Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 45 No. 1 (2024)

Assessing the Nursing Informatics Competency among Registered Nurses of Selected Hospitals in India

Ms. Vimala Varatharajan[1], Dr. Tulsi Shringi[2]
[1]Research Scholar & Lecturer, Department of Nursing, SJJT University, Jaipur, Rajasthan, India& Gulf Medical University, Ajman[1]
[2]Guide, Department of Nursing, SJJT University Jaipur, Rajasthan, India[2]

Abstract **-** Informatics competency has become an essential requirement for nurses to fulfill their professional roles. This pilot study examined the factors affecting informatics competency to help develop strategies to improve nurses' informatics practice. The study was conducted in India to assess the factors affecting nursing informatics competencies among registered nurses. A cross-sectional survey was conducted among 35 samples. A questionnaire was designed to collect data on nurses' informatics competency, basic computer skills, attitudes toward computerization, and general characteristics. The data was entered into SPSS16 software and correlation analysis, and regression were carried out.The mean score percentage of total nursing informatics competency was 94.30%. The highest mean score was related to informatics skills (40.30%), followed by computer literacy skills (32.80 %). In addition, informatics competency is mainly affected by education, age, position of job, and frequency of using devices. Nurses had favorable attitudes toward computerization. Significant factors associated with informatics competency were basic computer skills and formal informatics education. The study findings suggest that the enhancement of basic computer skills and incorporation of informatics into formal nursing curricula are needed to improve the nurses' competency in managing and using healthcare information.

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

I INTRODUCTION

In today's rapidly evolving healthcare landscape, the integration of technology and information systems has become paramount for delivering efficient and effective patient care. Nurses, as frontline healthcare providers, play a pivotal role in this digital transformation[1]. Their ability to harness the power of health informatics and seamlessly navigate through a plethora of electronic health records (EHRs), data-driven tools, and evidence-based resources is essential for optimizing patient outcomes and healthcare delivery. This phenomenon, known as nurse informatics competency, represents a critical juncture where nursing practice intersects with technological advancement[2].

The realm of healthcare informatics encompasses a wide array of skills and knowledge, ranging from understanding complex health information systems to utilizing digital platforms for communication and decision-making[3]. As healthcare organizations continue to adopt and implement sophisticated technologies, it becomes increasingly pertinent to investigate the factors that contribute to and influence nurse informatics competency. By delving into these factors, healthcare institutions can gain insights into the mechanisms that drive successful technology integration within nursing practice, ultimately leading to improved patient care, streamlined workflows, and enhanced professional development for nurses[4,5].

This research endeavours to explore the multifaceted landscape of factors associated with nurse informatics competency. By unravelling the interplay between education, experience, support systems, technological infrastructure, and individual attributes, this study seeks to shed light on the intricate web of influences that shape a nurse's proficiency in health informatics[6]. In doing so, it aims to provide healthcare leaders, educators, and policymakers with valuable insights that can guide the design of comprehensive training programs, supportive environments, and strategic initiatives to foster nurse informatics competency[7,8].

As the healthcare industry embraces the digital era, understanding the underpinnings of nurse informatics competency emerges as a critical endeavour. By examining the factors that contribute to this competency, stakeholders can better equip nurses with the skills and knowledge needed to thrive in an increasingly technology-driven healthcare environment[9,10]. Through empirical analysis and comprehensive exploration, this research aims to contribute to the ongoing dialogue surrounding nurse informatics competency and its role in shaping the future of nursing practice.

II Objectives

To assess the nursing informatics competency among registered nurses.

III Material & Methods

Study Design & Participants

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

Samples

The research population included nurses working in the hospitals, 35 of whom were selected as the sample based on Cochran's equation 10% of the main study. The non-probabilistic sampling technique with a combination of convenient sampling methods was applied to obtain responses from the study population. The inclusion criteria were being a registered nurse working in the hospitals, and an inclination to cooperate in the study, and familiarity with nursing informatics based on the nurse's self-declaration.

