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Türkiye'de Robotik Cerrahi Hemşirelerinin Çalışma Koşullarının Değerlendirilmesi: Çok Merkezli Bir Araştırma

Evaluation of Working Conditions of Robotic Surgery Nurses in Turkey: A Multicenter Study

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ÖZ

Amaç: Bu araştırmanın amacı, Türkiye'deki robotik cerrahi hemşirelerinin çalışma koşullarının belirlenmesidir.
Yöntem: Bu tanımlayıcı araştırmada, veriler Mayıs 2020 - Ocak 2021 tarihleri arasında toplandı. Araştırmaya robotik cerrahinin uygulandığı sekiz farklı ildeki 32 hastanede, en az bir yıldır robotik cerrahi alanında çalışan hemşireler dahil edildi (n=90). Veriler "Hemşirelerin Sosyodemografik ve Çalışma Koşulları Formu" kullanılarak elektronik ortamda toplandı.
Bulgular: Robotik cerrahi alanında çalışan hemşirelerin yaş ortalaması 32.03±6.52 olup, %80'i kadındır. Hemşirelerin %50'si robotik cerrahi konusunda eğitim almadığını, %50'si hemşirelik rollerinin net olmadığını, %44.4'ü bilgi düzeylerinin kısmen yeterli olduğunu, %58.9'u yazılı prosedürlerinin olmadığını ve %76.7'si cerrahi sırasında anksiyete yaşadıklarını belirtmişlerdir. Yaş (p=0.046), cinsiyet (p=0.005), medeni durum (p=0.013), ameliyat sırasında sorun yaşama (p=0.007), öz değerlendirme bilgisi (p=0.038), akış şeması/kontrol listesi olması (p=0.010), düzenli hizmet içi eğitim alma (p=0.022) ile hemşirelerin ameliyat sırasında anksiyete yaşamaları arasında istatistiksel olarak anlamlı fark saptandı.
Sonuç: Bu araştırmada robotik cerrahi hemşirelerinin yarısından fazlasının cerrahi sırasında sorun yaşadığı belirlendi. En yaygın yaşanan sorunların hemşirelerin bilgi eksikliği, rol ve sorumlulukların belirsizliği, çalışan eksikliği ve İngilizce dil becerilerinin yetersizliği şeklinde saptandı. Robotik cerrahide hasta güvenliğinin sağlanması için ulusal ve kurumsal prosedürlerin geliştirilmesi, hemşirelerin rollerine ilişkin belirsizliğin giderilmesi, hemşire yetkinliklerinin belirlenmesi ve hemşirelerin bu alandaki eğitimlerine katkı yapılması önerilmektedir.

Anahtar Kelimeler: Ameliyathane, Robotik cerrahi, Robotik cerrahi hemşireliği, Teknoloji.

ABSTRACT

Objective: This study aimed to determine the working conditions of the robotic surgery nurses in Turkey.
Method: In this descriptive study, data was collected between May 2020 to January 2021. Nurses who were working in robotic surgery for at least one year in 32 hospitals in different eight cities, were included in the study (n=90). Data were collected with the Sociodemographic and Working Conditions Form of Nurses electronically.
Results: The mean age of nurses working in the field of robotic surgery was 32.03±6.52 years and 80% of them were female. 50% of the nurses didn't receive any education about robotic surgery, 50% of the nurses stated that the nursing roles were not clear, 44.4% of the nurses consider their level of knowledge partially sufficient, 58.9% of them did not have a written procedure, 76.7% of them feeling anxious during the surgery. There was a statistically significant difference between the age (p=0.046), gender (p=0.005), marriage (p=0.013), experiencing problem during surgery (p=0.007), self-assessment knowledge (p=0.038), had flow charts/checklists (p=0.010), regular in-service education (p=0.022) and nurses' feeling anxious during surgery.

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Conclusion: In this study, more than half of robotic surgery nurses experienced problems in during surgery. The most common problems were lack of knowledge, ambiguity of roles and responsibilities, staff shortages and lack of English language skills. It is recommended to develop national and institutional procedures to ensure patient safety in robotic surgery, to eliminate the uncertainty regarding the roles of nurses, to determine nurse competencies and to contribute to the education of nurses in this field.

