to investigate the

“concerns about harm from the use of health IT” and make recommendations for improvement (IOM, 2012, p. 1). After examining the current state of health IT, the committee determined that opportunities in safer HIT could exist by examining both the “design and development of health IT and the other associated with the implementation and use of health IT” (IOM, 2012, p. 77). The committee recommended to make the use of health IT safer by training and educating the people who use the health IT along with incorporating them into the design and development (IOM, 2012).

Ward and colleagues (2011) used the I-SEE survey administered before and after implementation to assess experiences of nurses following introduction of an EHR. Three hundred fifty-four nurses from a Midwestern rural hospital (300 beds) completed the pre-training, 203 nurses completed the post training survey and 148 nurses completed the 6-month post survey. Data collection was done via the I-SEE survey distributed on paper by training facilitators. The survey was anonymous and used a 7-point Likert scale. Data analysis methods included descriptive analysis that examined characteristics like years of experience with EHR. The authors used factorial analysis of variance to compare mean responses across the three administrations of the survey along with the groups of nurses. Nurses expressed a high level of agreement with the survey items. Responses tended to be more positive on the first administration of the survey and continued to drop with each additional survey. Responses decreased significantly from the second administration to the third. Nurses were less confident after training on a number of factors including communication between departments, overall patient safety, and the ability to alert other staff to potential errors along with the accuracy of orders. One strength of this study was a large number of respondents. A limitation of was that the

data presented in tables was confusing to understand (Ward, Vartak, Schwichtenberg, & Wakefield, 2011).

Hill and colleagues (2014) used a Delphi approach in validation and corroboration of a nursing informatics (NI) tool to assess NI competencies in order to determine competencies of the Level 3 informatics specialist, and the Level 4 informatics innovator. A purposeful sample of 88 respondents from the NI community were recruited via list serve from American Nurse Informatics Association (ANIA) and Healthcare Information Management System Society (HIMSS). Data were analyzed from the three sections by looking at correlation, validity and internal consistency. Results from this study showed the need for a valid assessment tool for NI to improve upon strengths and weaknesses of nurses' skills in informatics. A strength of this study was using a highly reliable tool for assessing NI competencies, but a limitation of the tool was its length of 178 items. Recommendations for future informatics research included development of curricula by educators to expand Level 3 and level 4 nurses that would then continue to expand the profession of NI (Hill, McGonigle, Hunter, Sipes, & Hebda, 2014).

Al-Hawamdih and colleagues (2017) conducted a descriptive survey study using a convenience sample of 99 RNs at a 400-bed public hospital. This study examined the relationship between NI competency and quality of documentation. Of the 99 RNs, all had at least 3 months of experience with the EHR. Data collection consisted of a paper survey, Self-Assessment Nursing Informatics Competencies Scale (SANICS), with a 5-point Likert scale. The authors used Cronbach's alpha ranges between .85 and .90 (Al-Hawamdih et al., 2017, p. 2). They used SPSS for data analysis and there was a statistically significant positive correlation between quality of information process and NI competency. Strengths of this study include the in-depth analysis of the data. A limitation of this study was that nurses were told to complete the

study if they had time, which is biased towards nurses that are already efficient (Al-Hawamdih & Ahmad, 2017). The results of this study indicated that technology is commonplace in healthcare and nurses need to translate information from accurate data in order to transform care delivery. The authors concluded that additional research was necessary to examine other NI competencies that impact nursing quality.

Wilbanks and colleagues (2016) conducted a descriptive qualitative study via Survey Monkey with a sample of N=245 closed claims that were analyzed by 14 nurse anesthetists. Excluded were claims that did not have documentation issues. Data analysis was completed on 72 claims to determine themes on the relationship between documentation quality and anesthesia-related closed claims. The authors reached consensus on 4 themes from the qualitative analysis and showed that poor documentation resulted in provider wrongdoing, may have led to the inappropriate transfer of care, and resulted in accusations of malpractice. Strengths of this study were the easy-to-read and understandable results. A limitation of this study was the missing definition of what qualified the reviewers as experts (Wilbanks, Geisz-Everson, & Boust, 2016). This study provided strong evidence that poor documentation led to decreased patient safety but did not specify the cause of the poor documentation, specifically regarding nursing informatics competencies.

Rogers and colleagues (2013) conducted a qualitative, research-scenario-based evaluation technique/Case study. A purposeful sample of 12 nurses from 2 hospitals (760 and 300 bed) were randomly selected. The author analyzed data using Nielsen's usability heuristics & coded for themes then mapped within the Health Information Technology Reference evaluation framework (HITREF). Results revealed 7 interface design flaws found in the nursing information system (NIS) that impacted workflow. The design flaws were: "Requirements to document in

multiple locations, menus without applicable text, functionality does not have feedback, entered data not propagated throughout the system, shortcuts not visible and irrelevant data cluttering the screen” (Rogers et al., 2013, p. 1073). A strength of this study was the way human factors engineering was quantified by the “think aloud” protocol to evaluate usability of NIS (Rogers et al., 2013, p. 1072). A limitation of this study was the small number of volunteer participants n=12 and only one NIS was evaluated (Rogers et al., 2013). This study showed that “efficiency work-arounds were an expected outcome” when nurses are confronted with problematic workflow (Rogers et al., 2013 P. 1073). This research could guide informaticists to create more efficient, safer NISs.