Instrument

The study instruments were Section A – Demographic data. It includes (age, gender, level of education in nursing, years of experience as a nurse, area of assignment, and if attended any nursing informatics training courses before). Section B - Nursing Informatics Competency Assessment Tool (NICAT). Nursing Informatics Competencies Questions. It included 30 Items. It consists of three dimensions (computer literacies, informatics literacies, and information management literacies.

IV Analysis & Results

Statistical analysis was done using the SPSS 16 statistical software package. Cleaning of data was carried out to be sure that there were no missing or abnormal data by running frequencies and descriptive statistics. Data were presented using descriptive statistics.

As shown in Table 1 42.9% of nurses belong to the age group of between 20 to 30 years. Regarding level of education, most of the participants had bachelor's degrees (68.6%). Also, most participants were documenting both electronically and manually (54.3%). 77.1% of the nurses had exposure to the hospital information system through the staff development Program. Most of the nurses were using the digital devices regularly (71.4%)

Table 1 - Frequency & Percentage Distribution Of Demographic Variables

Demographic Variables	Frequency	Percentage Distribution
Age		
20 – 30	15	42.9%
31 - 40	12	34.3%
41 – 50	05	14.3%
< 51	0 3	8.6%
Gender		
Male	07	20.0%
Female	28	80.0%

Job position		
Staff Nurse	24	68.6%
Head nurse	02	05.7%
Supervisor	04	11.4%
Nurse educator	05	14.3%
Education level		
Bachelors	24	68.6%
Master	10	28.6%
Ph.d	01	02.9%
Mode of documentation		
Electronic	05	14.3%
Manual	11	31.4%
Electronic & manually	19	54.3%
Clinical experience		
> 1 year	02	5.7%
1 - 3 years	07	20.0%
4 - 6 years	12	34.3%
7- 10 years	05	14.3%
11 – 20 years	07	20.0%
> 20 years	02	5.7%
Time spent on hospital information system per day.		
> 1 hour.	11	31.4%
1 - 2 hours	12	34.3%
2 - 4 hours	07	20.0%
< 4 hours	03	8.6%
Never	02	5.7%
Experience in using electronic health records		
Highly experienced	03	8.6%
Experienced	24	68.6%
No experience	02	5.7%
Beginner	06	17.1%
Mode of exposure to hospital information system		
Staff development program	27	77.1%
Workshop	03	08.5%
Nursing curriculum	00	00.0%
No previous exposure	05	14.2%
Frequency of using digital devices – computer/laptop/tab		
Used regularly	25	71.4%
Used Rarely	10	28.6%
Availability of digital devices in clinical settings		
Individual devices	10	28.6%
Common devices	24	68.6%
No devices	01	02.9%

As shown in Table 1 42.9% of nurses belong to the age group of between 20 to 30 years. Regarding level of education, most of the participants had bachelor's degrees (68.6%). Also, most participants were documenting both electronically and manually (54.3%). 77.1% of the nurses had exposure to the hospital information system through the staff development Program. Most of the nurses were using the digital devices regularly (71.4%).

Table 2 – Level Of Competency Regarding Nursing Informatics Among Registered Nurses N=35