Key words: Operating room, Robotic surgery, Robotic surgery nursing, Technology.

1. INTRODUCTION

Robotic technology is not new in today's healthcare standards. In Turkey, robotic surgery (RS) was used firstly in bypass surgery in 2003 and urological surgery in 2005 (1,2). The most commonly used surgical robotic system is the da Vinci surgical system (3). However, understanding the origin of RS and how it has revolutionized surgery enables nurses to appreciate their distinctive role (4,5). Operating room nurses have essential roles in the successful continuation of RS (4,6). The roles and duties of a RS nurse are seen as a necessary bridge between the surgeon, resident, and patient (2,7). The safety and efficiency of RS depend significantly on the presence of a consistent, trained, and experienced nursing staff and surgical team (7,8). Ensuring patient and staff safety in RS; it depends on the correct installation of the robot, protection of materials, sterilization and calibration of devices. It is important to inform and educate the team about RS, new technology and medical devices to achieve the best patient outcomes and provide quality care to patients (3,9).

Providing structured formal education to operating room nurses about RS plays an important role in preventing problems related to patient safety (9). Although RS is considered as a safe surgical approach, a lack of knowledge and skills of the surgical team about the robot or malfunctions caused by the robot can lead to situations that may harm for the patient (10, 11). RS nurses should deal with many issues such as emergencies, unknowns, and lack of skills during RS interventions that require the use of complex medical instruments (7, 9). According to the International Labour Organization (ILO), issues such as the use of technology, lack of skills, emergencies, and role uncertainty are reported as concern factors faced by nurses in the work environment (12). In the literature, it is stated that RS nurses are mostly concerned about harming the patient due to technical issues and lack of knowledge (9,13). In this state, anxiousness may reduce the performance and motivation of RS nurses by restricting their cognitive processes and may put patient and employee safety at risk.

Nurses having sufficient knowledge and experience, anxiousness to be reduced, adapting to the RS process and increasing performance is important in terms of ensuring the safety of the surgical procedure and patient (14). In order to improve the quality of patient care, ensure patient safety and manage emergencies, the RS nurse should understand the robotic system and have the necessary knowledge about RS (3,5). In the future, with the widespread use of robots and the emergence of innovations in the field of technology, RS becoming more common and the development of new approaches and practices in this field will be inevitable (15). It is important to determine the general situation of nurses regarding RS in order for nurses to keep up with developing and changing technologies and to be well prepared. This study aimed to determine the working conditions of the RS nurses, working in all RS centers in Turkey.

2. METHOD

Study Design and Participants

This descriptive study was collected between May 2020 to January 2021. The study population consisted of RS nurses working in hospitals that perform RS in Turkey. There are 32 private and public hospitals in Turkey where RS is performed according to da Vinci Surgery (https://www.davincicerrahisi.com/hospitals/) statistics as of 2021. In the study, it was planned to reach the entire population without performing any sampling. Those who have worked for a minimum of one year as a RS nurse were included in the study. RS nurses of all hospitals in different eight cities where RS is performed were invited to participate in the study (n=90).

Data Collection and Instruments

The "Sociodemographic and Working Conditions Form of Nurses" prepared by the researchers was used for the data collection. The form consisted of a total of 28 questions related to the sociodemographic and occupational characteristics of nurses and their experiences regarding RS (2, 6, 8, 9,12,13). Before starting to collect data, a total of eight experts consisting of two faculty members of psychiatric nursing, four surgical nursing and two operating room nurses were consulted for their opinions about the questions, and the questions were rearranged and finalized in line with the suggestions.

The study data were collected online. A pilot test was conducted with five nurses to test the data collection form. After the pilot test, the data collection form was given final format. Then the forms were transferred on to the online environment and published on Google Forms. An invitation letter was sent to RS nurses from groups on social network sites indicating the purpose and the link of the study. A reminder message was sent to nurses two weeks after the first invitation letter was sent to increase participation in the study. An IP check was provided to enable a participant to complete a single survey. Answering the data collection form took an average of 15 minutes. Data collection forms filled out online were backed up daily by the researchers.