Swenty and colleges (2014) conducted a narrative qualitative study examining existing advanced practice registered nurse (APRN) curriculum for informatics education. The authors used Kotter’s Sense of Urgency framework to look at seven courses and the plan to include informatics in existing curriculum with faculty and student outcomes. To increase speed in change Swenty et al. concluded that outside factors are pushing APRN curriculum integration in informatics. Faculty need a sense of urgency to prepare APRNs for the fast-paced technological changes that are occurring in healthcare. The implications for practice are that APRNs that have a technology-enriched curriculum are better prepared to deal with the complexity of healthcare today. Future research implications are to better prepare faculty and APRNs who will then prepare the next generation of nurses to incorporate technology for improved quality of care (Swenty & Titzer, 2014).

A weakness in Swenty and colleagues’ (2014) study was that outcomes were not evaluated, and their research was more of an evaluation of the current state of APRN curriculum.

The strength of this study was the well-researched look at current trends and the need to implement change to improve informatics education (Swenty & Titzer, 2014).

The current state of healthcare includes many technological tools that require nurses to have an understanding of informatics competency in order to manage data, and information of patients in a complex environment. Existing literature indicates that further research is required to assess the level of informatics competency of bedside nurses in order to assist nursing leaders to fill gaps in education and training. Especially precarious are older nurses that have a decreased understanding of information literacy. Staff nurses at Sutter Maternity and Surgery have been studied in measuring baseline informatics competencies and age was determined to be a statistically significant factor in information literacy scores (Liston, 2017).

CHAPTER 3

Methods

This study measured NI competencies of the staff nurses at Sutter Maternity and Surgery using the Nursing Informatics Competency Assessment – Level 3/Level 4 (NICA L3/L4)© tool. The aim of this research was to use the NICA© to determine the advanced informatics competencies of nurses at Sutter Maternity and Surgery, using a quantitative cross-sectional research design, in order to determine if further NI skill education was necessary to improve utilization and patient safety. This instrument was established as an online self-assessment tool to determine proficiency of informatics skills at the Informatics Specialist (L3) and Informatics Innovator (L4) by Hill et al. in 2014. The lead authors and creators of the NICA tool at Chamberlain College granted permission for the use of the tool for this research.

The NICA tool has 178 questions and consists of 4 parts: demographic questions (8) and the self-assessment consisting of: computer skills, 13 questions, informatics knowledge, 56 questions, and informatics skills, 109 questions. Each section asked the respondent to rate his or her competence on each activity by either expert, proficient, comfortable or beginner/NA. Beginner scored as 1, comfortable scored as 2, proficient as 3, and expert as 4. Demographic data questions included age, registered nurse, highest level of education, length of practice in informatics, and other certifications in informatics. No identifying information was collected or reported.

Participants

The Sutter Chief Administrative Officer (CAO), Sutter Health IRB, and Fresno State University IRB all granted approval of the research. The principal investigator (PI) deployed an email invitation, using a convenience sample of the Sutter Maternity and Surgery registered

nurse (RN) distribution list, which consisted of 171 potential respondents. The invitation gave information of the upcoming survey and the details of how to locate and complete it. One day after the email announcement, paper surveys were distributed in a box to each of the four departments: 1) Surgery 2) Special Procedures/PACU 3) Perinatal 4) Medical-Surgical Department. Each survey packet contained an introduction and explanation letter of how to complete the survey. Continuation beyond the introduction letter of the survey constituted informed consent by the respondent. Completion of the survey took approximately 20 minutes and all participants were entered into a raffle for an iPad Mini. Potential respondents could enter the raffle regardless if they participated in the survey or not in order to prevent participant identification.

Selection

The participants were registered nurses at Sutter Maternity and Surgery. The rationale for studying this group of individuals was to determine advanced informatics competency among staff nurses. Exclusion criteria were those individuals that were not RNs. No screening methods were used other than demographic self-report question of RN: yes or no. The potential participants did not fall into the special population's category.

Recruitment

Initial contact method occurred after the Chief Administrative Officer (CAO) and Chief Nurse Executive (CNE) approval in addition to human subject's approval from Sutter Health and Fresno State University IRB. An email notification with information regarding the study was sent by the PI through access to the RN distribution list at Sutter Maternity and Surgery.

The surveys were available from October 1-29, 2018. Each subject was asked to check boxes on a paper survey for all 178 questions and return it to a survey completion box in their

department. The nurses completed the surveys anonymously during the downtime of their shifts and then deposited the completed surveys into a closed box in each department. Completed surveys were picked up by the PI daily and kept in a locked file in her office. The PI collected the boxes at the end of the designated time frame and was the sole reviewer of the surveys.

Data Analysis

Statistical analysis was performed using excel, on the self-reported scores from the NICA survey and included computing averages of each level of competency: expert (4), proficient (3), comfortable (2), and beginner (1). Each item in each category was assigned a point value of 1 to 4, with 4 points being the highest level of competency. The computer skills section consisted of sub categories in general computer skills, systems, and quality improvement. The informatics knowledge sections consisted of the following categories: 1) data, 2) education, 3) impact, 4) privacy/security, 5) regulations, 6) systems usability, and 7) data mining. The third section of informatics skills was comprised of: 1) analysis, 2) data/data structures, 3) design/development, 4) fiscal management, 5) implementation, 6) management, 7) programming, 8) requirements, 9) role, 10) systems maintenance, 11) system selection, 12) testing, and 13) training. A comments section at the end of the survey allowed for respondents to add feedback on the length of the survey, design, wording of items, items to add, and items needing to be removed.

Chapter 4

Statistical Analysis/Results

The survey was completed and submitted by 39 nurses at the Sutter Maternity and Surgery departments. The survey was divided into three groups of questions: computer skills, informatics knowledge, and informatics skills. Each of the three groups was then divided into a number of subgroups. Each subgroup consisted of a varying number of multiple-choice questions.

