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Competency Assessment and Perceived Barriers of Registered Nurses on Nursing Informatics / Health Informatics

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Abstract

The integration of technology into healthcare systems has underscored the critical need for nursing informatics (NI) competencies among nurses. NI, a specialty that merges nursing science with computer and information science, enables the effective use of information and communication technologies to improve healthcare delivery. This study aimed to assess the competency levels of registered nurses in NI and health information systems and explore their association with demographic and professional variables. A descriptive cross-sectional study was conducted with 144 registered nurses at Royale Hayat Hospital, Kuwait, using a validated self-reported questionnaire, including the Nursing Informatics Competency Assessment Tool (NICAT). Results revealed that 81.3% of nurses were experienced in using electronic health records (EHRs), and nearly half (47.9%) exhibited proficient competency levels. There were significant positive correlations among computer literacy, informatics literacy, and management skills ($p<0.05$). Additionally, the availability of digital devices in clinical settings showed a significant association with competency levels ($p<0.05$). No significant correlations were observed with other demographic variables. This study highlights the importance of fostering NI competencies to ensure effective utilization of health information systems, emphasizing the need for targeted training programs and the availability of digital resources in clinical settings. Enhanced informatics competencies are essential for optimizing nursing practice and improving healthcare outcomes.

***Keywords*:** Nursing informatics, Computer literacy, Hospital Management System, Electronic Health Records.

I INTRODUCTION

Informatics competencies have been deemed a necessity in today's technologically- rich healthcare delivery systems. Technology is considered an important part of health care and has increased rapidly over the past four decades. Nurses have participated in the structure, design, and implementation of information technology in health care. The field of nursing informatics (NI) is now a recognized specialty in the Nursing profession, especially after expanding the knowledge required for this field. Informatics refers to the "computer science and study of computational systems that are broader in context than information science that encompasses all aspects of the computer environment". NI, a subset of health informatics, is an established and growing specialty in the nursing field, which is defined as a science and practice that integrates nursing, information, and knowledge with information and communication technologies to enhance the health of people, families, and communities worldwide.

"Nursing Informatics is the specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge, and wisdom in nursing practice". (ANA, 2008). Competency in NI is defined as an acceptable level of knowledge, skill, and ability to complete specific informatics tasks, and is recognized as an important capability of nurses.

Competencies of NI can be defined as adequate knowledge, skills, and abilities to perform specific informatics tasks. These competencies include three features: basic computer skills, informatics knowledge, and

informatics skills. Basic computer skills refer to the knowledge and ability to use a computer and related technologies. Knowledge of Informatics refers to the comprehension levels in using computer technologies to deploy information sciences. In addition, informatics skills can be defined as the skills to implement instructions, tools, and specific methods in informatics. Since the advent of computer systems in healthcare settings, nurses and nurse educators have been urged to acquire or teach competencies in the effective utilization of this technology. As the domain of NI emerged, experts affirmed that nurses practicing in all domains and settings must be competent in selected aspects of nursing informatics.

II Aim, Objectives & Hypothesis

Aim of the Study

This study aims to assess the competency level of registered nurses in Nursing Informatics / Health Information systems.

Objectives of the Study

- To assess the competency level of registered nurses in Nursing Informatics / Health Information systems
- To compare the competency level of newly graduated nurses and nurses with experience in Nursing Informatics / Health Information systems
- To correlate Nursing Informatics Competency Levels among Nurses and various components
- To associate the competency level of registered nurses in Nursing Informatics / Health Information systems with demographic variables

Hypothesis of the Study

- H_{01} - There will be no significant Association between the competency level of registered nurses and their demographic variables.
- H_{01} - There will be no significant Correlation between the competency level of registered nurses and their demographic variables.

III Material & Methods

Research Approach and Design

The Research approach was quantitative, and a descriptive cross-sectional study design was used to describe the variables and examine the relationships among these variables where data was collected at one point.

Study Design & Participants

This research is an analytical descriptive study. The research community included 35 registered nurses working in a hospital.

Research Setting

The study was conducted in all the Royale Hayat Hospital, Kuwait.

Samples

Using a Convenient sampling technique, all available qualified nurses working in the study setting, who met the inclusion criteria, and who were present at the time of the study were included.