Statistical Analysis

SPSS (Statistical Package for the Social Sciences) for Windows 21.0 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) package program was used for the analysis of the data obtained from the research. Sociodemographic and occupational characteristics of nurses were described with frequency, percentage distribution, mean, and standard deviation values. Chi-square and Fisher's Exact Tests were used for comparative variables. In all results, p values <0.05 were considered statistically significant.

Ethical Consideration of the Study

Ethical approval was obtained from the Ethics Board of a University to conduct the research (2020-06/9). In the data collection form, nurses were given information about the study, and permission was asked from those who participated in the survey by clicking on the 'I accept' or 'I do not accept' buttons.

3. RESULTS

The mean age of RS nurses was 32.03±6.52 years, and 80% of them were female. 52.2% of the nurses are single, 60% have a bachelor's degree, 51.2% live in Istanbul and 36.7% work in private hospitals. While the experience of working in the operating room was 8.43±5.33 years for the nurses, the experience as a RS nurse was 3.58±1.90 years (Table 1).

Table 1. Sociodemographic Characteristics of Robotic Surgery Nurses.

	Min-Max	**Mean±SD**
Age	21-44	32.03±6.52
Experience in Operating Room	2-22 (years)	8.43±5.33
Experience in Robotic Surgery	1-9 (years)	3.58±1.90
Characteristics	**n**	**%**
Gender		
Female	72	80
Male	18	20
Marriage		
Single	47	52.2
Married	43	47.8
Education		
Vocational School of Health Services	14	15.6
Associate degree	9	10
Undergraduate degree	54	60
Postgraduate degree	13	14.4
The City		
İstanbul	46	51.2
Ankara	16	17.8
Antalya	8	8.9
İzmir	8	8.9
Kocaeli	4	4.4
Sakarya	3	3.3
Adana	2	2.2
Erzurum	3	3.3
Hospital Type		
Private Hospital	33	36.7
University Hospital	15	16.7
Faculty of Medicine Hospital	6	6.7
Training and Research Hospital	31	34.4
City Hospital	5	5.6

SD: Standard deviation

It was stated that 65.6% of the nurses had RS nurse selection criteria in their hospital, personal characteristics were the most common (64.4%) selection criteria for RS nurses, and the referral of the managers was the most common (75.6%) reason for choosing RS nursing. Urological surgery was found to be the most (88.9%) common RS field of work for nurses. A total of 50% of the nurses stated that they received education about RS, about half of those got education from the distributor company of the robots and the other half from the hospital, while 56.7% of them reported not having education certificate, and there was no regular education program on RS in their hospitals (Table 2).

While 50% of the nurses stated that the roles of the RS nurse were not clear, 58.9% stated not having a written procedure and 56.7% did not have flow charts/checklists during the RS. While 44.4% of the nurses consider their level of knowledge about RS nursing partially sufficient, 76.7% of them stated feeling anxious during the RS, and 42.1% of those did feel anxious frequently, 63.3% of the nurses feel anxious when the robot gives a fault. A total of

38.9% of the nurses stated having problems frequently during the RS, 37.8% of the nurses stated the roles and responsibilities were not defined clearly, 35.5% stated lack of knowledge, 31.1% lack of personnel, and 66.6% stated that they received support from distributor company employees when they had problems (Table 3).

Table 2. Occupational Characteristics of Robotic Surgery Nurses.

	N	%
RS nurse selection criteria in the institution		
Yes	59	65.6
No	31	34.4
RS nurse selection criteria*		
Personal characteristics (Being curious, interested, patience)	58	64.4
Operating room experience	41	45.6
Education -Undergraduate	14	15.6
Foreign language (English)	8	8.9
The reason for choosing RS nursing*		
Request/referral of my managers	68	75.6
Own choice	45	50
Request/referral of the surgeon	30	33.9
Lack of competent nurses	17	18.9
Good working conditions	4	4.4
RS branch/branches*		
Urological Surgery	80	88.9
General Surgery	69	76.6
Gynecological Surgery	51	56.7
Cardiovascular surgery	30	33.3
Ear, Nose and Throat Surgery	23	25.6
Thoracic Surgery	20	22.2
Receiving education on RS		
Yes	45	50
No	45	50
Where they received the RS education		
Hospital-in-service training	22	48.8
Distributor company	23	51.2
RS nursing education certificate		
Yes	39	43.3
No	51	56.7
Regular in-service education about RS		
Yes	39	43.3
No	51	56.7

* Multiple options were chosen. RS: robotic surgery

Table 3. Occupational Characteristics of Robotic Surgery Nurses.