For purposes of the analysis, the responses were quantified as follows.

Beginner/NA = 1

Comfortable = 2

Proficient = 3

Expert = 4

There was also a series of demographic questions with respect to age, experience, education level, and gender. The mean scores for all groups and all subgroups were statistically below the neutral value of 2.5. These self-assessments indicated a low level of informatics competency. The data also showed that age, experience, education level, and gender were not statistically significant in affecting the scores. The overall lack of competency dominates everything, leaving no room for other factors.

Mean Scores

For each of the three groups, the mean score is listed in Table 1 along with the standard deviation and the 95% confidence interval. None of the 95% confidence intervals includes the neutral value of 2.5. All three group scores were therefore considered to be statistically significantly lower than 2.5.

Table 1. Group Statistics

	Group	Mean	St. Dev.	95% Confidence Interval	
				Lower	Upper
1	Computer Skills	1.18	0.27	1.09	1.26
2	Informatics Knowledge	1.27	0.34	1.16	1.38
3	Informatics Skills	1.12	0.22	1.05	1.19

In Tables 2-4, the subgroup mean scores were evaluated for their statistical significance relative to 2.5. The 95% confidence intervals for all the subgroups were below the neutral 2.5.

Table 2. Computer Skills

	Group	Mean	St. Dev.	95% Confidence Interval	
				Lower	Upper
1.1	Gen. Comp. Skills	1.19	0.35	1.08	1.31
1.2	Systems	1.17	0.30	1.08	1.27
1.3	Quality Improvement	1.16	0.28	1.07	1.25

Table 3. Informatics Knowledge

	Group	Mean	St. Dev.	95% Confidence Interval	
				Lower	Upper
2.1	Data	1.44	0.59	1.25	1.63
2.2	Education	1.23	0.37	1.11	1.36
2.3	Impact	1.34	0.39	1.21	1.46
2.4	Privacy/Security	1.30	0.44	1.16	1.44
2.5	Info Knowledge-				
2.5	Regulation	1.12	0.27	1.03	1.20
2.6	Systems	1.27	0.38	1.15	1.40
2.7	Usability	1.37	0.48	1.22	1.53
2.8	Data Mining	1.10	0.29	1.00	1.19

Table 4. Informatics Skills

	Group	Mean	St. Dev.	95% Confidence Interval	
				Lower	Upper
3.1	Analysis	1.15	0.32	1.05	1.26
3.2	Data/Data Structures	1.04	0.15	1.00	1.09
3.3	Design/Development	1.12	0.27	1.04	1.21
3.4	Fiscal Management	1.07	0.16	1.01	1.12
3.5	Implementation	1.11	0.25	1.03	1.19
3.6	Management	1.15	0.28	1.06	1.24
3.7	Programming	1.01	0.08	1.00	1.04
3.8	Requirements	1.10	0.25	1.02	1.19
3.9	Role	1.22	0.38	1.10	1.34
3.10	Systems Maintenance	1.16	0.31	1.06	1.26
3.11	System Selection	1.14	0.30	1.04	1.24
3.12	Testing	1.09	0.28	1.00	1.18
3.13	Training	1.19	0.41	1.05	1.32

In Figure 1, the means for the three groups are plotted.

Figure 1. Group Means

Figures 2-4 are plots of the subgroup: Computer Skills, Informatics Knowledge and Informatics Skills, means.

Figure 3. Informatics Knowledge

Effect of Age on Mean Scores

The age of the nurse was looked at for its possible effect on the mean score for each group. Statistically, this was done by linear regression. The regression slope was tested against a theoretical value of zero, a value indicating no effect. The slope was tested by a t test. A p value below 0.05 was considered to be statistically significant. From Table 5, all three p values exceed 0.05 and were considered to be not statistically significant, indicating that age is not a factor affecting the mean scores.

Table 5. Age Regression

Stat\Group	Computer Skills	Info Knowledge	Info Skills
Intercept	1.039	1.222	1.277
St Err (Intercept)	0.197	0.249	0.161
Slope	0.0029	0.0010	-0.0033
St Err(Slope)	0.0041	0.0051	0.033
t	0.72	0.20	-1.00
p	0.478	0.841	0.326

1. Effect of Length of Practice on Mean Scores

The length of practice of the nurse was looked at for its possible effect on the mean score for each group. Again, a linear regression model was used. The regression slope was tested against a theoretical value of zero and involved a t test. A p value below 0.05 was considered to be statistically significant. From Table 6, all three p values exceed 0.05 and were considered to be not statistically significant, meaning experience was not a factor affecting the mean scores.

Table 6. Length of Practice Regression

Stat\Group	Computer Skills	Info Knowledge	Info Skills
Intercept	1.107	1.218	1.123
St Err (Intercept)	0.055	0.075	0.050
Slope	0.0065	0.0060	0.0005
St Err(Slope)	0.0038	0.0052	0.0035
t	1.72	1.18	0.154
p	0.095	0.250	0.878

Effect of Education on Mean Scores

Education was considered as a possible factor for mean scores. This was analyzed by the analysis of variance (ANOVA). The statistical test was an F test. All p values exceeded 0.05 and were not

considered to be statistically significant. The closest to being statistically significant was the computer skills group, where those with a master's degree in nursing had mean scores of 1.56.

