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RESEARCH ARTICLE

Behavioral Feasibility of the Clinical Nursing Information System

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Abstract:

Background:

Analysis of humanitarian issues affecting the implementation time of information systems to increase the acceptance of these systems is essential.

Objective:

The aim of this study was to assess the behavioral feasibility of the clinical nursing information system.

Methods:

An applied cross-sectional study was conducted with 348 nurses in 2015. Data were collected by face to face interviews and a questionnaire containing 33 questions, which were rated on a 5-point Likert scale. Face and content validity of the questionnaire was confirmed, and its reliability was estimated 0.90 through Cronbach's alpha coefficient. Data were analyzed using chi-square tests and t-test.

Results:

An average score of behavioral feasibility was 67.44%. The rate of supply provided for implementing the clinical nursing information system was 55.2%, which was in a semi-favorable level. The necessity of system deployment in the clinical nursing sector had the highest frequency (88.2%) and interference of redesigning structures with the current work had the lowest frequency (43.6%).

Conclusion:

The possibility of implementation of the clinical nursing information system in a behavioral dimension is at a semi-favorable level. To increase the acceptance of the system, presenting a new system as a positive change and further training of the nurses is recommended.

Keywords: Behavioral, Clinical nursing information, Feasibility, Information system, Nursing information system, Psychometric.

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1. INTRODUCTION

A Clinical Nursing Information System (CNIS) is a software system, which is exclusively designed and implemented for the use of nurses to perform all or part of the nursing services and activities [1]. Advantages of nursing information systems include: a) improvement of workflow and faster performance of high volume of work; because of determining the required staffing levels and combining proper skills for each shift; b) better care planning; due to reducing the time spent on care planning, increasing the quality of data registration and better evaluation of the patient; c) better drug prescription; due to readability increase and medication errors reduction in drug administration through electronic drug prescription [2]. All system development projects such as CNISs cause changes in the organization and its users are generally afraid of it. User resistance to these changes may be in the form of system malfunctions, such as incorrect data entry or deriding new user from the new system or potential resistance of the staff, so they prefer to use the old system instead of the new one [3]. For these reasons, the implementation of information systems has its own challenges, so feasibility studies and analysis of problems at all stages of

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the implementation cycle and system development, including the review, analysis, designs, imple-mentation, maintenance and evaluation [4 - 7] are essential. Feasibility studies are one of the key steps in the analysis phase to increase the success of system development projects, prevent costly errors, provide opportunities for beneficiaries to make decisions and determine the criteria for system evaluation in order to achieve various goals [5]. The purpose of these studies is to identify the cultural, time, budget, and legal limitations and analyze the effects on the organization in order to provide the best implementation method [8, 9]. Feasibility analysis is conducted with technical, economic, legal, behavioral and timing perspectives [10]. Most feasibility studies focus on the behavioral aspect because it assesses human issues and their behavior and attitude towards the development of new systems. Also, it determines whether the system needs to train, retrain, transfer and change employees' work status for the new way of doing things [3]. Kedwan *et al.* (2016) studied the feasibility of an online patient registration system and identified some reasons of outpatient and employee for choosing this system which included: saving time and cost, patient convenience, data sensitivity, less Effort, ease of use, accuracy, and errorless [11]. Fontil *et al.* (2018) in a study of the adaptation and feasibility of a digital health program stated that most participants in the focus group accepted the program. In the feasibility study, 54% of the patients were willing to enroll. Although computer access and literacy had created challenges for some participants, the majority were satisfied with the system and at least 80% of the participants used the system at least once a week [12].