Q.No	Self-Competency Assessment	Not Competent	Somewhat Competent	Competent	Very Competent	Expert
I. Computer Literacy Assessment						
1	Recognize the basic components of the computer system such as mouse, screen, and workstation.	0 (0.0%)	5 (14.3%)	15 (42.9%)	7 (20.0%)	8 (22.9%)
2	Use of telecommunication tools such as email & fax	0 (0.0%)	8 (22.9%)	10 (28.6%)	12 (34.3%)	5 (14.3%)
3	Use of remote communication tools such as Google Meet, Skype, and Zoom	4 (11.4%)	9 (25.7%)	11 (31.4%)	6 (17.1%)	5 (14.3%)
4	Create, rename, move, and delete files using computer operating systems such as Microsoft Windows.	1 (2.9%)	9 (25.7%)	8 (22.9%)	11 (31.4%)	6 (17.1%)
5	Use word processing functions such as save, categorize, copy, paste, and delete documents.	1 (2.9%)	6 (17.1%)	11 (31.4%)	8 (22.9%)	9 (25.7%)
6	Navigate computer operating systems to access the installed application and choose active printer.	0 (0.0%)	10 (28.6%)	12 (34.3%)	7 (20.0%)	6 (17.1%)
7	Use software to create presentations such as Microsoft PowerPoint.	3 (8.6%)	5 (14.3%)	12 (34.3%)	6 (17.1%)	9 (25.7%)
8	Use external devices such as USB flash drive, digital camera, CDROM	2 (5.7%)	11 (31.4%)	9 (25.7%)	7 (20.0%)	6 (17.1%)
9	Perform basic computer systems troubleshooting such as checking the power source, rebooting the computer, and printing.	1 (2.9%)	9 (25.7%)	14 (40.0%)	6 (17.1%)	5 (14.3%)
10	Manage computer systems security to protect data, devices, and passwords.	0 (0.0%)	11 (31.4%)	12 (34.3%)	8 (22.9%)	4 (11.4%)
II. Informatics Literacy Assessment						
11	Use the Internet to locate and download items of interest.	0 (0.0%)	7 (20.0%)	11 (31.4%)	10 (28.6%)	7 (20.0%)
12	Navigate the electronic health record.	1 (2.9%)	12 (34.3%)	10 (28.6%)	8 (22.9%)	4 (11.4%)
13	Review and acknowledge patient orders in the electronic health record.	1 (2.9%)	12 (34.3%)	8 (22.9%)	9 (25.7%)	5 (14.3%)
14	Develop and document care plans in electronic health records.	3 (8.6%)	8 (22.9%)	17 (48.6%)	3 (8.6%)	4 (11.4%)
15	Review point-of-care data such as urine dipstick, glucose check, and hemoglobin meter to make timely decisions.	0 (0.0%)	9 (25.7%)	15 (42.9%)	9 (25.7%)	2 (5.7%)
16	Respond appropriately to alerts from clinical decision-making tools such as algorithms, and best practice alerts.	1 (2.9%)	12 (34.3%)	16 (45.7%)	4 (11.4%)	2 (5.7%)

17	Conduct literature searches on inaccessible proprietary database systems such as CINAHL, EBSCO, etc.	6 (17.1%)	11 (31.4%)	11 (31.4%)	5 (14.3%)	2 (5.7%)
18	Use medication administration tools such as barcode medication verification and scanning.	6 (17.1%)	6 (17.1%)	11 (31.4%)	10 (28.6%)	2 (5.7%)
19	Use of medication dispensing system.	3 (8.6%)	9 (25.7%)	12 (34.3%)	8 (22.9%)	3 (8.6%)
20	Collect and document patient data relevant to care such as vital signs, height, and weight.	0 (0.0%)	6 (17.1%)	11 (31.4%)	9 (25.7%)	9 (25.7%)
21	View trended electronic documentation to understand the effectiveness of nursing interventions.	2 (5.7%)	8 (22.9%)	13 (37.1%)	8 (22.9%)	4 (11.4%)
22	Use systems to assist with the admission and discharge process.	2 (5.7%)	6 (17.1%)	11 (31.4%)	11 (31.4%)	5 (14.3%)
23	Continue patient care documentation and patient identification when the computer system is down.	0 (0.0%)	6 (17.1%)	18 (51.4%)	5 (14.3%)	6 (17.1%)
III. Informatics Management Skills Assessment						
24	Protect confidential patient data by logging out, suspending sessions, and password protection	0 (0.0%)	8 (22.9%)	16 (45.7%)	7 (20.0%)	4 (11.4%)
25	Use information technology as a primary means of patient safety such as bedside laboratory verification, barcode scanning, etc.	2 (5.7%)	10 (28.6%)	9 (25.7%)	11 (31.4%)	3 (8.6%)
26	Use electronic health records and another clinical information system as per organizational policy for documentation.	3 (8.6%)	8 (22.9%)	14 (40.0%)	7 (20.0%)	3 (8.6%)
27	Use electronic communication with colleagues, patients, or other departments.	1 (2.9%)	12 (34.3%)	13 (37.1%)	7 (20.0%)	2 (5.7%)
28	Find information stored in the clinical information system to guide patient care such as standardized care plans and guidelines.	1 (2.9%)	12 (34.3%)	11 (31.4%)	8 (22.9%)	3 (8.6%)
29	Use nursing data for improving practice and for clinical decision-making.	0 (0.0%)	10 (28.6%)	13 (37.1%)	10 (28.6%)	2 (5.7%)
30	Use data and statistical reports for unit-based quality improvement initiatives and practice evaluation.	1 (2.9%)	13 (37.1%)	11 (31.4%)	8 (22.9%)	2 (5.7%)

