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Crescent Journal of Medical and Biological Sciences
Vol. 7, No. 2, April 2020, 201–206
eISSN 2148-9696

Need Assessment for Nursing Informatics Curriculum in Iran: An Application of the Delphi Technique

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Abstract

Objectives: The progresses in information and communication technology, the increase in medical and nursing knowledge, the need for new methods for processing, maintaining and retrieving information for the production of new knowledge and also the economic benefits of the use of information and communication technology are the reasons for the importance of nursing informatics. This study was conducted with the aim of determining the skills of nursing informatics and need assessment for designing nursing informatics curriculum in Iran.

Materials and Methods: It was a mixed method study in which Delphi technique was used. The research population included nursing and medical informatics specialists who were a member of the faculty of medical universities of the country with a Ph.D. degree. Purposive and snowball sampling were used, and 45 people participated in this study. The data collection was first carried out on the basis of a review of the texts and global experiences. The researcher made questionnaire was sent through email in two steps. Focus group comments were used to complete and finalize the skills.

Results: Based on the results, 81% of the experts considered the design of a course in nursing informatics essential and, expressed their positive views on nursing informatics and considered it as a missing link in the application of informatics knowledge in nursing, which can contribute to beneficial change, innovation and professional development of existing knowledge in nursing. Nursing informatics skills were designed with 28 items in 4 domains. The role of graduates was determined in the areas of care with 6 tasks, training with 5 tasks, research with 5 tasks, and management with 5 main tasks.

Conclusions: The findings showed the importance of nursing informatics in the areas of training, research, management and clinical education. Moreover, the results showed that designing nursing informatics curriculum for postgraduate degree is a necessity which was approved by Nursing and Medical Informatics Experts. The findings of this study can be used for designing curriculum in the field of nursing informatics.

Keywords: Nursing informatics, Delphi technique, Nursing skills

Introduction

Nursing Informatics, after Medical Informatics, is one of the most prominent issues in Health Informatics, with many research and development efforts being undertaken at international level (1). Nursing informatics is a specialization integrating computer science and information science in order to identify, collect, process, and manage data and information to support activities of nursing, management, education, and research, and develop nursing knowledge. This specialization supports all specialized nursing areas in all centers and places from beginner to advanced level (2). Based on this definition, as nursing is considered as a separate discipline and specialization in the medical sciences, nursing informatics is also considered as a distinct field and profession (3).

During the years that the concept of nursing informatics was introduced, the role of nurses in nursing care and informatics increased (4). Technology and computer system for collecting, storing, processing, and modifying related data in the area of nursing care can facilitate the provision of nursing services, resource management, and nursing care, and support educational resources for the training of nurses. The internet is a complementary educational tool and an inevitable phenomenon for nursing profession and nursing care (5).

Health care environments are much extended and this extension is not just in terms of physical location, and accepting such new environments needs changing the methods of providing care. This issue also requires sufficient knowledge about the new technologies, and nurses with the highest levels of direct care of the patient are at the center of this progress. Current health care

Received 14 December 2018, **Accepted** 19 April 2019, **Available online** 9 April 2020

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environments include virtual visits, online turnouts, online payments, mobile labs, and e-drug prescriptions (6). Therefore, the process of providing favorable services for patients requires interconnection between different units, and if the users do not have sufficient literacy and ability in relation to computer, the system would experience the lowest efficiency. In addition, the knowledge and ability of users to use the hospital information system provide the satisfaction of staff and patients (7).

The advancements in information and communication technology, the increase of medical and nursing science, the need for new methods of processing, maintaining and retrieving information for the production of new knowledge as well as the economic benefits of using information and communication technology are good reasons to show the importance of nursing informatics (8).

The main mission of the nursing informatics curriculum is to educate students who can promote health systems, optimally use existing resources and reduce nursing mistakes. Training of these forces provides the basis for developing knowledge and raising awareness of authorities, specialists, health service providers and the public on the application of nursing informatics field. It can provide assistance and activities aimed at establishing interdisciplinary systems for establishment and expansion of cooperative fields between relevant centers and health service providers with professionals and activists in information technology as well as creating the necessary framework for defining standards and protocols in the field of nursing services (9).

Despite the growing trend of informatics in nursing in the world, the status of this field in Iran is unclear and the information technology in nursing is used less than the other countries. Since the promotion of nursing services requires promoting the knowledge and skills of nurses in the field of nursing informatics and considering the need of our country to have specialized nurses in the area of informatics and in order to define professional tasks as the basis for future planning on new disciplines and trends such as nursing informatics in this study, we extracted the skills of nursing informatics in Iran after examining the global experiences of selected countries using the views of nursing and medical informatics specialists.

Materials and Methods

This mixed-method study was conducted in Iran in 2018 using Delphi technique. The reason for the selection of the Delphi technique was the lack of specialists and the impossibility of gathering them in one place, and also the importance of their views on the professional tasks of nursing informatics graduates.