However, it seems that most of the CNISs have difficulty due to behavioral reasons and the lack of preparation of nurses in cultural and knowledge aspects. The same studies, also, emphasized that the nurses who are not familiar with information systems and have poor computer skills believe that the performance of these systems are complex and time-consuming, and are not eager to use them [13 - 22]. However, nurses who have the skills, experience and motivation to work with a computer or acquire the necessary confidence before setting up the new system by culture-building in a consulting environment tend to use these systems and have a sense of job security [23 - 25]. For this reason, often in the development or implementation of systems, the feasibility of behavior that addresses the human issues affecting the project is at the top of the research, and its results are analyzed to properly understand the system's ability to solve problems, use opportunities and determine whether a project can enter into an action or action step [4, 8]. Especially, in the analysis, rational and incentive considerations of change acceptance are examined to determine the effect of system implementation on the staff. Is there a need to retrain? Is there a need to create change in a business method? Are the changes accepted by the staff? And what is the impact of these changes on other sectors and processes [4, 26]. Since the implementations of the national projects of E-Health and Paperless are being studied and run in Iran and other countries, the current study was conducted to assess the behavioral feasibility of the CNIS. The results of this study may help to understand human problems of the implementation and development of CNISs and guide authorities for the development of these systems.

1.1. Objectives

The objective of the study was to determine: a) The impact of the system on information process, b) The impact of the system on nursing tasks, c) The impact of the system of inter-sectoral communication, d) The acceptance rate of a new system, e) The impact of the system on nursing business and f) The level of the nurses' computer knowledge.

2. MATERIALS AND METHODS

This descriptive study was conducted in 2015 at general hospitals affiliated with the Mazandaran University of Medical Sciences, Sari, Iran, in which Hospital Information Systems (HISs) were implemented.

2.1. Area Characteristics

Mazandaran with 24,091 square kilometer area is one of the green provinces of northern Iran, with a population of more than 3 million people. Since being located near the sea, its population is doubled on holidays. In this province, there are two universities of medical sciences affiliated to the Ministry of Health and Medical Education, namely “Mazandaran University of Medical Sciences” and “Babol University of Medical Sciences”, which monitor a total of 30 hospitals with 3524 beds across the province and are responsible for providing health services to the population and most of the passengers on holidays. At present, the universities in the province have been selected as the pilot project of E-Health and Paperless in the country.

2.2. Hospital Information System Characteristics

Three private computer companies are responsible for implementation and support of HISs in this province, but most of the HISs (86.6%) are provided by a single computer company. The nursing module is provided in these systems whose functions mostly include management of beds, transfer and transport of patients, requests and laboratory result registration, pharmaceutical requirement registration, and recording the number of visits to physicians. Also, it is essential to perform other nursing functions, such as patient assessment, nursing care plan, patient education programs and patient discharge planning, system development and upgrade to a CNIS.

2.3. Tool Development

2.3.1. Development of Tool for Behavioral Feasibility of CNIS

The particular tool was developed on content analysis of related literature [26 - 29]. The set of questions was according to the results of content analysis. The questionnaire included two sections, five demographic questions and 33 questions in line with research objectives. The questions are rated on a 5-point Likert scale with 1= “very low” to 5= “very high”. Face validity of the questionnaire was confirmed by 5 experts (two nursing and two health information management professors, and also one information technology specialist).

2.3.2. Psychometric Testing of Tool for Behavioral Feasibility of CNIS

To determine the validity of the content, the necessity of each above-mentioned question was confirmed by 15 professors. The Content Validity Ratio (CVR) was the criterion for determination of the necessity of each question, which was measured by three options:" It is necessary", "It is useful but not necessary", and "It is not necessary" [27]. The Content Validity Index (CVI) of each question was obtained based on simplicity, relevance, and clarity of the questions. Choices and scores of CVI questions included: "No, score 1", "Yes, but needs fundamental revisions, score 2", "It is, but needs minor revisions, score 3" and "Completely Yes, score 4". Questions with CVI> 0.7 were accepted and those with CVI <0.7 were rejected or revised. Questions with CVR> 0.49 were confirmed and those with CVR <0.49 were rejected or revised [28]. To determine the reliability of data collection tools, questionnaires were distributed among the 15 members of the research community. The Cronbach's alpha coefficient was obtained 0.90 using the split-half method.