Above mentioned tables represent the self-competency of nursing informatics competency level among registered nurses. Has 30 items each item representing the subcomponents.

Table 3 - Sub-Components Of Nursing Informatics Competency Among Registered Nurses

S. No	**Computer Literacy**	**Novice (1- 10)**		**Advanced Beginner (11 – 20)**		**Competent (21 – 30)**		**Proficient (31 – 40)**		**Expert (41 – 50)**	
		f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**

1		1	2.8%	7	20%	12	34.28%	7	20%	8	22.85%
2	**Informatics Literacy**	**Novice (1- 13)**		**Advanced Beginner (14 – 26)**		**Competent (27 – 39)**		**Proficient (40 – 52)**		**Expert (53 – 65)**	
		f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
		2	5.7%	9	25.71%	13	37.14%	8	22.85%	**3**	**8.57%**
3	**Informatics Management Skills**	**Novice (1- 7)**		**Advanced Beginner (8- 14)**		**Competent (15 – 21)**		**Proficient (22 – 28)**		**Expert (29 – 35)**	
		f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**
		1	2.8%	10	28.57%	13	37.14%	8	22.8%	3	8.5%

The table shows that the majority of registered nurses 12(34.28 %) were competent in computer literacy, 7 (20%) were proficient 7 (20%) were at the level of advanced beginner in computer literacy, and the least 1 (2.8%) were novice in computer literacy. Regarding informatics literacy 13 (37.14%) were competent then 8(22.85%) belonged to proficient in handling informatics literacy, 9(25.71%) were advanced beginners, 3(8.57%) were experts and least 2 (5.7%) were novices. Then moving on to Informatics management skills majority 13 (37.14%) were competent, 10(28.57%) were advanced beginners, 8 (22.8%) were proficient in handling informatics management skills and 3(8.5%) were experts and the least 1(2.8%) was a novice in handling informatics management skills.

Table 4 – Mean Score Of Nursing Informatics Competencies

FACTORS	MEAN	STANDARD DEVIATION
Computer Literacy	32.8	09.4
Informatics Literacy	40.3	10.0
Informatics Management Skills	21.2	05.5
Nursing Informatics Competency Score	94.3	23.1

Table 5– Overall Competency Of Nursing Informatics

Nursing Informatics Competency	
Competent	14 (40%)
Proficient	18 (51%)
Expert	03 (9%)

Data from Table 5 indicate that most of the participants were proficient in nursing informatics competency 18 (51%). 14(40%) of the participants were competent in using nursing informatics competencies and 3(9%) participants were experts in handling the competencies.