Table 7. Education Analysis of Variance

Education Level	Computer Skills Mean	Info Knowledge Mean	Info Skills Mean
Assoc Nurse	1.10	1.24	1.10
BSN	1.23	1.38	1.17
Diploma Nursing	1.22	1.14	1.04
Masters Nursing	1.56	1.27	1.08
Other Bachelors	1.00	1.18	1.00
Other Masters	1.10	1.19	1.22
F	2.10	0.37	0.40
p	0.09	0.87	0.85

Effect of Gender on Mean Scores

Two-sample t tests looked at gender as a possible factor in mean scores. As indicated by the p values, none of the three groups were found to be statistically significant with respect to gender.

Table 8. Gender Differences

	Computer Skills	Info Knowledge	Info Skills
Female Mean	1.18	1.27	1.12
Male Mean	1.00	1.23	1.20
Pooled St. Dev.	0.266	0.345	0.229
t	0.55	0.19	-0.60
p	0.583	0.853	0.554

CHAPTER 5

Gaps

Currently NI studies do not include human factor effects on patient care, designing systems that incorporate the clinicians doing the work to improve patient safety. As of 2016 more than 95% of all hospitals have a certified electronic health record (EHR) ("Quick Stat," 2017) yet literature to date lacks depth in how to manage, train and educate staff of the EHR. More time motion analysis is needed in order to understand lack of efficiency in nursing workflow which contributes to workarounds and errors, or how much is attributed to lack of NI proficiency.

Nurses have been notoriously absent from the discussion of what they actually need in order to provide safe, valuable care to patients (IOM, 2012). Measuring informatics knowledge will help communicate to hospital and IT leadership both the understanding and the needs of bedside nurses in order to develop usable systems and train clinicians on safe use.

Discussion

This study took place eight years after implementation of the electronic record and nurses showed unexpectedly low confidence in their informatics skills in all categories. Nursing must have a seat at the table when developing and building HIT in order to improve quality and safety for patients. With current budget constraints in healthcare and doing more with less, nurses continue to be expert at "work arounds" when using health IT. This mentality which permeates hospitals, defies the research that proves standardization is safer for patients (Staggers, Elias, Makar, Hunt, & Alexander, 2016). Yet gaps in the literature exist on how to remove barriers in healthcare technology to decrease workarounds. Further studies need to be conducted on the correlation of informatics competencies and the impact for both clinicians and patient safety.

Limitations

The length of the survey was a limitation as well as the advanced level of the questions. The survey also was subjective and not an objective measurement as nurses rated their proficiency level based on of their own perception of informatics skills. Respondents self-selected to complete the survey based on downtime during their shift. This could favor nurses that had quicker skills in in EHR documentation. Lastly, the study took place in a small urban hospital and did not have a large respondent pool.

Future Research

Across the board nurses showed unexpectedly low scores in all informatics competency categories. Implications from this research show the need for nursing practice to continue pushing the informatics agenda forward by educating current staff nurses who have not had informatics in their nursing education. Future research also needs to focus on how to design systems that allow nurses to extract and coalesce data into information to teach and empower patients, but more importantly, assure patient safety

Conclusions

Too often we turn to technological solutions to assure patient safety. One of the tenant goals of the HITECH act was that by computerizing the healthcare industry we could assure patient safety. The problem with that thinking fails to take into account the level of skill of the user. The most important factor in patient safety is a well-trained and well-educated nurse, operating at the highest level of professional practice. But current designs of technology tools has failed to take into account the complex workflow of the clinician. In addition, informatics training has been woefully inadequate in nursing programs and post graduate education. To make up for these deficiencies, it is incumbent upon hospitals to asses end user skill, and continually train to decrease workarounds that assure patient safety.

Appendix A-Survey Tool

**ADVANCED NURSING INFORMATICS COMPETENCY
ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)**

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Dear Informatics Nurse,

Thank you for your participation in this voluntary, anonymous self-assessment of nursing-informatics (NI) competencies. This instrument has 4 parts: questions about you (demographics) and the self-assessment, consisting of: computer skills, informatics knowledge and informatics skills. There are a total of 178 items in the self-assessment portion.

The purpose of this study is to measure nursing informatics competencies at Sutter Maternity and Surgery with the Nursing Informatics Competency Assessment - Level 3/Level 4 (NICA L3/L4). All data collected will be kept confidential and secure. Data reporting will be at the aggregate level.

This study has been approved by the Institutional Review Board of Sutter Health and California State University Fresno. Jessica Liston is the Principal Investigator (PI).

Continuation beyond this page of the study instrument constitutes your agreement to participate in this study. Please refrain from writing any identifying information on the survey. We ask that you not skip any items, however if a question makes you uncomfortable you are free not to answer.

If you have questions about your rights as a research participant, you may call the Sutter Health Institutional Review Board at 855-771-7498.

Thank you,

Jessica Liston MS, RN, CNOR, CPHIMS

DNP Student

Northern California Consortium Doctor of Nursing Practice

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Permission is granted by Chamberlain College of Nursing for non-commercial use of the Nursing Informatics Competency Assessment – Level 3/Level 4 (NICA L3/L4) in the context of research or practice, provided credit is given as noted below. The wording of the introductory paragraph above should be changed to reflect the situation in which the tool is used. The wording and order of the questionnaire items may not be changed.

Acknowledgement of this work must include:

- Dee M. McGonigle, Kathleen M. Hunter, Toni L. Hebda and Taryn Hill
- Nursing Informatics Competency Assessment – Level 3/Level 4 (NICA L3/L4): The development and implementation of an online tool for self-assessment (2013)

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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Below are a series of demographic questions for your completion. Please respond to each item.

