Evaluation of Nursing Information System: Nurses' Perspectives

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Abstract

Aim: This study aimed to evaluate nurses' perspectives on the nursing information system (NIS).
Method: In this cross-sectional study, 120 nurses participated. The data collection tool was a researcher-made questionnaire developed based on content analysis of related literature. The questionnaire comprises 39 specific questions, and the experts confirmed the validity of the questionnaire, and the instrument's reliability was calculated by Cronbach Alpha (α =0.88). Data were analyzed by SPSS Statistics version 22 using descriptive and analytic statistics.
Results: The majority of nurses (50%) believed that NIS reduces medical errors (strongly agree or agree). More than half of the participants (58%) stated that the NIS's tolerance is high (strongly agree or agree). 69% of them were satisfied with the capabilities of the NIS (strongly agree or agree).
Conclusion: According to the results, the NIS status is poor and more attention is needed in designing and developing hospital software.
Key Words: Hospital information system, Nurses, Usability, Evaluation

In recent years, the serious consequences of medical malpractice due to the resulting costs have been identified worldwide. The use of information and communication technology in medicine can help improve the quality of clinical treatment and reduce medical errors (1,2,3). Due to the need for clinical and legal information, the use of hospital information systems (HIS) is essential (4). Although HISs often improve service quality and reduce costs, they must be evaluated by users to ensure better quality, reliability, and maintenance. Information technology-based nursing care is an important aspect of high-quality care (5).

On the other hand, among all clinical staff, nurses play a key role in patient care, including diagnosing, controlling, and preventing medical errors (1). Due to nurses' roles as one of the main providers of health care services, they have become one of the largest users of HIS (4). Therefore, one of the largest modules of HIS is the nursing information system (NIS). The use of the nursing information system with the support of timely monitoring of the quality and careful analysis of nursing data leads to the continuous improvement of the quality of nursing work and prevention of nursing errors that leads to the monitoring of patient care (6). Evaluation of a nursing information system can highlight nurses'

preferences and expectations, leading to the design of an appropriate system (7). This study was conducted to evaluate the nurses' perspectives on NISs in two hospitals.

Method

This cross-sectional study evaluated nurses' perspectives on NISs in two hospitals of two cities in one of the Eastern provinces in Iran in 2017. The study population consisted of nurses working in the studied hospitals. The sample size was equal to the community size. The data collection tool was a researcher-made questionnaire developed based on a content analysis of the related literature. The questionnaire comprises 39 specific questions related to nurses' perspectives in three criteria, including reducing medical errors, tolerance of HIS error, and HIS capabilities.

The validity of the questionnaires was confirmed by five health information management specialists, and the reliability of the instrument was calculated by Cronbach Alpha (α =0.88). The sample size was equal to the community size. Data were collected by the researcher directly referring to the studied hospitals. This questionnaire utilizes a 5-point Likert scale ranging from no idea (score 1) to strongly agree (score 5). Data were analyzed by IBM SPSS Statistics version 22 using descriptive and analytic statistics.

Results

The response rate was 90% (n=120). 96/67% had a bachelor's degree. Most of the nurses in the study population (69/17%) were women. Also, most nurses (58/33%) had less than five years' work experience, while 3/3% had more than 20 years of work experience.

Table 1 shows the frequency distribution of nurses' perspectives about "the effect of NIS on reducing medical errors." The majority of nurses (50%) believed that the NIS had effects on reducing medical errors (strongly agree or agree). The nurses' highest satisfaction rate in teaching and the non-teaching hospital was the effect of information system on embolic prevention (3/37%) and the small amount of medical staff error in patients' treatment, respectively.

Table 2 shows the frequency distribution of "tolerance of NIS error from the nurses' perspective." More than half of the participants (58%) stated that the NIS's tolerance is high (strongly agree or agree). The highest satisfaction rate of the nurses in both hospitals was the software warns in case of danger.

Table 3 reveals the frequency distribution of "capabilities of the NIS from the perspective of nurses."The majority of nurses (69%) were satisfied with the capabilities of the NIS (strongly agree or agree).

