Nurses views on accepting the creation of a nurses' health monitoring system

Nasrin Rasoulzadeh[1,2], Abbas Abbaszadeh[3], Reza Zaefarian[4], Fariba Khounraz[5]

[1] Ph.D. Student in Nursing, Nursing and Midwifery College, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2] Lecturer of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran
[3] Professor, Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[4] Assistant Professor, Department of Entrepreneurship Development, Faculty of Entrepreneurship, Tehran University, Tehran, Iran
[5] M.Sc. Student, Shahid Beheshti University of Medical Sciences, Tehran, Iran

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Abstract

Background: Nurses' health is often accompanied by various dangers due to the nature of their career. Therefore, it is required to monitor their health. Based on designing any system, users' views should be investigated relative to the usefulness, necessity and acceptance of the system. Then, a designing and implementing process is conducted.

Objective: To investigate nurses' views on accepting the creation of a Nurses' Health Monitoring System.

Methods: This cross-sectional study was conducted in 2015. Sample size was 586 nurses of Shahid Beheshti University of Medical Sciences. Sampling was conducted using multi-stage random sampling method. Research tool was a two-section researcher-made questionnaire. In the first section, demographic data were studied and in the second section, a twelve-item questionnaire was presented based on technology acceptance model. Five-item questions were regulated on perceived usefulness (PU) and perceived ease of use (PEU) and views towards creating this system. Validity of the questionnaire was approved by content validity and content validity index and its reliability was approved by Cronbach's alpha. Data were analyzed using SPSS16 and descriptive statistics (frequency distribution, percentage, mean).

Results: The majority of participants (75.3%) were females between 25-35 years of age (44.4%) and (58.2%) were married. Mean work experience was 11.5±8.19. Mean perceived usefulness (PU) (17.36±2.66) and perceived ease of use (PEU) (16.75±2.65) and views towards using a Nurses' Health Monitoring System was (16.220±3.05).

Conclusion: Over two-thirds of nurses demonstrated perceived usefulness and perceived ease of use as well as positive views towards creating a nurses' health monitoring system. It is recommended to design and implement a nurses' health monitoring system based on local culture of Iranian nurses using IT in the health sector.

Keywords: Health Monitoring; Nurse; Technology Acceptance Model (TAM)

Corresponding author:

Professor Dr. Abbas Abbaszadeh, Department of Nursing, Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Tel: +98.2188202520, Email: aabaszadeh@sbmu.ac.ir

1. Introduction

Nurses are considered as the major part of the healthcare system (1). In hospitals and various sectors, nurses directly care for patients (2). Due to the nature of nurses' work, they encounter high physical activity, high stress and they suffer from health problems most of the time (3). Professionally, they are expected to care patients at a high level of professional performance (4). According to the United States Department of Labor, nursing is considered as a hazardous job (5), since they have to stand for considerable periods of time during their work shift and endure high muscular tension while bending and lifting (6). In addition, they have irregular work shifts, being up all night for long periods, and circulation shifts that result in sleeplessness, chronic diseases, fatigue, heart and digestive diseases (7). Findings from the study by Fronteira and Ferrinho showed that after reviewing 187 papers on nurses' physical problems, it was revealed that almost all suffered from musculoskeletal disorders. In addition, they are often endangered by blood infections and pathogens, tuberculosis and allergens (1). Based on other studies, obesity and hypertension is very common among nurses (8). In addition, due to their weak health promotion, they often suffer from anxiety, headache, and digestive and sleep problems. Heavy workloads result in an imbalance between life and work (9, 10). In addition, the stressful work environment and inappropriate work conditions as well as insufficient wages and salary significantly affect nurses' health status (11). Reports are presented on the low health status of nurses and this has become a factor causing medication errors and events related to them (12, 13). Work-induced health problems have resulted in high absenteeism and turnover (14). These cases can significantly affect the quality of patients' care. Studies on Iranian nurses' health indicate reduced sleep quality in female nurses as they age, due to numerous night shifts. Female nurses' general health is lower compared to males. As the night shift work increases, nurses' general health is diminished and more anxiety is observed in them (15). Due to moving patients and carrying heavy objects as well as prolonged standing, the most common complaint among nurses is backache (16). In terms of job burnout, nurses are at a low level of emotional analysis and in terms of lack of personal success and weakness of character, they are at a high level (17). Therefore, as they work for patients' health, their health status should be considered more than ever (18). As nurses access their health and medical data, they can decide for themselves in any therapeutic plan. They even can participate in preventing work-induced physical and mental problems (19) and promote their health status. Today through developments in information technologies and use of health informatics for users, systems are created or promoted to save and keep health data. Systems have provided the possibility of people's participation in sharing data, communication, facilitating decision-making, increasing efficiency, quality of care and reducing therapeutic expenditures (20). Various studies have been conducted on designing a system on health in the world and Iran. In two recent decades, the Europe Commission has supported research activities on IT and communication for health. This support enabled Europeans to use local health networks, electronic health records, and brought about the development of leading health cards. In 2004, an operational plan started for electronic health. The main objective of this plan is to provide easy and equal access to high quality healthcare for all European citizens at any time or place (21).