Age

☐ 19-21

☐ 22-25

☐ 26-30

☐ 31-35

☐ 36-40

☐ 41-45

☐ 46-50

☐ 51-55

☐ 56-60

☐ 61-65

☐ 66-70

☐ 70+

Gender

☐ Male

☐ Female

RN

☐ Yes

☐ No

Highest Education Preparation

☐ Diploma in nursing

☐ Associate degree in nursing

☐ Other associate degree

☐ BSN

☐ Other baccalaureate degree

☐ Master's degree in nursing

☐ Other master's degree

☐ ND

☐ DNS

☐ DSN

☐ DNSc

☐ DScN

☐ PhD

☐ DNP

☐ Other Doctorate

Length of Practice in Informatics

☐ 0

☐ 1 week – 6 months

☐ 6 – 12 months

☐ 13 – 23 months

☐ 2 – 3 years

☐ 4 – 5 years

☐ 6 – 10 years

☐ 11 – 15 years

☐ 16 – 20 years

☐ 21 – 25 years

☐ 26 – 30 years

☐ 31 – 35 years

☐ 26 – 40 years

Board Certification in Nursing Informatics

☐ Yes

☐ No

Other Certification in Informatics

☐ Yes

☐ No

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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How to Complete this Self-Assessment

This instrument is divided into the key dimensions, or core competencies, of Nursing Informatics (NI) practice and assesses 178 perceived competencies in three areas or categories: computer skills (13 items), informatics knowledge (56 items) and informatics skills (109 items). Please take your time when completing this self-assessment.

Reflect on each competency. Read each one, "As an informatics nurse, I can..." and determine your level of competency (Expert, Proficient, Comfortable or Beginner/NA) based on your ability to exhibit the behavior or perform the skill.

- Beginner / N/A level reflects that you are unaware of or have limited knowledge and/or skills
- Comfortable level relates to easy association with the information, knowledge or skill necessary to be able to function with ease and able to use your judgment to problem solve, infer and interpret
- Proficient level denotes that you are informatics competent, well-advanced, and fluent in your ability to bilingually address nursing and IT; able to analyze and synthesize data, information and knowledge into wisdom to inter-professionally guide other healthcare team members
- Expert level reflects extraordinary or exceptional proficiency that progresses the data, information, knowledge and wisdom pathway to intuition; the breadth of your experience provides the ability to assess the context of each situation intuitively and respond and perform appropriately

Please select only one competency level for each item based on your perceived ability. There are no right or wrong responses.

1. Computer Skills

Please select one competency level for each item. There are no right or wrong responses.

1. General Computer Skills

I rate my competence in each of the following activities as:

	Expert	Proficient	Comfortable	Beginner/ NA
1.1.1 Develop or modify spreadsheets used for complex problems	☐	☐	☐	☐
1.1.2 Write macros or shortcuts for spreadsheets	☐	☐	☐	☐
1.1.3 Create queries for a database	☐	☐	☐	☐
1.1.4 Run reports from a database	☐	☐	☐	☐
1.1.5 Manage projects with project-management software	☐	☐	☐	☐

2. Systems

	Expert	Proficient	Comfortable	Beginner/ NA
1.2.1 Integrate different applications or programs	☐	☐	☐	☐
1.2.2 Use utility programs for data recovery and system-performance indices	☐	☐	☐	☐
1.2.3 Support research efforts through the use of specific types of software (for example, statistical or qualitative data management software)	☐	☐	☐	☐
1.2.4 Determine the impact of electronic information management on leadership roles	☐	☐	☐	☐
1.2.5 Utilize pattern recognition technologies for mathematical analysis	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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3. Quality Improvement

	Expert	Proficient	Comfortable	Beginner/ NA
1.3.1 Collect data to monitor quality and effectiveness of nursing informatics practice	☐	☐	☐	☐
1.3.2 Determine data indicators used to monitor quality and effectiveness of nursing informatics practice	☐	☐	☐	☐
1.3.3 Determine aspects of nursing informatics practice important for quality monitoring	☐	☐	☐	☐

2. Informatics Knowledge

1. Data

I rate my competence in each of the following activities as:

	Expert	Proficient	Comfortable	Beginner/ NA
2.1.1 Demonstrate fluency in informatics and nursing terminologies	☐	☐	☐	☐
2.1.2 Recognize the capacity for data aggregation and integration	☐	☐	☐	☐
2.1.3 Teach nurses to find, retrieve and evaluate information	☐	☐	☐	☐

2. Education

	Expert	Proficient	Comfortable	Beginner/ NA
2.2.1 Implement and evaluate application/system training programs for users and clients	☐	☐	☐	☐
2.2.2 Develop and plan application/system training programs	☐	☐	☐	☐
2.2.3 Construct guidelines for the purchase of software and hardware	☐	☐	☐	☐
2.2.4 Participate with practicing nurses, nurse administrators and nurse researchers to define and develop new computer competencies	☐	☐	☐	☐
2.2.5 Teach users/clients about effective and ethical uses of applications and systems	☐	☐	☐	☐
2.2.6 Serve as an informational resource person for applications and systems	☐	☐	☐	☐
2.2.7 Assist with and support others engaging in social media (Facebook, Twitter, etc.) to benefit the patient	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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3. Impact