Table1: Frequency distribution of nurses' perspectives about the effect of NIS on reducing medical errors

Items	Hospital	Strongly Agree	Agree	Strongly disagree	Disagree	No idea
Reduction of medical staff error in the treatment of patients	Teaching	10	34	18	16	22
	Non-teaching	21.4	40	15.7	12.8	10
The effect of an electronic information system on bedsore prevention	Teaching	14	34	24	10	18
	Non-teaching	15.7	30	24.2	11.4	18.5
The effect of information system on embolic prevention	Teaching	6	44	32	12	6
	Non-teaching	14.2	27.1	25.7	7.1	25.7
Prevents misreading doctors' orders	Teaching	24	20	28	14	14
	Non-teaching	32.8	31.4	21.4	5.7	8.5
The effect of not forgetting the necessary tests	Teaching	12	30	24	10	24
	Non-teaching	11.4	38.5	28.5	12.8	8.5

Items	Hospital	Strongly Agree	Agree	Strongly disagree	Disagree	No idea
Prevention of delay in changing the bandage	Teaching	10	24	44	16	6
	Non-teaching	5.7	30	27.1	20	17.1
Easy access to essential information	Teaching	32	26	22	4	16
	Non-teaching	28.5	37.1	18.5	4.2	11.4
No delay in required nursing care	Teaching	24	20	40	12	4
	Non-teaching	17.1	35.7	34.2	5.7	7.1
A reminder of possible work errors	Teaching	22	30	34	2	12
	Non-teaching	20	30	22.8	5.7	21.4
The effect of reminder on reducing possible errors	Teaching	28	24	28	6	16
	Non-teaching	12.8	35.7	31.4	1.4	18.5
Total mean		18	32	27	9	14

Table 2: Frequency distribution of tolerance of NIS error from the perspective of nurses

Item	Hospital	Strongly Agree	Agree	Strongly disagree	Disagree	No idea
A small error has serious consequences	Teaching	16	52	18	4	10
	Non-teaching	21.4	47.1	21.4	1.4	8.5
Error destroy information	Teaching	14	24	12	12	20
	Non-teaching	11.4	54.2	15.7	2.8	15.7
Software error is compensable	Teaching	12	24	22	12	12
	Non-teaching	12.8	50	27.1	1.4	8.5
Error warning before an operation	Teaching	16	44	12	6	22
	Non-teaching	21.4	35.7	24.1	0	15.7
The error compensate easily	Teaching	18	34	26	16	6
	Non-teaching	17.1	40	28.5	12.8	1.4
Always controls data correction	Teaching	18	40	14	4	24
	Non-teaching	12.8	42.8	20	1.4	22.8
Working with it is without error	Teaching	14	38	24	8	16
	Non-teaching	4.2	32.8	41.4	8.5	12.8
The error correct easily	Teaching	14	38	24	8	16
	Non-teaching	10	45.7	31.4	5.7	7.1
It never locks	Teaching	12	26	26	14	22
	Non-teaching	8.5	35.7	34.2	5.7	15.7
It prevents unwanted actions	Teaching	6	36	24	12	22
	Non-teaching	10	38.5	34.2	1.4	15.7
Improves mistakes	Teaching	12	52	16	10	10
	Non-teaching	17.1	37.1	27.1	14.2	4.29
Messages are useful and understandable	Teaching	18	52	10	6	14
	Non-teaching	5.7	67.1	17.1	0	10
Warning in times of danger	Teaching	16	56	10	8	10
	Non-teaching	2.8	65.7	18.5	2.86	10
Data retention after a change	Teaching	12	56	12	12	8
	Non-teaching	11.4	60	17.1	0	11.4
Total mean		13	45	23	6	14

Table 3: Frequency distribution of capabilities of the NIS from the perspective of nurses