In a study by Sequist et al., an electronic clinical reminder system was designed for diabetic and coronary heart disease patients. Treatment process of diabetic patients improved significantly. Over two thirds of physicians were satisfied with this system and considered it as useful (22). In 2009, Tian et al. investigated the uses of employing a designed website for chronic fatigue syndrome (CFS) in the Center for Disease Control and Prevention. Views reflected by visitors demonstrated that they were interested in using this website (23). Based on designing any system, users' views should be investigated relative to the usefulness, necessity and system acceptance. Then, a designing and implementing process is conducted. The Technology Acceptance Model is a useful model to explain and accept the use of information technology (24). In a technology acceptance model, the behavior of using information technology is determined by the intention of using that particular system. The intention of use is in turn determined by the amount of usefulness of intended technology according to the user and the ease of using the system by them (25). The most common pattern of investigating acceptance of information technology is the technology acceptance model presented by Davis in 1985 based on Ajzen and Fishbein's theory of reasoned action. The base of the technology acceptance model is composed of two specific ideas of perceived usefulness and perceived ease of use. These main factors are connected to technology acceptance behaviors. Davis' model is composed of four main components of perceived usefulness, perceived ease of use, attitude and use. Perception means the mental possibility formed in users relative to a phenomenon, and attitude means the composition of cognitions, feelings and being prepared for action towards a special phenomenon. In this model, Davis states that attitude towards a phenomenon is affected by the user's perception of that phenomenon (24). Many studies are conducted using a technology acceptance model in the field of information systems that show perceived ease of use affects the intention of use, and this impact can directly or indirectly be resulted from the effect it has on perceived usefulness. Considering that in Iran there is no coherent system for nurses' health monitoring, it is required to create

a nurses' health monitoring system to save and store their health information. This study was conducted as the first step to designing the system in order to recognize nurses' views on accepting the creation of a nurses' monitoring system.

2. Material and Methods
2.1. Research design and selection criteria
This cross-sectional study was conducted in 2015. The study population were nurses of Shahid Beheshti University of Medical Sciences with a work experience of over a year and full-time work at the hospital and the ability to work with a computer and the Internet. After primary investigations, sample size was 700 people by estimating variance of 8.86 and $p < 0.05$ and possibility of sample loss. After collecting samples, 586 participants filled the questionnaire. Exclusion criteria was lack of completing over one-third of the second part of questionnaire. In this study, multi-stage sampling was used. First, six hospitals were randomly selected among twelve hospitals of Shahid Beheshti University of Medical Sciences. In each hospital, sampling was conducted using stratified random sampling such that each ward of the hospital was considered a stratum. Sampling was conducted with an equal size in each class using a simple random sampling method and drawing from the list of nurses working in each ward.

2.2. Data collection
As the author referred to the nurses, they filled the questionnaire as self-report. Samples' participation in this study was voluntarily with their informed consent. The data collection tool was a two-section researcher-made questionnaire. The first section was related to demographic data (gender, age, number of children, work experience, education, ward and the ability to use computer) and the second section was a twelve-item questionnaire derived from a technology acceptance model. Four items (1-4) were related to perceived usefulness, four items (5-8) were related to perceived ease of use and four items (9-12) were related to attitude towards creating a nurses' health monitoring system. Each item was scaled using a 5-item Likert scale (completely agree=5, agree=4, no idea=3, disagree=2, and completely disagree=1). The maximum and minimum score in this section were 60 and 12 respectively. Higher scores showed more acceptance of creating the nurses' health monitoring system. If the average of each question was over 2.5, it was interpreted that nurses had accepted that aspect of the health monitoring system. Fourteen faculty members of Shahid Beheshti and Tehran Schools of Nursing approved validity of the questionnaire using content validity index. Corrective comments were applied on items.