	N	%
Determination of the roles of the RS nurse		
Yes	45	50
No	45	50
Written procedures related to RS		
Yes	37	41.1
No	53	58.9
Flowchart/checklists related to RS		
Yes	39	43.3
No	51	56.7
Self-assessment of nurses' RS knowledge		
Sufficient	31	34.4
Insufficient	19	21.1
Partially Sufficient	40	44.4

Table 3. Occupational Characteristics of Robotic Surgery Nurses (Continue).

	N	%
Feeling anxious during the RS		
Yes	69	76.7
No	21	23.3
How often do you feel anxious during the RS?		
Often	29	42.1
Sometimes	24	34.7
Rarely	16	23.2
Causes of anxiousness during the RS*		
Failure of the robot	57	63.3
Expecting the technical problem solutions from the nurse	40	44.4
Not knowing English	16	17.7
Robot being jammed	45	50
The risk of patient safety violation	31	34.4
The risk of asepsis violation	18	20
Not knowing the parts of the robot	13	14.4
The frequency of experiencing problems during RS		
Often	35	38.9
Sometimes	22	24.4
Rarely	12	13.3
Never	21	23.3
Causes of problems during the RS *		
Lack of knowledge about robotic surgery	32	35.5
The roles and responsibilities are not defined	28	37.8
Shortage of staff	21	31.1
English language deficiency	19	21.1
Shortage of equipment	10	11.1
Unsuitable working conditions	11	12.2
Insufficient team communication	14	15.5
Failure of the robot	4	4.4
Resources of support for solving issues during the RS *		
Distributor company employees	60	66.6
Senior RS nurse	39	43.3
Surgeon	16	17.7
Charge Nurse	7	7.7
Other nurses	3	3.3

* Multiple options were chosen. RS: robotic surgery

There was a statistically significant difference between the nurse's educational status of RS nurses according to age group (p=0.001), who did not receive regular educational program in their hospital (p=0.019), who did not have written procedures related to RS (p=0.001) and who had partially sufficient knowledge about RS nursing (p=0.000). There was no statistically significant difference between other variables (p>0.05) (Table 4).

There was a statistically significant difference between the RS nurses' feeling anxious during surgery according to age groups (p=0.046), gender (p=0.005), and marital status (p=0.013), regular educational program in their hospital (p=0.022), had flow charts/checklists related to RS (p=0.010), had partially sufficient knowledge about RS nursing (p=0.038), experiencing problem during RS (p=0.007). There was no statistically significant difference between the other variables (p>0.05) (Table 5).

4. DISCUSSION

Robotic surgery is an up-to-date technology benefiting the ever-evolving health sciences. It is normal to expect RS nurses that have primary responsibilities in the use of this

Table 4. Comparison of Robotic Surgery Nurses Educational Status and Some Variables.

	Receiving education about RS				
	Yes		**No**		**Test and**
	N	**%**	**N**	**%**	**Significance**
Age					
21-32 years	17	37.8	32	71.1	X^2=10.080
33-44 years	28	62.2	13	28.9	**p=0.001**
Gender					
Female	34	75.6	38	84.4	X^2=1.111
Male	11	24.4	7	15.6	p=0.292
Marriage					
Single	25	55.6	22	48.9	X^2=0.401
Married	20	44.4	23	51.1	p=0.527
Education					
Vocational School of Health Services	10	22.2	4	8.9	p*=0.065
Associate degree	7	15.6	2	4.4	
Undergraduate degree	23	51.1	31	68.9	
Postgraduate Degree	5	11.1	8	17.8	
Regular in-service education about RS					
Yes	25	55.6	14	31.1	X^2=5.475
No	20	44.4	31	68.9	**p=0.019**
Written procedures related to RS					
Yes	26	57.8	11	24.4	X^2=10.326
No	19	42.2	34	75.6	**p=0.001**
Flowchart/checklists related to RS					
Yes	21	46.7	18	40	X^2=0.407
No	24	53.3	27	60	p=0.523
Self-assessment of nurses' RS knowledge					
Sufficient	26	57.8	5	11.1	X^2=22.799
Insufficient	8	17.8	11	24.4	**p=0.000**
Partially Sufficient	11	24.4	29	64.4	
Experiencing problems during RS					
Yes	32	71.1	37	82.2	X^2=1.553
No	13	28.9	8	17.8	p=0.213
Feeling anxious during the RS					
Yes	32	71.1	37	82.2	X^2=1.553
No	13	28.9	8	17.8	p=0.213