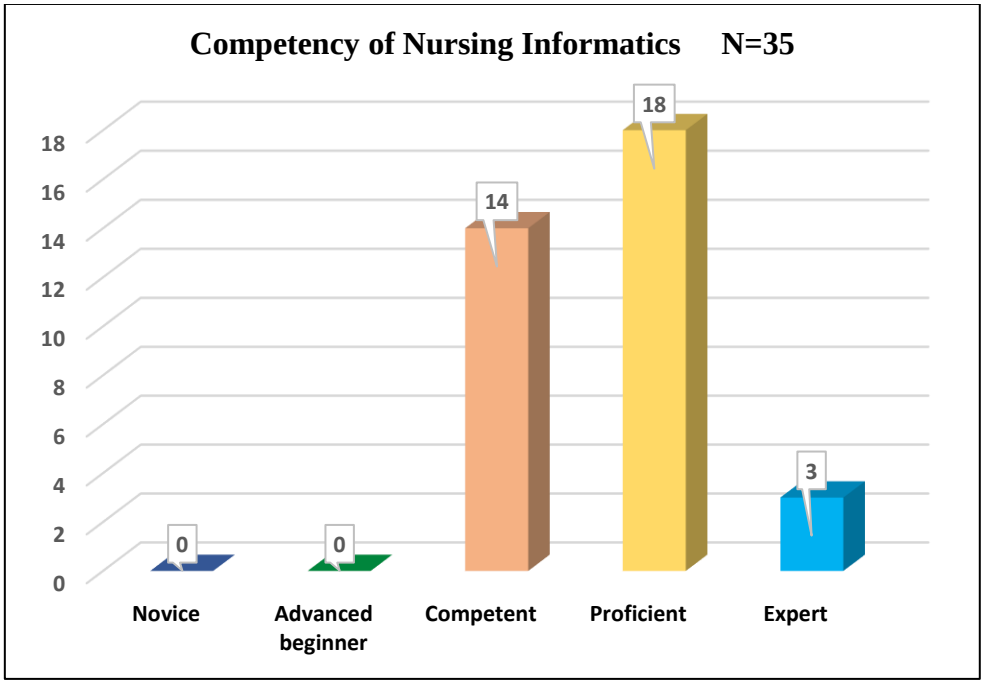

Figure 1 - Competency of Nursing Informatics among nurses

Discussion

Nursing informatics competency is considered a main factor that affects the quality of services in healthcare. As a vital component of the clinical staff, nurses have a great role in clinical practice, and the success and failure of medical interventions are significantly dependent on their abilities and competencies. The results of this study acknowledge that self-efficacy, job satisfaction, time spent on HIS, and clinical experience have a direct and significant effect on nurses' informatics competency. Also, we found that age has an indirect and significant effect on nurses' informatics competency. The findings of the present study showed that informatics management skills have the lowest mean score compared with computer and informatics skills subscales. This result agreed well with that of Ademuyiwa et al. (2020), who investigated nurses' attitudes concerning evidence-based practice[12]. The findings of the latter study reported that the highest mean score percentage was related to the informatics literacy subscale, while the lowest mean score was related to computer literacy. These findings disagreed with Farzandipour (2021), who found that the mean score of informatics management skills was low [5].

However, this result disagreed with Yang et al. (2017), who studied the manager nurses' perspectives on informatics competencies and reported that education level had a significant impact on informatics competencies[13]. The results are also contrary to those of Farzandipour (2014), who found a statistically significant difference in NI competency between the diploma nurses and MSN nurses, and those of Kleib and Nagle[13] (2018), who found significant differences in total mean scores of competencies in relation to education level, suggesting that competency scores were more likely to increase with higher education[14,15].

Conclusion

Based on the literature and the results of this study, nurses' informatics competencies have a more critical impact on patient outcomes and organizational success than the information systems themselves. It is therefore vital to support informatics as a core competency of professional practice among current and future nurses[16,17]. This study clearly identified NI competency-related factors and also shed light on the necessity for informatics competency in practice, and opportunities that should be grasped by managers and educators to enrich the informatics competency of nurses. In order to achieve this aim, nurse's basic computer skills should be improved, while incorporating informatics education programs into the curriculum[18]. The results indicate that

informatics knowledge, computer skills, and self-efficacy require considerable attention in planning for high-quality educational programs. Moreover, to train nurses for informatics practice, the components related to informatics competency such as self-efficacy and time spent on HIS. will be the first step in initiating suitable strategies to achieve this goal.