In the present study, Canada, Australia, the United States, United Kingdom, and Taiwan were chosen purposefully for studying the experiences of nursing informatics in countries with a background in this field. The reasons for this choice were the prior determination of nursing informatics skills and the availability of specialized and academic nursing informatics education in different educational levels and the employment of graduates in related occupations in these countries. Moreover, purposive and snowball sampling were used in this study to select the sample group of experts. According to the existing references, the total number of Delphi samples is usually less than 50 people and most often it ranges from 15 to 20 people (10). In this study, a total of 48 nursing and medical informatics specialists have participated in the need assessment in order to have more comprehensive and complete information on the groups and educational issues. For this purpose, a list of all faculty members of the nursing and medical informatics department with a doctoral degree in the country with their telephone number and postal addresses were extracted using the scientometrics system, and the first questionnaire was sent to them. They were also asked to introduce people familiar with research subject in other universities. The first questionnaire was then sent to the people introduced. The inclusion criteria of the study were awareness of the research subject, interest in participating in the research, and having an organizational position of nursing and medical informatics faculty member in all of the universities of medical sciences in the country with a doctoral degree. The exclusion criteria of the study were the unwillingness to participate in the study and the lack of participation in Delphi sessions.

The first phase of Delphi included six open-ended questions and the subjects were asked to comment on the need for acquiring nursing informatics skills. The face and content validity of the questionnaire was determined using the experts' opinions. To measure its reliability, Cronbach α was used. Cronbach α coefficient was 89%. After receiving informed consent, the questionnaires of the first phase of Delphi were sent to the participants. Questionnaire completion was defined as free and a two-week return period was considered. After the expiration of the period, the items not opened yet were identified and the email was resent. Questionnaires were followed up for three times until the return of 80% of the questionnaires. After collecting the Delphi questionnaires for phase 1, the extent and reasons for the need to determine the skills of nursing informatics in Iran mentioned in each questionnaire were studied.

Then, in order to design a Delphi questionnaire for phase 2, we examined the global experiences of nursing informatics skills using the resources and texts (printed and electronic) and collecting information by taking notes of these documents. Self-assessment questionnaires for informatics skills, nursing informatics competency assessment and nursing informatics competency validation test in other countries were also used. After comparing and matching the items, a structured questionnaire was developed for extracting the views of nursing and medical

informatics experts using 74 items on nursing informatics skills in Iran.

Participants were asked to assign points to each item on a 5-point scale from strongly agree to strongly disagree. The questionnaires were then analyzed and all the views of "agree" and "strongly agree" with the 80% agreement rate were considered as the required skills in nursing informatics.

Finally, two focus groups of 7-10 people including nursing and medical informatics faculty members were formed and the skills with great importance were identified. Prior to each meeting, an invitation to participate in the meeting with the time, the date and place of the meeting, the purpose of the meeting and the discussion subject, along with a list of previous extracted skills were sent to the samples. The meetings lasted for 2-3 hours and in case of agreement, each skill was entered the list of required skills and professional roles of the graduates or removed. After completing the sessions, the researcher reviewed the skills, and a list of residual skills with the highest percentage of agreement was developed. Data were analyzed by calculating the mean and standard deviation for each statement using SPSS version 21.0.

Results

The data of the global experiences of nursing informatics skills were gathered through a questionnaire and were determined by a survey of the country's experts in nursing and informatics. In the first stage, 45 experts aged between 28 and 74 years old were surveyed (Table 1).

In the first phase of Delphi, experts agreed about the lack of the ability of nursing graduates to acquire informatics knowledge (85%) and inadequacy of current informatics training for undergraduate students to empower them in knowledge acquisition (82%), as well as the inadequacy of current trainings in informatics field for undergraduate students to create enough skills in nursing graduates (84%). Therefore, the specialists considered designing a master's degree in nursing informatics as an essential issue (81%). However, some of them agreed on holding workshops and informatics courses (6%), and some believed that some informatics courses were complementary to other nursing disciplines (8%). Experts have expressed their positive views on nursing informatics and considered it as a missing link in the application of knowledge in nursing, which can contribute to beneficial change, innovation and professional development of knowledge in nursing.

In the second phase of the Delphi, a structured questionnaire on the skills required for nursing informatics in Iran was designed according to global experiences and according to experts, there was more than 80% agreement on its items, and it was identified with the title of nursing informatics skills in Iran with 74 items. Among the 74 qualifications that were agreed upon, some were taken as the most important and some items were integrated. Finally, 28 qualifications were agreed upon (Table 1).