2.3. Validity, reliability, and statistical analysis
In addition, content validity was approved qualitatively using two coefficients of content validity ratio (CVR) and content validity index (CVI). In this study, content validity ratio was 0.64 after corrective comments of 14 participants and over 50% of experts considered items as necessary. In this study, content validity index was 0.82, which means that experts have approved the existing items. Twenty nurses analyzed reliability of tools using Cronbach's alpha in a phase of internal consistency of tools. These samples were excluded from the total samples. Cronbach's alpha of the questionnaire related to accepting the creation of a nurses' health monitoring system was at desired level (0.84), 0.88 in perceived usefulness, 0.78 in perceived ease of use and 0.77 in attitude. Data were analyzed using SPSS16 and descriptive statistics (frequency, percentage, mean).

3. Results
Results from studying personal details are as follows: most samples (75.3%) were females between 25 and 35 years of age (44.4%), married (58.2) and childless (58.7%). The highest work experience was less than 5 years and education was undergraduate. In terms of nursing position, it was 23.4%, 91% and 89.1% respectively and in terms of working at critical care wards, it was 29.9% and in internal wards it was 24.6%. Mean age of participants under study was 34.77±8.49 and mean work experience was 11.50±8.10. All participants were able to use computer. Other demographic data of participants are summarized in Table 1. Absolute and relative frequency and mean of participants under study are shown in Table 2 on each question related to accepting the creation of a nurses' health monitoring system. Mean and standard deviation of perceived usefulness, perceived ease of use, attitude towards using the system and total acceptance were 17.36±2.66, 16.57±2.65, 16.20±3.05 and 50.41±7.37 respectively (Table 3).

Table 1. Absolute and relative frequency distribution of nurses based on personal variables in accepting the creation of nurses' health monitoring system

Variable		n	%
Gender	Female	441	75.3
	Male	145	24.7
Age (year) (34.77±8.49)	<25	93	15.9
	25-35	260	44.4
	35-45	153	26.1
	45-55	77	13.1
	over 55	3	0.5
Marital status	Single	230	39.2
	Married	341	58.2
	Widowed	15	2.6
Number of children	None	344	58.7
	One	102	17.4
	Two	120	20.5
	Over 3	20	3.4
Education	Associate degree	7	1.2
	Undergraduate	533	91.0
	Masters	40	6.8
	PhD	6	1.0
Work experience (year) (11.50±8.10)	<5	187	31.9
	5-10	137	23.4
	10-15	86	14.7
	15-20	100	17.1
	over 20	76	13.0
Position:	Nurse	521	89.1
	Head nurse	47	8.0
	Supervisor	17	2.9
Ward	Internal	144	24.6
	Surgery	100	17.1
	Intensive care (dialysis, ICU, CCU)	175	29.9
	Emergency	105	17.9
	Other (operation room, psychiatric, transplant, clinic)	37	6.3
	Management	25	4.3

Table 2. Descriptive statistics of participants' attitude on each question related to acceptance of creating a nurses' health monitoring system (n=586)

Attitude items	Attitude (n)					Mean±SD
	Completely agree	Agree	No idea	Disagree	Completely disagree	
Existence of the system is useful and essential for health monitoring of nurses.	353	186	34	11	2	4.49±0.72
Existence of the system leads to improving my performance in my health monitoring.	285	239	44	17	1	4.34±0.75
I do my health tracking in the least amount of time by using the system.	266	241	62	16	1	4.28±0.77
I will have access to my previous problems and diseases by using the system.	247	250	67	19	3	4.22±0.81
Using the health monitoring system is	204	241	121	15	5	4.06±0.85

easy for me.						
I can easily use it by using my previous skills with computers.	213	273	86	14	0	4.16±0.76
I can easily obtain anything that I need about my health with reference to the system.	222	273	73	17	1	4.19±0.77
At any moment, I can get access to required information about my health	214	271	81	17	3	4.15±0.80
I believe the health monitoring system of nurses should be in accordance with my culture.	234	239	91	21	1	4.16±0.82
I believe that despite the existence of the health monitoring system, the health of nurses will be fully tracked.	194	240	117	29	6	4.00±0.90
I feel the organization cares for my health with the existence of the health monitoring system.	197	223	121	39	6	3.96±0.94
I believe that the health monitoring system of nurses will be effective in protecting my health.	208	255	88	29	6	4.07±0.88