2.4. Study Procedure and Data Collection

The participants were official hiring nursing experts with experience of at least five years working at clinical sectors and two years of work experience with the HIS. The sample size was obtained (n = 348) using a formula based on 50% possibility of the behavioral development of CNIS with 5% accuracy and 95% reliability, respectively. The number of nurses per hospital is determined by proportional allocation. Nurses were randomly selected from the hospitals. Data collection was done by face to face interviews and the necessary explanations were provided to the participants (the nursing expert). The average score is calculated for each question and multiplied by 5 to turn it into a base of 100. To better assess each item, the scores less than 30 were in weak and poor situation, scores 30-70 were in middle and relative desirable situation, and scores more than 70 were in high and desirable situation. Data were analyzed using the chi-square test, t-test, two-way ANOVA and Tukey's test.

3. RESULTS

3.1. Development of Tool for Behavioral Feasibility of CNIS

The results of literature review showed six items including impact of clinical nursing information system on information flow, impact of clinical nursing information system on work of nurses, impact of clinical nursing information system on inter-departmental communication, acceptance rate of clinical nursing information system by nurses, the need for change in business method for use of clinical nursing information system, status of nurses knowledge for use of clinical nursing information system should be included in behavioral feasibility.

3.2. Psychometric Measure of Tool for Behavioral Feasibility of CNIS

A psychometric measure of the instrument showed that all items extracted from literature review had CVI scores more than 0.7 and CVRs more than 0.49, and were accepted. Only two items had CVRs lower than 0.49 and were omitted (Table **1**).

3.3. Evaluation of Behavioral Feasibility of CNIS

From the total number of 348 nursing experts selected from the hospitals, 79.3% were women and 1.3% were in the age group of 25-29 years, 36.2% in the age group of 30-34 years, 30.7% in the age group of 35- 39 years, 17.8% in the age group of 40-44 years and 4.9% in the age group of 45-49 years. Ninety-four percent of the participants had a Bachelor of Science degree, and the remainder had a Master of Science degree. Moreover, 39.1% had contractual employment, 25% sub-contractors and 35.9% official contract. Also, 42.8% of the cases had 5-9 years; 32.2%, 10-14 years; 16.1%, 15-19 years; 8%, 20 -24 years and 0.9%, 25-19 years of work experience. The response rate was 100%.

The results showed that the lowest average score of behavioral feasibility in each goal included was as follows: a) The impact of the system in the information process, the completeness of the information received, with an average score of 65.4%; b) The impact of system of nurses, providing the information needed to make decisions at the right time, with an average score of 61.4%; c) The impact of system of inter-sectoral communication, presence of proper communication with other automation systems, with an average score of 68.2%; d) System adoption, the impact of system on increased interest of nurses to use the system, with an average score of 54.8%; e) The impact of system for business method change, interference of redesigning structures with the current work, with an average score of 43.6%; and f) Nurses' computer knowledge status, the need to increase their knowledge and computer skills, with an average score of 56%. The necessity of system deployment in the clinical nursing sector (88.2%) and the need for change in methods to maintain the financial and employment security (82.6%) had the highest frequencies, respectively (Table **2**).

The results revealed that the highest possible rate of implementation of the system in women population was 51.4%; in the age group of 35-39 years was 54.2%; BSc education, 52%; contractual employment 55.9%; and those with the work experience of 10-14 years, 57.1% which were at a moderate level. A statistically significant relationship was observed between the level of education and system implementation possibility ($P < 0.05$) (Table **3**).

The overall average score of nurses' behavioral feasibility and the rate of supply provided for implementing the CNIS were 67.44% and 55.2% in a semi-favorable level, respectively.

4. DISCUSSION

This study aimed to assess the behavioral feasibility of CNIS. Behavioral feasibility is a scale of how the proposed system solves the problems, to what extent it takes the advantage of the opportunities identified during scope definition and how much it satisfies the requirements identified in the requirements analysis phase of system development. Moreover, the behavioral feasibility assessment focuses on the suitability of development projects proposed for the existing

Table 1. CVI and CVR on behavioral feasibility of clinical nursing information system.