Tools for Data Collection

Data for the present study was collected using a self-reported questionnaire.

Study Instrument & Validation Procedure.

The questionnaire had 2 parts.

Section A: Demographic Details of Registered Nurses

The researchers developed this section based on the review of the related literature for examining demographic details of qualified nurses such as (sex, age), professional background (education, years of nursing experience, job title), and computer use (previous computer education, and computer users experience).

Section B: NICAT - Nursing Informatic Competency Assessment Tool

It was developed by Rahman (2015) to assess the level of nursing informatics competency. It is composed of three dimensions. They are computer literacy assessments (which contain ten items, e.g., Recognize the basic components of the computer system such as a mouse, screen, and workstation). The second domain is informatics literacy assessment (which contains 13 items, e.g., using the internet to locate and download items of interest), and informatics management skills assessment (which contains seven items, e.g., protecting confidential patient data by logging out, suspending sessions, and password protection). The internal consistency for the NICAT was reported by El-Sayed et al[6]. (2017) to be 0.976, indicating the high reliability of the tool. In this study, Cronbach's alphas were (r= 0.861), indicating the high reliability of the tool. Scoring system, the questionnaire consists of a five-point self-rated Likert scale ranging from competent to expert. Not competent scored (1), somewhat competent scored (2), competent scored (3), very competent scored (4), and finally expert scored (5). Total scores of studied nurses regarding competency level classified as a novice (30). Advanced beginner (31-5). Competent (60-89). Proficient (90-119). Expert (120 -150).

Data collection Procedure

An official letter requesting permission to conduct the study has been issued from the Chief Nursing Officer of Royal Hayat Hospital. It was sent to the Medical Director of the hospital explaining the aim of the study. Then, the researcher met the hospital administrator and assured complete confidentiality of the obtained information, and the study would not affect the work.

Data collection took about three months from October 2023 to December 2023. The researcher collected their email ID and prepared a Google form questionnaire along with explaining the aim and the nature of the study. It took from 25 to 30 minutes to complete the Google form questionnaire. Informed consent was obtained from the participants at the beginning of the survey. They were informed about their rights to refuse or withdraw from the study with no consequences. They reassured the anonymity of the information collected, and it would be used only for scientific research. No harmful manoeuvrers were performed or used, and no foreseen hazards were anticipated from conducting the study on participants.

Data Analysis

Statistical analysis was done using IBM SPSS (Statistical Package of Social Sciences) software package version 25. Cleaning of data was done to ensure no missing or abnormal data by running frequencies and descriptive statistics. Data were presented using descriptive statistics like frequencies and percentages for categorical variables, means, and standard deviations for continuous variables (e.g., age). Spearman correlation analysis was used to assess the inter-relationships among quantitative variables.

Results

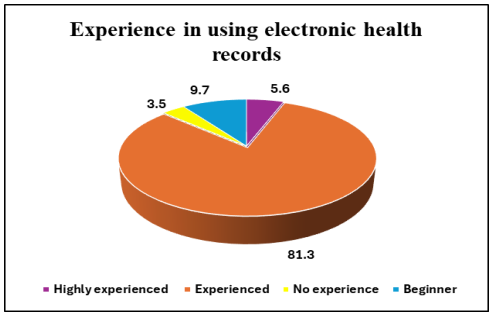

Figure 1: Experience of Nurses in using Electronic Health Records

Table 1: Competency in Nursing Informatics among Nurses

(n=144)

Competencies	**Mean**	**SD**
Computer Literacy	35.19	8.66
Informatics Literacy	43.48	10.06
Informatics Management Skills	24.25	5.49
Total	102.92	22.56