	Expert	Proficient	Comfortable	Beginner/ NA
2.3.1 Determine the impact of computerized information management on leadership roles through program evaluation	☐	☐	☐	☐
2.3.2 Interpret current legislation, research and economics affecting computerized information management in healthcare	☐	☐	☐	☐
2.3.3 Assess current capabilities and limitations of technology	☐	☐	☐	☐
2.3.4 Determine projected impacts to users and organizations when changing to computerized information management	☐	☐	☐	☐
2.3.5 Assess the social, legal and ethical impacts of computerized information management	☐	☐	☐	☐
2.3.6 Determine the limitations and reliability of computerized patient-monitoring systems	☐	☐	☐	☐
2.3.7 Apply strategies for change management to ensure satisfied and productive users	☐	☐	☐	☐
2.3.8 Determine the impact of information-management technologies on therapeutic outcomes and quality of care	☐	☐	☐	☐
2.3.9 Interpret the benefits and risks of computerized information management	☐	☐	☐	☐
2.3.10 Interpret research findings about the impact of computerized information management on clinical practice, education, administration and/or research	☐	☐	☐	☐
2.3.11 Analyze the impacts of information-management technologies on time allocation and tasks of care	☐	☐	☐	☐
2.3.12 Participate with and adhere to IRB regulations for patient safety	☐	☐	☐	☐
2.3.13 Assist in developing clinical practice environments that support the knowledge work of nurses	☐	☐	☐	☐
2.3.14 Assess clinical workflow	☐	☐	☐	☐
2.3.15 Support and maintain clinical workflow	☐	☐	☐	☐

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4. Privacy/Security

	Expert	Proficient	Comfortable	Beginner/ NA
2.4.1 Interpret copyright issues and plagiarism in this knowledge era	☐	☐	☐	☐
2.4.2 Assess features, capabilities and scope of user passwords	☐	☐	☐	☐
2.4.3 Differentiate issues surrounding confidentiality in computerized information management	☐	☐	☐	☐
2.4.4 Participate with and adhere to IRB regulations for data/IT security	☐	☐	☐	☐

5. Informatics Knowledge - Regulations

	Expert	Proficient	Comfortable	Beginner/ NA
2.5.1 Incorporate relevant law and regulations into informatics practice, such as the HITECH Act	☐	☐	☐	☐
2.5.2 Support adhering to ADA technology accessibility guidelines	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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6. Systems

	Expert	Proficient	Comfortable	Beginner/ NA
2.6.1 Explain various input and output devices	☐	☐	☐	☐
2.6.2 Apply theories that influence computerization in healthcare	☐	☐	☐	☐
2.6.3 Describe computer fundamentals (hardware, software, networks, data communications)	☐	☐	☐	☐
2.6.4 Project healthcare computing trends in nursing	☐	☐	☐	☐
2.6.5 Evaluate applications/systems available in healthcare	☐	☐	☐	☐
2.6.6 Interpret capabilities and limitations of hardware and interfaces and their relationship to the outcomes of healthcare computing	☐	☐	☐	☐
2.6.7 Demonstrate extensive knowledge of the applications/systems currently in use	☐	☐	☐	☐
2.6.8 Construct resources to support users	☐	☐	☐	☐
2.6.9 Describe general knowledge and terminology of computer, information and cognitive sciences	☐	☐	☐	☐
2.6.10 Recognize viruses and other system risks	☐	☐	☐	☐
2.6.11 Devise strategies to involve clinicians in the design, selection, implementation and evaluation of applications and systems in healthcare	☐	☐	☐	☐
2.6.12 Assess current applications available to support clinical care	☐	☐	☐	☐
2.6.13 Describe concepts of telehealth/telenursing and the Internet and their relationship to nursing	☐	☐	☐	☐
2.6.14 Analyze point-of-care terminals and associated issues, such as use in sterile environments	☐	☐	☐	☐
2.6.15 Interpret the current and projected future state of physiological monitoring	☐	☐	☐	☐

7. Usability

	Expert	Proficient	Comfortable	Beginner/ NA
2.7.1 Analyze the ergonomics, health and safety aspects of the work station and its location	☐	☐	☐	☐
2.7.2 Apply human factors and ergonomics to the design of the computer screen, location and design of devices, and design of software	☐	☐	☐	☐
2.7.3 Use cognitive science principles and artificial intelligence theories to participate in the design of technology appropriate to the cognitive abilities of the user	☐	☐	☐	☐
2.7.4 Develop algorithms for clinical decision support in nursing practice	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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8. Data Mining

	Expert	Proficient	Comfortable	Beginner/ NA
2.8.1 Appreciate the value of data mining techniques	☐	☐	☐	☐
2.8.2 Utilize data mining to predict future uses and trends	☐	☐	☐	☐
2.8.3 Utilize data mining to describe patterns within a data set	☐	☐	☐	☐
2.8.4 Utilize statistics to provide complete analysis patterns within a data set	☐	☐	☐	☐
2.8.5 Utilize data mining to provide informed decision making	☐	☐	☐	☐
2.8.6 Utilize data mining to provide quality data metrics for proposed practice change	☐	☐	☐	☐

3. Informatics Skills

1. Analysis

I rate my competence in each of the following activities as:

	Expert	Proficient	Comfortable	Beginner/ NA
3.1.1 Develop and implement work plans during application development and implementation	☐	☐	☐	☐
3.1.2 Construct data elements appropriate to a given practice context	☐	☐	☐	☐
3.1.3 Apply principles and techniques of systems analysis	☐	☐	☐	☐
3.1.4 Apply principles of computing (e.g., reading an algorithm)	☐	☐	☐	☐
3.1.5 Analyze user areas to determine procedural errors versus hardware and software problems	☐	☐	☐	☐
3.1.6 Interpret information flow within the organization	☐	☐	☐	☐
3.1.7 Modify existing applications/devices to meet changing requirements	☐	☐	☐	☐
3.1.8 Conduct feasibility assessments throughout the information systems life cycle	☐	☐	☐	☐
3.1.9 Prepare process flow charts to describe current and proposed information flows for all aspects of practice-related information systems	☐	☐	☐	☐
3.1.10 Determine problems and impediments in installing computerized information management	☐	☐	☐	☐
3.1.11 Understands and can retrieve information using data mining	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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2. Data/Data Structures