Behavioral Feasibility Questions	CVI			CVR	Status
	Relevance	Simplicity	Clarity		
Providing information for decision-making at the right time	0.87	0.87	0.87	1	Accepted
Improving the flow of information needed nurses	0.93	0.87	0.80	0.87	Accepted
Leading to reparation of information shortage	0.87	0.87	0.80	0.87	Accepted
Leading to responsive to the sudden demand of information	0.80	0.80	0.80	0.87	Accepted
System deployment reduces problems caused by high volume of data.	0.87	0.87	0.87	0.73	Accepted
Saving time by organizing and compression data	0.87	0.87	0.87	0.87	Accepted
Affecting on increase the efficiency of information systems	0.73	0.73	0.73	0.87	Accepted
Information needs of nurses to be resolved	0.87	0.87	0.80	0.87	Accepted
Management support of system designers	0.80	0.87	0.87	0.87	Accepted
Nurses are familiar with existing information systems.	0.87	0.87	0.87	1	Accepted
The system deployment affecting on nursing staff.	0.87	0.87	0.80	0.73	Accepted
The system deploy is essential in clinical departments of nursing.	0.80	0.80	0.80	0.87	Accepted
There is acceptance by managers and nurses.	0.80	0.80	0.80	0.60	Accepted
Nurses' education and familiarity is affecting on system acceptance.	0.80	0.80	0.80	0.73	Accepted
The meetings on system advantages is affecting on system acceptance.	0.87	0.87	0.87	0.73	Accepted
The nurses' participation is affecting on system acceptance.	0.87	0.87	0.87	0.73	Accepted
Nurses are interested to use the system.	0.93	0.87	0.93	0.87	Accepted
Job security and financial is affecting on system acceptance.	0.80	0.87	0.87	0.73	Accepted
There is Internet access.	0.87	1	1	0.87	Accepted
Redesigning structures interfered with current work.	0.80	0.87	0.87	0.60	Accepted
Change occur in direction of culture Issues.	0.67	0.80	0.80	0.60	Accepted
Usually corrected mistakes that to returned from the system.	0.93	1	1	0.73	Accepted
Nurses have enough knowledge to use system.	1	1	1	1	Accepted
Nurses have enough skill to use software.	1	1	1	1	Accepted
Nurses need to increase knowledge and computer skills.	1	1	1	1	Accepted
There is possibility of receiving essential information of system.	1	0.93	0.93	1	Accepted
There is not deficiency in information received.	0.80	0.80	0.80	0.87	Accepted
Information is accurate sufficiently.	1	0.93	0.93	0.87	Accepted
There is not duplicate information in system.	0.80	0.87	0.80	0.73	Accepted
Data entry is done with ease to system.	0.87	0.87	0.87	1	Accepted
Information stored has not in expose risk of damage and disrepair.	0.87	0.93	0.93	1	Accepted
Appropriate information communications with other systems.	1	0.93	0.93	0.87	Accepted
There are a lot of control for system user.	0.87	0.93	0.93	0.43	Not Accepted
Unrelated messages from the system can be seen.	0.93	0.93	0.93	0.73	Accepted
Information needs of nurses to be resolved with system deployment.	1	0.93	0.80	0.47	Not Accepted

Table 2. Behavioral feasibility of clinical nursing information system.

Impact of Clinical Nursing Information System on Information Flow							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean (%)**	**Feasibility**
Improving the flow of information from different parts	12 (3.4)	37 (10.6)	90 (25.9)	141 (40.5)	68 (19.5)	72.4	Desirable
Reparation of information shortage	10 (2.9)	45 (12.9)	93 (26.7)	134 (38.5)	66 (19)	71.6	Desirable
Reduce high volume of data	8 (2.3)	37 (10.6)	118 (33.9)	117 (33.6)	68 (19.5)	71.4	Desirable
Obviation of information needs	9 (2.6)	32 (9.2)	97 (27.9)	118 (33.9)	92 (26.4)	74.4	Desirable
Ability of receiving necessary information of system	12 (3.4)	32 (9.2)	103 (29.6)	131 (37.6)	70 (20.1)	72.4	Desirable

(Table 2) contd.....