Table 3. Descriptive items of answering all dimensions of technology acceptance in accepting the creation of a nurses' health monitoring system

Factors of Technology Acceptance Model	Minimum	Maximum	M	% M	SD
Perceived usefulness	4	20	17.36	86.8	2.66
Perceived ease of use	4	20	16.57	85.82	2.65
Attitude of use	4	20	16.20	81	3.05
Total acceptance	12	60	50.41	83.56	7.37

4. Discussion

Based on the technology acceptance model, perceived usefulness and perceived ease of use affect people's attitude towards using a technology, and results in their decision-making to use that technology. Finally, it will lead to using the technology. Results of this study showed that most nurses totally agreed upon perceived usefulness of creating the nurses' health monitoring system with an average of 17.36±2.66. Results of the study by Gagnon et al. showed an increase in the mean of perceived usefulness of using an electronic health record according to healthcare providers (physicians and nurses) (27). The study by Karaman showed that participants demonstrated a high perceived usefulness of an online continuous training system (28). Results of the study by Bahli and Saade showed that mean perceived usefulness has increased in online-based learning systems (29). Pan and Jordan-Marsh showed that perceived usefulness has been effective in using technology by the elderly (30). Results of this study comply with mentioned studies. Furthermore, usefulness of a nurses' health monitoring system shows the importance of creating this system for them. Most samples agreed upon perceived ease of use in creating a health monitoring system with an average of 16.57±2.65. Perceived ease of using this technology results in using that system more. The study by Aggelidis and Chatzoglou showed increased perceived ease of using hospital information systems (35). Results of the study by Esmaeili et al. indicated that most subjects under study agreed upon usefulness of information technology. Based on the results of this study, most participants showed ease of learning and usefulness of information technology (32). Findings of Pan and Jordan-Marsh demonstrated the ease of use in deciding to use this technology by the elderly. This study is similar to mentioned studies (30). However, results of the study by Holden et al. represented that using a pharmaceutical barcode system has been only partially useful for work performance and caring patients. Over 20% of participants stated that this system has not resulted in their improved work performance and it has not been effective in their efficiency. In addition, over half of nurses did not agree upon the ease of caring for patients when using a pharmaceutical barcode system. Thirty percent of nurses regarded the relative ease of using a pharmaceutical barcode system (33). It appears that lack of compliance between their study and the present study is due to the use of the type of system and the type of its function. Most nurses in this study agreed on creating a nurses' health monitoring system with an average of 16.2±3.05. The study by Karaman showed that participants represented a positive attitude towards using the system (28). In the study by Aggelidis and

Chatzoglou, the mean attitude towards using hospital information systems also increased, which shows positive attitude towards the system (31). Based on the findings of study conducted by Esmaeili et al., most participants had a positive attitude towards using information technology (32). Results of the study by De Veer and Franke showed that participants showed perceived usefulness and positive attitude towards patients' electronic records (34). This study is similar to mentioned studies. Considering that in this study, nurses believed in the usefulness of creating a nurses' health monitoring system and the ease of using it, these results represent the importance of creating a health monitoring system for nurses. Regarding the study limitations, personal differences of nurses in using some information and computer systems in answering the questions were among limitations of this study.

5. Conclusions
Implementing and successfully operating IT services systems requires cognition and acceptance of users before planning and implementing it. Most studies related to IT services and its systems are implemented without considering the issues that finally result in failure. Results of the study showed that over two-thirds of nurses participating in this study, had positive perceived usefulness and ease of use, as well as a positive attitude towards creating a nurses' health monitoring system. Using IT in the health sector, it is suggested to plan, assess and implement a nurses' health monitoring system based on the local culture of nurses.

Conflict of Interest:
There is no conflict of interest to be declared.

Authors' contributions:
All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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