	Expert	Proficient	Comfortable	Beginner/ NA
3.2.1 Construct data structures and maintains data sets	☐	☐	☐	☐
3.2.2 Apply data structure concepts in designing a database system	☐	☐	☐	☐
3.2.3 Determine relationships among tables in databases and performs tasks such as database normalization	☐	☐	☐	☐
3.2.4 Integrate nursing taxonomies, unified nomenclatures and other data needed by nurses within database design	☐	☐	☐	☐
3.2.5 Develop procedures to establish and maintain the validity and integrity of data and databases	☐	☐	☐	☐
3.2.6 Modify available software programs to support data aggregation and analyses	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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3. Design/Development

	Expert	Proficient	Comfortable	Beginner/ NA
3.3.1 Develop screen layouts, report formats and custom views of clinical data through working directly with clinical departments and individual users	☐	☐	☐	☐
3.3.2 Consult in the design or enhancements to integrated patient information, management, educational or research systems	☐	☐	☐	☐
3.3.3 Participate in the development of new methods or in making modifications to improve the efficiency and/or effectiveness of data storage and its communication	☐	☐	☐	☐
3.3.4 Coordinate the development of integrated computer-based patient record technologies	☐	☐	☐	☐
3.3.5 Maintain a database (e.g., adding, deleting fields, structuring input for others, relational database)	☐	☐	☐	☐
3.3.6 Incorporate established data and database management standards into database design	☐	☐	☐	☐
3.3.7 Participate in the development of new tools for management purposes	☐	☐	☐	☐
3.3.8 Develop methods of data communication, hardware and software integration and data transformation	☐	☐	☐	☐
3.3.9 Develop database structures to support clinical care, education, administration or research	☐	☐	☐	☐
3.3.10 Apply concepts of nursing theory and research to the design of health information applications and systems	☐	☐	☐	☐
3.3.11 Develop databases to facilitate clinical care, education, administration or research	☐	☐	☐	☐
3.3.12 Develop new ways to interact with information technology and access data	☐	☐	☐	☐
3.3.13 Assist in the development of computer applications to meet clinical, education, administration and research requirements	☐	☐	☐	☐
3.3.14 Evaluate existing technologies for cost-effectiveness	☐	☐	☐	☐
3.3.15 Evaluate data storage capacities of the system in use	☐	☐	☐	☐
3.3.16 Evaluate hardware, software and vendor support	☐	☐	☐	☐
3.3.17 Participate on interdisciplinary teams that evaluate nursing-informatics practice or health informatics services	☐	☐	☐	☐
3.3.18 Use a variety of analytical tools to assess the systems in use	☐	☐	☐	☐
3.3.19 Analyze the system in use through internal environment scanning	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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4. Fiscal Management

	Expert	Proficient	Comfortable	Beginner/ NA
3.4.1 Develop strategies to obtain funding for information systems	☐	☐	☐	☐
3.4.2 Use strategies to optimize application use after implementation (benefits realization)	☐	☐	☐	☐
3.4.3 Participate in budget activities for the procurement and maintenance of the system	☐	☐	☐	☐
3.4.4 Determine the cost versus benefit of computer technology used in practice, education, administration and/or research	☐	☐	☐	☐
3.4.5 Conduct return on investment (ROI) analysis regarding the use of IT systems	☐	☐	☐	☐

5. Implementation

	Expert	Proficient	Comfortable	Beginner/ NA
3.5.1 Lead or participate in user groups during all phases of the systems life cycle	☐	☐	☐	☐
3.5.2 Devise strategies for installing applications/systems	☐	☐	☐	☐
3.5.3 Develop implementation plans	☐	☐	☐	☐
3.5.4 Distinguish implementation phases (i.e., pre-implementation, implementation, post-implementation)	☐	☐	☐	☐
3.5.5 Apply appropriate implementation strategies	☐	☐	☐	☐
3.5.6 Recognize opportunities for applying information management technologies to clinical practice, education, administration and/or research situations	☐	☐	☐	☐
3.5.7 Devise strategies to encourage interdisciplinary use of computerized information management	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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6. Management

	Expert	Proficient	Comfortable	Beginner/ NA
3.6.1 Function as a project manager	☐	☐	☐	☐
3.6.2 Manage terms and conditions of a contract with an information-systems vendor	☐	☐	☐	☐
3.6.3 Develop a plan for limited resources (e.g., costs, staffing, equipment)	☐	☐	☐	☐
3.6.4 Determine project scope, objectives, and resources for each proposed application, system or enhancement	☐	☐	☐	☐
3.6.5 Develop system testing, implementation, conversion and backup plans	☐	☐	☐	☐
3.6.6 Develop a strategic or long-range plan for the management of applications and systems	☐	☐	☐	☐
3.6.7 Develop policies, procedures and guidelines based on research	☐	☐	☐	☐
3.6.8 Develop policies and procedures related to information-systems implementation, use and maintenance	☐	☐	☐	☐
3.6.9 Escalate client issues and problems to the next available level of management in a timely manner	☐	☐	☐	☐
3.6.10 Communicate progress of the project to appropriate personnel	☐	☐	☐	☐
3.6.11 Apply principles and concepts of project management	☐	☐	☐	☐
3.6.12 Develop policies related to privacy, confidentiality, and security of patient and client data	☐	☐	☐	☐
3.6.13 Recommend procedures for achieving data integrity and security	☐	☐	☐	☐