*Fisher's Exact Test

Table 5. Comparison of Robotic Surgery Nurses Feels Anxious and Some Variables.

	Feeling anxious during the RS				
	Yes		**No**		**Test and**
	N	**%**	**N**	**%**	**Significance**
Age					
21-32 years	41	59.4	8	38.1	X^2=4,952
33-44 years	28	40.6	13	61.9	**p=0.046**
Gender					
Female	58	84.1	14	66.7	X^2=8.000
Male	11	14.7	7	46.7	**p=0.005**
Marriage					
Single	41	59.4	6	28.6	X^2=6.141
Married	28	40.6	15	71.4	**p*=0.013**
Education					
Vocational School of Health Services	10	14.5	4	19.0	p*=0.968
Associate degree	7	10.1	2	9.5	
Undergraduate degree	42	60.9	12	57.1	
Postgraduate Degree	10	14.5	3	14.3	

*Fisher's Exact Test

Table 5. Comparison of Robotic Surgery Nurses Feels Anxious and Some Variables (Continue).

	Feeling anxious during the RS				
	Yes		No		Test and
	N	%	N	%	Significance
Regular in-service education about RS					
Yes	28	40.6	11	52.4	X^2=3.913
No	41	59.4	10	47.6	**p=0.022**
Written procedures related to RS					
Yes	26	37.7	11	52.4	X^2=1.437
No	43	62.3	10	47.6	p=0.231
Flowchart/checklists related to RS					
Yes	27	39.1	12	57.1	X^2=2.127
No	42	60.9	9	42.9	**p=0.010**
Self-assessment of nurses' RS knowledge					
Sufficient	21	30.4	10	47.6	X^2=3.028
Insufficient	14	20.3	5	23.8	**p*=0.038**
Partially Sufficient	34	49.3	6	28.6	
Experiencing problems during RS					
Yes	53	76.8	16	76.2	X^2=4.028
No	16	23.2	5	23.8	**p=0.007**

*Fisher's Exact Test

technology to be curious about and interested in technology, open to learning, highly educated, and experienced (16). In this study, the most common reasons for choosing to be an RS nurse were stated as the request/referral of the managers and the surgeon and the shortage of competent nurses in the field. Although selection criteria have been set in institutions, it is believed that these selection criteria are not given much attention. It is stated that it is important to choose only willing and experienced people in the selection of RS nurses, otherwise coping with the stress and difficulties encountered in the RS process might be challenging (4, 9).

In this study, 50% of RS nurses were found not to receive any education on RS, 56.7% did not have a certificate related to RS, their hospital did not organize any in-service training on RS, and most of the educational programs were given to surgeons only. In our country, it is also thought that the education of RS nurses is not prioritized, and learning among nurses occurs more through a master-apprentice relationship. The fact that the international RS nursing education is held in English might be a significant obstacle to the participation of Turkish nurses in the courses. Providing the competency programs in the country's language after creating the RS nursing training standards can be more effective in learning. A qualitative study conducted with RS nurses reported that there were not enough educational programs or educational opportunities for nurses on RS (13). RS nurses have been experiencing restrictions regarding up-to-date information, education programs, and learning opportunities about RS (17). In another qualitative study, RS nurses were found to learn by observing experienced nurses through the master-apprentice relationship since they did not receive orientation and practice training for postgraduate RS training, and they considered themselves inadequate in regards to training (9). RS involves specific nursing responsibilities in the operating room, for example, robotic set-up, calibration, and draping, as well as administrative issues of optimal scheduling of robotic procedures and timely instrument procurement. Given these additional responsibilities, additional nursing education is necessary to maintain a successful program (8, 18).