Item	Hospital	Strongly Agree	Agree	Strongly disagree	Disagree	No idea
Error reduction in administrative and clinical units	Teaching	26	60	6	6	2
	Non-teaching	21.4	58.5	5.7	1.4	12.8
Save the time of staff	Teaching	26	60	6	6	2
	Non-teaching	24.2	52.8	10	4.2	8.5
Reduce access time to medical record	Teaching	40	44	0	10	6
	Non-teaching	22.86	60	11.4	1.4	4.2
Reduce response time to customer	Teaching	30	42	6	8	14
	Non-teaching	21.4	51.4	12.8	5.7	8.5
Eliminate duplicate and unnecessary procedures	Teaching	24	46	8	10	12
	Non-teaching	17.1	51.4	15.7	2.8	12.8
Reduce the number of staff	Teaching	18	30	22	14	16
	Non-teaching	12.8	28.5	34.2	11.4	12.8
Record the correct information	Teaching	21	40	4	8	27
	Non-teaching	25.7	41.4	18.5	2.8	11.4
Maintain the confidentiality of patient' clinical and demographic information	Teaching	22	46	16	8	8
	Non-teaching	14.2	44.2	20	1.4	20
Maintain the confidentiality of information when sharing data	Teaching	20	40	20	6	14
	Non-teaching	12.8	44.2	27.1	5.7	10
Security of medical record' information	Teaching	24	52	14	6	4
	Non-teaching	10	48.5	22.8	0	18.5
Facilitate communication between different units	Teaching	16	62	10	4	8
	Non-teaching	7.1	65.7	7.1	2.8	17.1
Ability to share information between physicians and other clinical units	Teaching	18	56	6	2	18
	Non-teaching	10	58.5	11.4	4.2	15.7
Ability to share information between the administrative and clinical units	Teaching	14	58	14	2	12
	Non-teaching	11.4	60	10	1.4	17.1
Ability to share information between the administrative and clinical departments of your hospital with the administrative and clinical departments of other institutions	Teaching	12	64	8	8	8
	Non-teaching	11.4	40	15.7	4.2	28.5
Determining the level of access of researchers to the medical record information	Teaching	14	58	12	2	14
	Non-teaching	12.8	55.7	14.2	1.4	15.7
Save research time and money	Teaching	22	64	8	6	0
	Non-teaching	17.1	52.8	10	2.8	17.1
Help improve the quality of services provided	Teaching	16	56	8	6	14
	Non-teaching	18.5	50	14.2	2.8	14.2
Total mean		18	51	13	5	13

Discussion

This study aimed to evaluate the NIS from the perspective of nurses. The present study results showed the poor effect of HISs to reduce medical errors in both teaching and non-teaching hospitals (mean= 2, 5). The results of Ariaei study showed that 86% of physicians and 90% of nurses believed in the possibility of medical errors in their workplace, and 88% agreed that the installation of an efficient

computer system would reduce errors, which is not consistent with the results of the present study (8).

The nurse's error in transferring the doctor's medication order from order sheet to cardex, prescribing the wrong dose by the doctor, and incorrectly adjusting the infusion equipment were the most important medication errors from the nurses' point of view in this study. This error can be reduced if doctors enter the computer's prescriptions (9). A reliable electronic information system can prevent communication-related medical errors (10). The function of system support to prevent medication errors by providing the necessary warnings is one of the nursing information system's important functions. In general, the performance of creating and updating a nursing care program should be given more attention when designing a nursing information system (4).

The findings showed that the rate of error tolerance in NISs was poor in both types of hospitals. Therefore, corrective measures should be taken in this regard (mean= 2.8). The results of Teshnizi's study showed that error tolerance in the studied HIS is following 78.5% of user opinions is desirable or relatively desirable (11). Moghaddasi et al.'s study showed that concerning the nursing systems' capability to 'error tolerance,' more attention should be paid to this aspect in further developments (12).

Examining NIS's capabilities to perform the duties of nurses showed that the information system in both teaching and non-teaching hospitals is moderate (mean= 3).

Moreover, Kahoee et al. showed that less than half of the staff were relatively satisfied with the impact of the HIS on patient care activities and the system's capabilities (13). The study by Kimiafar et al. showed that most HIS users in the study population were satisfied with the ability of the HIS to help in making decisions because the capabilities of this system lead to time and cost savings and increase information confidentiality (14). The results of a study showed that this system is effective in supporting nursing management decisions by simplifying nursing tasks, increasing the speed of work, efficiency, and accuracy of the active process (15).

In general, according to the study results, the status of NIS is poor (mean= 2.7). Also, the results of using the Chi-Squared test to compare the findings in the two types of hospitals showed that there was no significant difference between them (P value= 0.001>).

Successful implementation of NIS can be useful in performing the duties of nurses. In study sites, the use of HIS reduced the time of data registration for both new and old nurses; for new nurses, the recording time per shift decreased from 66.2 ± 15.0 minutes to 37.16 ± 15.7 minutes, while for senior nurses with more than ten years of experience, it decreased from 45.4 ± 6.65 minutes to 29.1 ± 4.23 minutes. With the application of the nursing information system, the Nursing Department achieved cross-team cooperation with the Information Department, which laid a solid foundation for the case hospital to further develop other information systems (16).

Conclusion

According to this study, NIS functions are poor and require more attention in their design and development. Based on the results, it is recommended that it is better to interact with designers and the users of HISs to use each other's strengths and experiences to improve the quality of HISs, and the system should be designed to meet their needs. Due to nurses' role in providing health services, using their opinions at all steps of design and implementation of the NIS has a double effect. An appropriate information system is effective

in nursing diagnoses, performing nursing interventions, and reducing nursing errors.

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