7. Programming

	Expert	Proficient	Comfortable	Beginner/ NA
3.7.1 Apply principles of computer programming in order to communicate with software developers	☐	☐	☐	☐
3.7.2 Differentiate between machine and high-level programming languages	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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8. Requirements

	Expert	Proficient	Comfortable	Beginner/ NA
3.8.1 Determine priorities for new requirements within budget constraints	☐	☐	☐	☐
3.8.2 Modify information technologies to meet changing data requirements/needs	☐	☐	☐	☐
3.8.3 Determine new requirements according to the needs of the organization	☐	☐	☐	☐
3.8.4 Demonstrate skills in the systems life cycle to support policies, procedures and knowledge bases in organizations	☐	☐	☐	☐
3.8.5 Include client needs in requirements development	☐	☐	☐	☐
3.8.6 Develop requirements for integrated clinical, education, administration and/or research applications	☐	☐	☐	☐
3.8.7 Communicate informatics needs to a systems analyst	☐	☐	☐	☐
3.8.8 Perform needs assessment for future requirements	☐	☐	☐	☐

NURSING INFORMATICS COMPETENCY ASSESSMENT: LEVEL 3/LEVEL 4 (NICA L3/L4)

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9. Role

	Expert	Proficient	Comfortable	Beginner/ NA
3.9.1 Influence change to improve the impact of informatics on the system of care	☐	☐	☐	☐
3.9.2 Design strategies to manage the impact of change to information-systems implementation	☐	☐	☐	☐
3.9.3 Consult with clinical, managerial, educational and/or research entities regarding informatics	☐	☐	☐	☐
3.9.4 Develop collegial relationships with information system technical support personnel	☐	☐	☐	☐
3.9.5 Serve as a liaison among agency departments and vendors	☐	☐	☐	☐
3.9.6 Collaborate with nursing personnel and interdisciplinary teams to accomplish information management work	☐	☐	☐	☐
3.9.7 Promote understanding and effective use of information technology	☐	☐	☐	☐
3.9.8 Make formal presentations of project findings, recommendations, and specifications to user/client department managers, supervisors and/or administrators	☐	☐	☐	☐
3.9.9 Recommend changes in health informatics practice based upon evaluation data from nursing informatics (e.g., a validated severity-of-illness instrument)	☐	☐	☐	☐
3.9.10 Recommend policies and procedures to improve the quality of nursing-informatics practice	☐	☐	☐	☐
3.9.11 Implement activities to enhance the quality of nursing-informatics practice	☐	☐	☐	☐
3.9.12 Develop recommendations to improve nursing-informatics practice or outcomes	☐	☐	☐	☐
3.9.13 Act as a liaison to support communication among providers, patient/client and technical communities	☐	☐	☐	☐
3.9.14 Use software tools as appropriate during the systems life cycle	☐	☐	☐	☐
3.9.15 Apply knowledge of patient-care processes to systems and their life cycles	☐	☐	☐	☐
3.9.16 Maintain a system perspective that encompasses the entire organization	☐	☐	☐	☐
3.9.17 Integrate knowledge from other informatics disciplines with nursing to improve patient care, administration, education and/or research	☐	☐	☐	☐
3.9.18 Participate in top-level decisions and policy design that impact clinical information management	☐	☐	☐	☐
3.9.19 Conduct research to examine impacts of computer technology in nursing	☐	☐	☐	☐
3.9.20 Conduct research to determine application needs in clinical care, education, administration and research	☐	☐	☐	☐
3.9.21 Conduct research in informatics	☐	☐	☐	☐

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	Expert	Proficient	Comfortable	Beginner/ NA
3.9.22 Disseminate new knowledge by informing colleagues of new developments and applications in nursing or healthcare informatics	☐	☐	☐	☐
3.9.23 Contribute to informatics education of students, peers and colleagues	☐	☐	☐	☐
3.9.24 Analyze information to generate new knowledge	☐	☐	☐	☐
3.9.25 Consult with clinical, managerial, educational and/or research entities about informatics	☐	☐	☐	☐

10. Systems Maintenance

	Expert	Proficient	Comfortable	Beginner/ NA
3.10.1 Assist in the resolution of basic software problems	☐	☐	☐	☐
3.10.2 Perform complex trouble-shooting in applications	☐	☐	☐	☐
3.10.3 Recommend solutions to application-specific problems	☐	☐	☐	☐
3.10.4 Maintain the data dictionary and other technical-support elements	☐	☐	☐	☐

11. System Selection

	Expert	Proficient	Comfortable	Beginner/ NA
3.11.1 Design evaluation criteria and strategies for selecting applications and systems	☐	☐	☐	☐
3.11.2 Apply ergonomics principles in the selection and use of information-management technologies	☐	☐	☐	☐
3.11.3 Participate with others in selecting applications or systems (e.g., users, vendors, system designers)	☐	☐	☐	☐

12. Testing

	Expert	Proficient	Comfortable	Beginner/ NA
3.12.1 Develop procedures and scenarios for acceptance testing, conversions and interface testing	☐	☐	☐	☐
3.12.2 Conduct tests of information-management applications, systems	☐	☐	☐	☐

13. Training

	Expert	Proficient	Comfortable	Beginner/ NA
3.13.1 Produce short-term and long-term training plans	☐	☐	☐	☐
3.13.2 Produce training materials and operating manuals tailored to the organization and end-user	☐	☐	☐	☐
3.13.3 Deliver user-training programs	☐	☐	☐	☐
3.13.4 Evaluate user-training programs	☐	☐	☐	☐

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Please write any comments or suggestions you have about these items, considering the following issues and others that come to mind:

Length of survey

Design

Wording of items

Items to add

Items needing to be removed

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