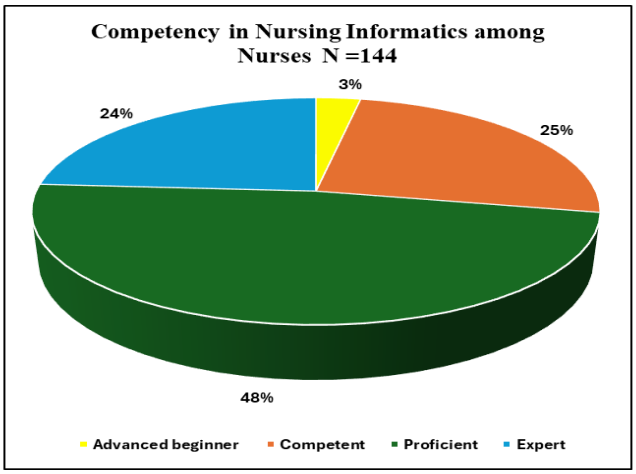

Figure 1: Level of Competency in Nursing Informatics among Registered Nurses

Table 2: Correlation between Nursing Informatics Competency Scores among Nurses and various components

Variable	Computer Literacy	Informatics Literacy	Informatics Management Skills
Computer Literacy	---	r=0.791 p=0.001*	r=0.730 p=0.001*
Informatics Literacy	r=0.791 p=0.001*	---	r=0.865 p=0.001*
Informatics Management Skills	r=0.730 p=0.001*	r=0.865 p=0.001*	---
Total	r=0.914 p=0.001*	r=0.960 p=0.001*	r=0.909 p=0.001*

***Significant (P<0.05)** **Spearman's Correlation**

Table 3: Association between the competency level of registered nurses in Health Information systems with their demographic variables

Variable	Advanced Beginner	Competent	Proficient	Expert	X^2 (P)
Age in Years					
20: >30	0	7(4.9)	15(10.4)	6(4.2)	7.700
30: >40	4(2.8)	15(10.4)	31(21.5)	14(9.7)	(0.565)
40: >50	0	11(7.6)	20(13.9)	14(9.7)	
50 and more	0	3(2.1)	3(2.1)	1(0.7)	
Gender					
Male	0	1(0.7)	2(1.4)	2(1.4)	0.788
Female	4(2.8)	35(24.3)	67(46.5)	33(22.9)	(0.852)
Level of education					
Bachelor	4(2.8)	36(25.0)	68(47.2)	34(23.6)	1.116
Master	0	0	1(0.7)	1(0.7)	(0.773)
Job position					
Staff Nurse	4(2.8)	35(24.3)	67(46.5)	31(21.5)	7.203
Head nurse	0	1(0.7)	2(1.4)	2(1.4)	(0.616)
Supervisor	0	0	0	1(0.7)	
Nurse educator	0	0	0	1(0.7)	
Mode of documentation					
Electronic	3(2.1)	33(22.9)	61(42.4)	32(22.2)	1.309
Manual	1(0.7)	3(2.1)	8(5.6)	3(2.1)	(0.727)
Experience					
Less than one year	0	0	1(0.7)	1(0.7)	
1-3 years	0	5(3.5)	9(6.3)	2(1.4)	
4-6 years	2(1.4)	2(1.4)	9(6.3)	5(3.5)	20.010
7-10 years	1(0.7)	7(4.9)	14(9.7)	7(4.9)	(0.172)
11-20 years	1(0.7)	10(6.9)	30(20.8)	12(8.3)	
More than 20 years	0	12(8.3)	6(4.2)	8(5.6)	
Time spent on hospital information system per day					
Less than 0ne hour	1(0.7)	6(4.2)	18(12.5)	6(4.2)	9.523
1-2 hours	1(0.7)	15(10.4)	13(9.0)	11(7.6)	(0.658)

2-4 hours	0	3(2.1)	9(6.3)	6(4.2)	
More than 4 hours	2(1.4)	11(7.6)	27(18.8)	12(8.3)	
Never	0	1(0.7)	2(1.4)	0	
Mode exposure to hospital information system					
Staff development program	2(1.4)	25(17.4)	46(31.9)	24(16.7)	8.839
Workshop	1(0.7)	5(3.5)	3(2.1)	4(2.8)	(0.452)
Nursing curriculum	0	5(3.5)	14(9.7)	5(3.5)	
No previous exposure	1(0.7)	1(0.7)	6(4.2)	2(1.4)	
Frequency of using digital devices – computer –laptop- tab					
Regularly used	3(2.1)	29(20.1)	63(43.8)	33(22.9)	4.752
Rarely used	1(0.7)	7(4.9)	6(4.2)	2(1.4)	(0.191)
Availability of digital devices in clinical settings					
Individual device	0	7(4.9)	3(2.1)	7(4.9)	8.496
Common devices	4(2.8)	29(20.1)	66(45.8)	28(19.4)	(0.037*)