Impact of Clinical Nursing Information System on Information Flow							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean (%)**	**Feasibility**
Lack of deficiency in information received	19 (5.5)	44 (12.6)	120 (34.5)	150 (43.1)	15 (4.3)	65.6	Semi-Desirable
Accuracy of information	10 (2.99)	33 (9.5)	120 (34.5)	162 (46.6)	23 (6.6)	69	Semi-Desirable
Lack of received of duplicate information	14 (4)	45 (12.9)	139 (39.9)	134 (38.5)	16 (4.6)	65.4	Semi-Desirable
Ease the data entry to system	14 (4)	34 (9.8)	68 (19.5)	130 (37.4)	102 (29.3)	75.6	Desirable
Lack of damage and disrepair of data stored	16 (4.6)	40 (11.5)	120 (34.5)	147 (42.2)	25 (7.2)	67.2	Semi-Desirable
Impact of Clinical Nursing Information System on Work of Nurses							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean**	**Feasibility**
Decision making at the right time	22 (6.3)	87 (25)	130 (37.4)	64 (18.4)	45 (12.9)	61.4	Semi-Desirable
Accountability to the demands	11 (3.2)	40 (11.5)	99 (28.4)	112 (32.2)	86 (24.7)	72.8	Desirable
Saving time	13 (3.7)	43 (12.4)	110 (31.6)	77 (22.1)	105 (30.2)	72.6	Desirable
Nursing clinical performance	6 (1.7)	17 (4.9)	40 (11.5)	51 (14.7)	234 (67.2)	88.2	Desirable
Correcting mistakes	14 (4)	42 (12.1)	115 (33)	149 (42.8)	28 (8)	67.8	Semi-Desirable
Internet access	37 (10.6)	47 (13.5)	67 (19.3)	138 (39.7)	59 (17)	68.8	Semi-Desirable
Receive unrelated messages	47 (13.5)	133 (38.2)	78 (22.4)	70 (20.1)	20 (5.7)	66.8	Semi-Desirable
Impact of Clinical Nursing Information System on Inter-Departmental Communication							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean**	**Feasibility**
Establish of the inter- departmental Communication in improvement decision-making	5 (1.4)	46 (13.2)	61 (17.5)	116 (33.3)	120 (34.5)	77.2	Desirable
Information communication with other mechanized systems	19 (5.5)	48 (13.8)	107 (30.7)	119 (34.2)	55 (15.8)	68.2	Semi-Desirable
Acceptance Rate of Clinical Nursing Information System by Nurses							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean**	**Feasibility**
Enough acceptance by managers and nurses	16 (4.6)	94 (27)	144 (41.4)	65 (18.7)	29 (8.3)	59.8	Semi-Desirable
The impact of nurses' participation in system acceptance	5 (1.4)	38 (10.9)	82 (23.6)	111 (31.9)	112 (32.2)	76.4	Desirable
The impact of education on system acceptance	7 (2)	29 (8.3)	105 (30.2)	98 (28.2)	109 (31.3)	75.6	Desirable
Increase of the nurses interested to use the system	29 (8.3)	145 (41.7)	94 (27)	46 (13.2)	34 (9.8)	54.8	Semi-Desirable
Impact of the meetings on system acceptance	6 (1.7)	36 (10.3)	79 (22.7)	114 (32.8)	113 (32.5)	76.8	Desirable
Impact of the system deployment on nursing staff	15 (4.3)	63 (18.1)	123 (35.3)	90 (25.9)	57 (16.4)	66.4	Semi-Desirable
Necessity acceptance of the system deploy in the clinical departments of nursing	6 (1.7)	17 (4.9)	40 (11.5)	51 (14.7)	234 (67.2)	88.2	Desirable
The Need for Change in Business Method for Use of Clinical Nursing Information System							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean**	**Feasibility**
Interference redesigning structures with current work	86 (24.7)	151 (43.4)	77 (22.1)	31 (8.9)	3 (0.9)	43.6	Semi-Desirable
Change in direction of culture issues	19 (5.5)	27 (7.8)	109 (31.3)	147 (42.2)	46 (13.2)	70	Semi-Desirable

(Table 2) contd.....