In this study, more than half of RS nurses stated that the hospitals did not have procedures, flowchart/checklist about RS. Almost half of nurses considered themselves as partially sufficient. In addition to providing legal assurance, the creation of nurse registration forms specific to RS also helps to solve issues related to the ambiguity of nurses' roles and lack of technical knowledge (19). The procedures to be created regarding the responsibilities of the nurse should include the installation and operating instructions of the robotic system, its calibration, and draping of the patient, patient safety, evaluation of the patient before and after the surgery (20, 21). Since RS is a current and newly developing field, it is important to develop care standards and share information that will create resources in this field to eliminate the lack of technical knowledge and role ambiguities. Nurses have been noted to play a key role in the creation of these resources, and it is recommended to create education programs that cover all RS team members (21, 22).

In this study, most RS nurses stated that they felt anxious during the RS procedures, and the most common causes of anxiousness were the robot giving fault and being jammed, the solution of technical problems is being expected from the nurse and the risk of violating patient safety. Technical fault and lack of technical knowledge in the robot during surgery were the commonly reported problems that cause RS nurses to feel scared and, in this case, they were worried about harming the patient (9, 12).

In this study, among the nurses, those who were young, female, not married, those who find their level of knowledge insufficient, who experienced problems in the RS were found to feel anxious more during the RS procedures. Besides, RS nurses who did not receive regular in-service education program and haven't institutional procedures and instructions in their hospitals were stated that they feel anxious more during the RS procedures. It is thought that transferring the younger or inexperienced operating room nurses to RS without them gaining enough experience in traditional surgery may lead to difficulties and stress in the management of the crisis that might happen during the surgeries. In the literature, lack of knowledge is one of the important factors causing anxiousness (5,23). The functioning of the RS process, the lack of self-confidence regarding its technical structure, and the lack of institutional instructions increase the anxiousness in nurses. It is stated that the organization of orientation programs during the RS nursing education process will effectively facilitate the adaptation of nurses and improve employee and patient safety. To improve the quality of care and promote efficient teamwork, nurses need to receive the necessary training to make the best use of these new technologies. There is a need for universal standardized education and certification programs for surgical teams involved in RS (4,6,24). Creating algorithms for the procedures to be followed in the RS process in emergencies, developing procedures for all emergencies, and including these in the training content is recommended (22). Nurses can encounter technological stress that stems from various surgical technologies (25). Nurses should have a thorough understanding of robotic procedures, including how to troubleshoot during robotic malfunctions to maintain a high standard in perioperative nursing and to ensure maximum patient safety (15, 24).

Limitations

This study has some limitations. Since the study was conducted in a multicentre, it was difficult to reach all RS nurses. Conducting the surveys online limits the accuracy of the nurses.

Focus groups and in-depth interviews in studies and direct observation of RS nurses' practices may be more descriptive approaches to determine the general situation of RS nurses regarding the surgical method.

Although the study has limitations, it contains important data for Turkey. It may be a reference for national and institutional policies to be made for RS nursing and contains new suggestions and results for future studies on this subject.

5. CONCLUSION

In this study, more than half of the RS nurses were found to have problems during the RS procedures, and the most common problems were reported to be the lack of knowledge about RS, the roles and responsibilities not being defined, the shortage of staff and English language deficiency. RS nurses have important responsibilities in overcoming technology-related challenges. In terms of adaptation to technological innovations, nurses should be supported with orientation and educational programs in the RS learning process. RS education programs can be effective in facilitating nurses' adaptation, reducing anxiety, increasing work performance and improving employee satisfaction and patient safety. Protocols and professional guidelines at institutional and national level are recommended to eliminate ambiguity regarding the role of RS nurses.

Ethical Consideration of the Study

Ethical approval was obtained from the Ethics Board of a University to conduct the research (Date:2020 and Decision No:06/09).

Conflict of Interest Statement

The authors declared that there is no conflict of interest.

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