References

[1] Aanuoluwapo O. Competencies and barriers to the use of nursing informatics among nurses in primary, secondary, and tertiary healthcare facilities in Nigeria. J Health Inform Afr. 2014;2(1):30-42. DOI: 10.12856/JHIA-2014-v2-i1-85.
[2] Ademuyiwa IY, Faleke SO, Otetubi EE. Knowledge and use of nursing informatics among nurses in a university teaching hospital in Lagos. Int J Health Sci Res. 2020;10(12):63-70.
[3] Chang J, Poynton MR, Gassert CA. Nursing informatics competencies required of nurses in Taiwan. Int J Med Inform. 2011;80(5):332-340. DOI: 10.1016/j.ijmedinf.2011.01.011.
[4] Darvish A, Bahramnezhad F, Keyhanian S, Navidhamidi M. The role of nursing informatics in promoting quality of health care and the need for appropriate education. Glob J Health Sci. 2014;6(6):11-19. http://dx.doi.org/10.5539/gjhs.v6n6p11.
[5] Farzandipour M, Mohamadian H, Akbari H, Safari S. Designing a national model for assessment of nursing informatics competency. BMC Med Inform Decis Mak. 2021;21:2-12. https://doi.org/10.1186/s12911-021-01405-0.
[6] Hill T, Gonigle M, Hunter KM, Sipes C, Hebda TL. An instrument for assessing advanced nursing informatics competencies. J Nurs Educ Pract. 2014;4(7):104-114. DOI: 10.5430/jnep.v4n7p104.
[7] Hwang JI, Park HA. Factors associated with nurses' informatics competency. Wolters Kluwer. 2011;29(4):256-262. DOI: 10.1097/NCN.0b013e3181fc3d24.
[8] Jeon E, Kim J, Park H, Lee H, Jin M. Current status of nursing informatics education in Korea. Healthc Inform Res. 2016;22(2):142-149. http://dx.doi.org/10.4258/hir.2016.22.2.142.
[9] Jouparinejad S, Foroughhameri G, Khajouei R. Improving the informatics competency of critical care nurses: results of an interventional study in southeast Iran. BMC Med Inform Decis Mak. 2020;20(17):2-12. https://doi.org/10.1186/s12911-020-01244-5.
[10] Kaihlanen AM, Gluschkoff K, Kinnunen UM, Saranto K. Nursing informatics competencies of Finnish registered nurses after national educational initiatives. Nurse Educ Today. 2021;105060. https://doi.org/10.1016/j.nedt.2021.105060.
[11] Kaihlanen AM, Gluschkoff K, Laukka E, Heponiemi T. The information system stress, informatics competence, and well-being of newly graduated and experienced nurses. BMC Health Serv Res. 2021; 21:2-8. https://doi.org/10.1186/s12913-021-07132-6.
[12] Khezri H, Abdekhoda M. Assessing nurses' informatics competency and identifying its related factors. J Res Nurs. 2019;24(7):529-538. DOI: 10.1177/1744987119839453.
[13] Kleib M, Nagle L. Development of the Canadian Nurses Informatics Competency Assessment Scale and Evaluation of Alberta's Registered Nurses' self-perceived informatics competencies. Wolters Kluwer. https://doi.org/10.1097/cin.0000000000000435.
[14] Kuusisto A, Ahonen O, Koponen S, Kaihlanen A, Hassinen T. Nurses' informatics competency assessment of health information system usage. Res Square. 2022;1-11. https://doi.org/10.21203/rs.3.rs-1324459/v1.
[15] Manal K. Factors associated with Canadian nursing informatics competency. Comput Inform Nurs. 2018;36(8):406-415. DOI: 10.1097/CIN.0000000000000434.
[16] Mohamed LK, Abouzaied MT. Self-assessment of nursing informatics competencies and attitudes among baccalaureate-nursing students. Egypt Nurs J. 2022;28-38. DOI: 10.4103/enj.enj_40_20.
[17] Ponchitra R. Nursing informatics. Nitte Univ J Health Sci. 2013;2(3):18-24. https://www.researchgate.net/publication/340959861_NURSING.
[18] Ragneskog H, Gerdnert L. Competence in nursing informatics among nursing students and staff at a nursing institute. Health Inform Libr J. 2006;23(2):126-132. https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1471-1842.2006.00643.x.