Impact of Clinical Nursing Information System on Information Flow							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean (%)**	**Feasibility**
Maintain of nurses job security and financial security	5 (1.4)	24 (6.9)	49 (14.1)	113 (32.5)	157 (45.1)	82.6	Desirable
Status of Nurses Knowledge for Use of Clinical Nursing Information System							
Items	**Very-low (%)**	**Low (%)**	**Moderate (%)**	**High (%)**	**Very-high (%)**	**Mean**	**Feasibility**
Nurses familiarity with system	21 (6)	107 (30.7)	142 (40.8)	47 (13.5)	31 (8.9)	57.8	Semi-Desirable
Skills and knowledge use of system	12 (3.4)	95 (27.3)	161 (46.3)	69 (19.8)	11 (3.2)	58.4	Semi-Desirable
Nurses skill for use of software	19 (5.5)	115 (33)	131 (37.6)	59 (17)	24 (6.9)	57.4	Semi-Desirable
need to increase knowledge and computer skills	21 (6)	109 (31.3)	154 (44.3)	46 (13.2)	18 (5.2)	56	Semi-Desirable

Table 3. Behavioral feasibility in terms of the demographic status of participants.

Variable Demographics Status:		Weak* (%)	Moderate* (%)	High* (%)	P. Value
Gender	Male	0	37(51.4%)	35(48.6)	0.104
	Female	2(7)	142(51.4)	132(47.8)	
Age	25-29	0	15(41.7)	21(58.3)	0.384
	30-34	0	67(53.2)	59(46.8)	
	35-39	2(1.9)	58(54.2)	47(43.9)	
	40-44	0	33(53.2)	29(46.8)	
	45-49	0	6(53.3)	11(64.7)	
Education	BS	1(3)	170(52)	156(47.7)	0.037
	MS	1(4.8)	9(42.9)	11(52.4)	
Type of Employment	formal	1(8)	65(52)	59(47.2)	0.014
	Contract 5 years old	0	38(43.7)	49(56.2)	
	Contractual	1(7)	76(55.9)	59(43.4)	
Job Experience	5-9	1(7)	75(50.3)	73(49)	0.047
	10-14	1(9)	64(57.1)	47(42)	
	15-19	0	31(55.4)	25(44.6)	
	20-24	0	9(32.1)	19(67.9)	
	25-29	0	0(0)	3(100)	

Weak: Less than 30%, **Moderate:** 30%-70%, **High:** More than 70%.

business environment and the objectives designed according to the schedule, the date of delivery, corporate culture and business processes. The results of the present study showed the necessity of system deployment in the clinical nursing sector (88.2%) and the need for change in methods to maintain the financial and job security of nurses for system acceptance were 88.2% and 82.6%, respectively.

The results of other studies show that deployment of the system is essential to improve nursing performance and provide better care to patients [30] and leads to satisfaction and nursing quality improvement, acquiring new knowledge and increased job security [31 - 34] which is consistent with the results of the present study. Also, in this study, interference of redesigning existing structures with the current work was 43.6%, which did not fit with the workflow of nurses. The results of this study are consistent with Lau (2011) who investigated the benefits of successful adoption of clinical information systems in Canada and reported that the information system is not accepted by nurses due to the heterogeneity with clinical practices of nurses and therefore has underlined the redesign of structures and workflows [35]. However, it is not consistent with the results of other studies that examine the structure and processes of nurses' work when designing the systems which reported the compliance of new system structures with their current work [36 - 38]. The findings show that redesigning the structures parallel with system design is essential for nursing processes and workflow efficiency improvement, especially since the establishment of an information system, problems of existing processes and workflows become clearer [39, 40]. In addition, when redesigning the structures, processes and workplace design, technical capability enhancement, increasing job satisfaction, efficiency, and reducing error rates should also be considered [25]. Because nursing information systems are designed and implemented to improve the performance of nurses and help them in planning, diagnosis, care planning, and decision

making, nurses should be trained to use these systems with motivation, satisfaction and a sense of job security. It is suggested that during the design, development and implementation of these systems, the necessary support for nurses, nursing work processes and structures should be designed according to the status and safety of nurses' work. Moreover, in order to prevent the loss of time for nurses, and delay the registration of documentation in nursing information systems, due to the use of other nurses, computer equipment should be provided to them. Also, to improve the flow of information from different parts and to complete the information, a minimum set of nursing data is included and used in nursing information systems.