Table 1. Distribution of Experts by Degree

Degree	Field	Number	Percentage
Master of Science	Nursing	3	6.38%
Ph.D.	Nursing	35	74.48%
Ph.D.	Medical Informatics	10	19.14%

In the third step, and after focus group meetings, considering the previously determined skills, the total number of tasks determined in this step was 21, which were extracted in the caring, educational consulting, research and management realms. 6 items were considered in the caring area, 5 in the consulting area, 5 in the research area and 5 in the managerial area. Some of the tasks extracted in Delphi are shown in Table 3.

Discussion

This research sought to assess needs and determine informatic skills of nurses using the Delphi method due to the need of the country for specialized nurses in the field of informatics and in order to define professional skills, as the basis for future planning on curriculum and new trends such as informatics nursing.

Considering the fact that despite the tremendous advances in medical sciences, Iran has newly embarked on the development of informatics in the field of health, hence the establishment of the Nursing Informatics discipline seems necessary. In this research, the experts considered the design of the course in nursing informatics necessary (81%). Nursing Informatics looks through interdisciplinary knowledge and a multidisciplinary perspective toward designing, developing, implementing and evaluating IT tools and solutions in order to support and improve nursing practices. However, nurses will deal with various applications of IT in their field at three levels. Nurses who are only users of these technologies, nurses who evaluate systems as nursing technology analysts and nurses who contribute to the design or selection of systems, and who develop and implement them. Therefore, the informatics science and skills required for nurses at each of these levels also vary (11).

According to Staggers, academic nursing informatics institutes were extended and specific standards for training and validation were included in the new edition of "The Scope and Standards of Informatics Nursing Activity". One of the criteria for determining and presenting the main competencies is a Delphi study conducted by three nursing informatics specialists (Staggers N., Gassert C., Curran C.). According to this study, there are 22 main competencies to gain, such as the integration of knowledge, skills, and attitudes in various informatics activities. Four major competencies were arranged alongside them: novice nurse, experienced nurse, informatics specialist, and informatics innovator. They determine 300 competencies for each of the four levels (12).

Tiger in his extensive studies on nursing informatics

Table 2. Nursing Informatics Key Competencies and Skills

No.	Skill	Completely agree	Agree	No idea	Opposite	Completely opposed
1	Communication development	83.4	5.5	11.1	0	0
2	Having a professional commitment	66.8	22.2	5.5	5.5	0
3	Participation and teamwork	8.77	1.11	1.11	0	0
4	Familiarity with ICDL Seven Skills	4.83	6.16	0	0	0
5	Participation in the process of selecting, designing, implementing and evaluating the system as a nurse	8.77	2.22	0	0	0
6	Use of informatics tools to design nursing care programs and essential applications in nursing diagnosis, interventions and outcomes	3.72	6.16	1.11	0	0
7	Training and empowerment of nurses in relation to informatics	4.83	1.11	5.5	0	0
8	Support for system users, including clients, nurses and medical groups	9.88	1.11	0	0	0
9	Online search for new and existing nursing care resources	5.94	5.5	0	0	0
10	Nursing management to apply creativity and informatics concepts in the field of nursing	4.83	6.16	0	0	0
11	Information management (collection, organization, and retrieval) and the use of nursing information management tools to train the client	9.77	6.16	5.5	0	0
12	Use of informatics tools and database for evidence-based decisions	3.72	1.11	6.16	0	0
13	Understanding databases and using database programs to import and retrieve information	89	5.5	5.5	0	0
14	Observing ethical considerations, security, privacy and patient rights	7.66	8.27	5.5	0	0
15	Access to the common dataset	3.72	2.22	5.5	0	0
16	Extraction of important data in nursing care	6.66	4.33	0	0	0
17	Providing remote services and using patient remote control systems	6.55	4.33	1.11	0	0
18	A quick review of health indicators	2.61	9.38	0	0	0
19	Introduce a new paradigm in nursing environment through the application of nursing informatics theory in practice	3.72	2.22	5.5	0	0
20	Detecting the impossibility to perform some human activities by computer	7.66	8.27	5.5	0	0
21	Ensuring that there is no negative interference between technology and care	8.77	2.22	0	0	0
24	Training nursing informatics expert to increase interaction between nursing specialists and informatics professionals	9.88	1.11	0	0	0
25	Familiarity with health information quality assessment tools on the web	8.77	1.11	1.11	0	0
27	Correcting some deficiencies in the nursing care system	8.77	2.22	0	0	0
28	Development of goals and common perspective and setting up a strategic plan for informatics nursing	2.61	7.27	1.11	0	0