***Significant (P<0.05). (X^2) chi-square tests.**

Discussion:

The majority (64%) of nurses were between 30 to 40 years of age, 96.5% were females, and the majority (98.6%) of them had a bachelor's degree in nursing. 95.1% were Registered nurses, while the rest 4.9% were head nurses/supervisors or nurse educators. Regarding the experience of the nurses, 36.8% of them have 11-20 years of experience.

Nearly 36.1% of the nurses spent about 4 hours daily on documentation through electronic health records (EHR). Most (81.3%) of the nurses were well-experienced using EHR. More than half (67.4%) of them had been exposed to the Hospital Information System (HIS) through Staff development programs, while 6.9% mentioned that they had no previous exposure to HIS. The majority (88.9%) had the habit of using digital devices frequently which enabled them to use EHR with ease in clinical settings.

Figure 1 shows that the majority (81.3%) of nurses were experienced in using Electronic Health Records, while 3.5% had no previous experience.

Table 1 depicts the Mean and Standard deviation of different competencies regarding Nursing Informatics among Nurses.

The figure below shows that the competency levels of nearly half (47.9%) of the nurses were proficient, while only 2.8% of them were at an advanced beginner level.

The table 2 on Correlation reveals that, when computer literacy improves, there is a significant improvement in informatics literacy improvement and Information Management skills. Findings also show that informatics literacy had a significant positive correlation with computer literacy and Informatics Management skills. On the other hand, Information management skills had a positive correlation with both computer and informatics literacy.

In another research study revealed that the competency level in Informatics among nurses revealed a positive correlation between computer literacy, informatics literacy, and information management skills. A similar study by Ghanem et al (2023), on the relationship between nurses' attitudes towards the use of computers and their

informatics competencies in nursing practice on 300 staff nurses revealed a significant positive correlation between the study participants' attitudes toward the use of computers and their overall informatics competencies.

The table 3 shows that there is a significant association between the competency level of registered nurses in Health Information systems and the availability of digital devices in the clinical setting at $p<0.05$ level. None of the other baseline variables revealed an association.

The findings of the study revealed that the competency level in Informatics among nurses revealed a positive correlation between computer literacy, informatics literacy, and information management skills. A similar study by Ghanem et al (2023), on the relationship between nurses' attitudes towards the use of computers and their informatics competencies in nursing practice on 300 staff nurses revealed a significant positive correlation between the study participants' attitudes toward the use of computers and their overall informatics competencies.

Implications for Nursing:

- Improved Patient Care: Nursing informatics enables nursing students to access health information management systems to collect patient data and medical records quickly and efficiently.
- Increased Efficiency: Nursing Informatics helps nursing students streamline documentation and data entry, reducing the time spent on administrative tasks and increasing time spent with patients.
- Enhanced Communication: Provides a platform for nursing students to collaborate with other healthcare professionals and communicate important patient information, resulting in better care coordination and improved patient outcomes.
- Expanded Career Opportunities: Nursing students who are trained in nursing informatics are better equipped to work with electronic health records, telehealth technologies, and other emerging healthcare technologies, opening new career opportunities in nursing informatics.
- Improved Safety: NI can help nursing students identify and mitigate potential safety risks, such as medication errors and falls, with electronic health records, decision support systems, and other safety-related tools.

Conclusion:

In light of the main study findings, it can be concluded that the highest percentage of qualified nurses were proficient in the total level of informatics competency. Baseline variables did not show any noteworthy correlation with informatics competencies, except for health information systems

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Author Contributions:

Ms. Vimala Varatharajan, the Principal Investigator and corresponding author was responsible for the overall organization and coordination of the study. Dr. Vanitha Rajkumar facilitated the acquisition of ethical clearances and collected data from all participants. Both Dr. Beryl Juliet Sam and Ms. Vimala Varatharajan contributed to the research proposal, data analysis, and manuscript presentation.