The results showed that nurses' familiarity with information systems was 57.8%, the skill to use computer 57.4%, the knowledge to use system 58.4% and their interest to use system 54.8%. Other studies show that nurses do not have sufficient training and have poor computer skills and cannot use the system and need more training [17 - 19, 21, 22]. Lam-mintakanen's study (2010) showed that training of nurses working at health centers is not sufficient; moreover, using these systems is time-consuming and nurses are not eager to use them [13]. Izzatty (2013) also reported that the information systems applied for nurses, in Malaysia, are complex and time-consuming, the system adoption level of nurses was low, and they were reluctant to use the system [14]. Mbananga *et al.* (2002), in a study carried out in North Africa, stated that nurses were reluctant to use the system due to issues such as lack of computer skills, misunderstanding of the system, lack of adequate training, technical defects of the system, the presence of duplicate files, loss of files, and problems in tracking patients [16]. The results of this study are consistent with the study of Bitene *et al.* (2000) who stated that nurses who lacked sufficient skills and computer literacy were concerned or reluctant to use the system [18]. Furthermore, the study of Imani *et al.* (2015) reported that most problems that nurses are faced with happen when working with medical information computer programs due to lack of familiarity with computer science and the lack of adequate training [41]. However, it is not consistent with the results of some studies that have reported that at the time of information system application, nurses were familiar with computer, felt good when using its tools and easily recovered their data [23, 24, 42, 43]. Blignaut *et al.* (2001) stated that a workshop-like consulting environment helped nurses improve their confidence and familiarity with system before launching a new system [25]. The study of Bond (2007) and Just (2008), conducted in Thailand, reported that nurses familiar with computer skills search their needed information easily and apply them when providing care [22, 44]. Emuziene (2009) reported that 70% of nurses have computer knowledge and skills and can work with computers easily to promote their jobs [45]. The increased computer skills of nurses make patient's information recovery faster and provide better and more efficient care [46]. This also saves time allowing nurses to focus on performing other specific activities [22]. Since nurses' lack of ability and skills in computer use affects the system adoption, in order to increase the possibility of the establishment of the system in terms of behavioral dimension, it is essential that the universities include computer training in annual programs to provide cultural context for using a computer.

This work has several limitations. The overwhelming workload, which somewhat complicated the completion of the questionnaire by the researcher. A wide range of research scope that should cover all hospitals and lack of papers on the feasibility of health information systems. Because of the inability and lack of skill of the nurses to use computer affect their acceptance of the system, it is imperative to include computer training in hospital education programs. Also, with an increasing use of information systems in hospitals, and especially in nursing units, it is necessary to develop computer information technology and nursing information systems in nursing curriculum planning. Educational programs are successful and increase the motivation to learn computer skills when presented in the student's specialized curriculum.

CONCLUSION

The possibility of CNIS implementation in behavioral dimension is semi-favorable. Suitable environment, education and the promotion of the culture of using information systems, collaboration and the participation of all nurses in the formulation, and implementation of work processes is a prerequisite for achieving the goals of nursing information systems. Nurses' lack of computer literacy and unfamiliarity with the system along with fear of making a mistake, demoralization, decreased job satisfaction and a sense of insecurity make it necessary to present a new system as a positive change, and also more training for nurses could encourage them to use information systems. Furthermore, more in-service training is required to increase the level of literacy and computer skills of employed nurses.

LIST OF ABBREVIATIONS

CNIS	=	Clinical Nursing Information System
HISs	=	Hospital Information Systems
E-Health	=	Electronic-Health
CVR	=	Content Validity Ratio
CVI	=	Content Validity Index
BSc	=	Bachelor of Science

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was approved by the institutional review board and the research ethics committee of Kashan University of Medical Sciences. Permissions were also obtained from the hospital authorities.

HUMAN AND ANIMAL RIGHTS

No Animals were used in this research. Moreover, a written informed consent was obtained from all participants prior to their inclusion in the study. The research team was sensitive to preserve the participants' rights in accordance with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

A written informed consent was obtained from all participants prior totheir inclusion in the study.

AVAILABILITY OF DATA AND MATERIALS

All data presented in the result but the raw data that support the finding of this study are available from corresponding author upoun request.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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