Table 3. Professional Roles of Nursing Informatics Graduates

Background	Role
Caring	1. Helping to reduce nursing errors
	2. Helping security and protect the privacy of patients
	3. Quick and easy access to client information
	4. Guiding and providing remote nursing services
	5. Diagnosis and nursing intervention with computer
	6. Helping to reduce nursing errors
Training	1. Designing and using simulation software of clinical nursing skills
	2. Teaching courses related to nursing informatics
	3. Collaboration on the transfer of information and knowledge and the introduction of nursing technologies to the scientific community
	4. Encouraging and training nursing staff to participate in the use of computers in the work
	5. Technology-based nursing education
Research	1. Conducting applied research on the challenges of nursing
	2. Achieving the findings of the day to improve the quality of nursing care
	3. Research on the application of storage and retrieval methods of nursing data
	4. Institutionalizing evidence-based performance in the nursing process with the help of nursing informatics
	5. Contextualization for conducting applied research of researcher nurses in the fields of nursing informatics
Management	1. Helping the development and improving nursing management information systems
	2. Designing, implementing and evaluating clinical information systems for nurses
	3. Development of the use of tools for assessing the quality of nurses' performance and the consequence of patient care
	4. Support for system users, including clients and nurses
	5. Designing nursing decision systems

proposed that a nurse must have at least three competencies, including basic computer information, information management and information literacy (13). Chang et al in Taiwan in 2011 conducted a study entitled "Nursing informatics competencies required of nurses in Taiwan". In this study, a web-based modified Delphi method was used for the group of nursing experts (n = 32), nursing educators (n = 23) and managers (n = 9). Experts commented on 323 items of nursing informatics competencies, prepared according to studies by Staggers et al. Three web-based Delphi rounds were done. The analysis was done in a precise manner. Competencies gaining 60% or more agreement were accepted for proper nursing practice. A total of 318 items out of the 323 competency items required for the nursing informatics have reached agreement levels and 42 new competencies were added. These competencies have been presented completely in a list. The results of this study have international use because of the global importance of IT for nursing (14).

In this study, considering the study of global experiences and the combination of the same items in various studies, 74 items were presented to experts for providing comment. Since determining the skills in this study is a prerequisite for determining the curriculum of nursing informatics, agreed skills were considered according to the roles of graduates and inclusion in the curriculum in general.

Cheraghi et al also in their study emphasized the necessity of proper actions by the authorities to prepare faculty members to teach nursing informatics skills to students. They also pointed out the feasibility of the establishment of postgraduate and PhD courses in nursing informatics in Iran. In their study of educational strategies for nursing informatics in selected countries, they showed that Australia, Canada, the United States, and Taiwan have determined the integration of nursing informatics skills and knowledge with their nursing education curriculum as their educational strategies. Nevertheless, the training of nursing informatics professionals in Canada and Australia is followed through the development of a specialized nursing informatics orientation in postgraduate and PhD nursing disciplines (15). In this regard, Nahm et al from the Baltimore Nursing School of Maryland pointed out that graduates are employed in the fields of care, education, research, and management (16).

Yamani et al (17) used the Delphi technique for need assessment and designing the curriculum for a postgraduate degree in family nursing. In addition, Goudarzian et al found that the Delphi technique is appropriate for developing the MA curriculum for diabetes nursing in Iran. In these studies, three Delphi rounds and a special curriculum panel based on skills in clinical, educational, research and managerial areas were taken into account (18).

Outstanding achievements have been made in nursing informatics qualifications over the past decades (19). Nursing informatics makes changes in health care and nursing performance by increasing the safety of the patient, improving the quality of healthcare and reducing costs of health care by combining the best practices in patient care (20).

After determining the skills of nursing informatics in this study, experts have studied the role of graduates in different fields and reached a consensus on the role of graduates in the areas of education, research, management

and care.

Applying the results of need assessments conducted according to the current and main needs of our country will lead to training nurses in future plans for training specialist personnel which undoubtedly will have long-term health, economic, cultural and social benefits. The findings of this research can be used for the design of nursing informatics curriculum in undergraduate degree.

Limitations of the Study

The lack of knowledge of nursing informatics among nurses can lead to reluctance to participate in the research, which is the main limitation of the study. Another limitation is the limited access to some of the information resources required for nursing informatics. Moreover, belief in the adequacy of the medical informatics discipline among some scholars in the country can result in the lack of proper cooperation.

Recommendations for Future Studies

Investigation of information needs to determine the minimum national nursing data required

Analysis of information, structural and functional needs of the nursing information system in Iran by nurses, informatics experts, and health information managers

Investigation of nurses' needs in structural and content features of Iranian nursing portal

Conflict of Interests

Authors have no conflict of interests.

Ethical Issues

This study was conducted at the Faculty of Nursing and Midwifery of Jundishapur University of Medical Sciences with the issue number of U-96069.

Financial Support

Jundishapur University of Medical Sciences supported the study.

Acknowledgments

This study was a part of a Ph.D. thesis in Nursing which was conducted at the Faculty of Nursing and Midwifery of Jondishapur University of Medical Sciences (U-96069). The authors sincerely thank the Nursing and Medical Informatics Specialists of the country and all those who helped in this project.

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