Nurses' Attitudes Toward Caregiving Roles and Views on the Use of "Robot Nurses": A Cross Sectional Study During the COVID-19 Pandemic

Hemşirelerin Bakım Verme Rollerine İlişkin Tutumları ve "Robot Hemşirelerin" Kullanımına İlişkin Görüşleri: COVID-19 Salgını Sırasında Kesitsel Bir Çalışma

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Abstract

Aim: This study aimed to determine the nurses' attitudes toward caregiving roles and views on the use of robot nurses during the COVID-19 pandemic.

Method: This descriptive and cross-sectional study was conducted with nurses providing care COVID-19 patients. The data were collected through an online survey using a sociodemographic form, a COVID-19 care form, and the Attitude Scale for Nurses in Caregiving Roles.

Results: The total score on the Attitude Scale for Nurses in Caregiving Roles was 66 (SD=9.10); the scores on the self-care, safety, and treatment subscales were 4.06 (SD=0.65), 4.12 (SD=0.63), and 4.35 (SD=0.63), respectively. More than half of the nurses preferred the use of robot nurses to reduce the workload and the risk of severe infections.

Conclusion: Even during the COVID-19 pandemic, nurses adopted caregiving roles and nursing robots could be used as a support to improve the quality of care.

Keywords: Caregiving role, nurse, robotics, robot nurse.

Öz

Amaç: Bu çalışmanın amacı, COVID-19 salgını sırasında hemşirelerin bakım verme rollerine ilişkin tutumlarını ve COVID- robot hemşire kullanımına ilişkin görüşlerini belirlemektir.

Yöntem: Tanımlayıcı ve kesitsel tipte olan bu çalışma, COVID-19 hastalarına bakım veren hemşireler ile gerçekleştirilmiştir. Veriler, sosyo-demografik form, COVID-19 bakım formu ve Hemşirelerin Bakım Verici Rollerine İlişkin Tutum Ölçeği kullanılarak çevrimiçi bir anket oluşturularak toplanmıştır.

Bulgular: Çalışmada, Hemşirelerin Bakım Verici Rollerine İlişkin Tutum Ölçeği'nden alınan toplam puan 66 (SS=9,10); öz bakım, koruma ve tedavi alt ölçeklerinden alınan puanlar sırasıyla 4,06 (SS=0,65), 4,12 (SS=0,63) ve 4,35 (SS=0,63) olarak bulunmuştur. Hemşirelerin yarısından fazlası iş yükünü ve ciddi enfeksiyon riskini azaltmak için robot hemşireleri kullanmayı istediğini belirtmiştir.

Sonuç: COVID-19 salgını sırasında hemşirelerin bakım verme rollerini benimsediği görülmüştür. Robot hemşirelerin iş yükünü ve ciddi enfeksiyon riskini azaltmak için kullanılmasının dijitalleşen dünyada bakımın kalitesini artırmada destekleyici olabileceği düşünülmektedir.

Anahtar Sözcükler: Bakım verici rol, hemşirelik, robotic, robot hemşire.

Introduction

The novel coronavirus (COVID-19) is highly contagious and caused a global pandemic (Wu et al., 2020). Although the local health authorities issued an epidemic alert, the disease rapidly spread worldwide and became a major healthcare problem (Xu et al., 2020). Healthcare systems of countries have been inadequate in managing the COVID-19 outbreak (Yildirim et al., 2022). Healthcare providers were the frontline workers in containing the outbreak. In clinics and intensive care units, patients with COVID-19 were managed through high-quality and close-contact care provided by nurses (Ibrahim et al., 2022).

In 2020, the "Year of the Nurse and Midwife", stories of selfless care provided by nurses during the COVID-19 pandemic, as well as the burden of care for COVID-19 patients emerged. Cases of COVID-19 increased the nursing care workload, and nurses were exposed to significant challenges related to burnout, maintaining the required number of staff, retaining nurses, and job dissatisfaction (Nie, Su, Zhang, Guan, & Li, 2020). In the COVID-19 patient care units, unsafe facilities, insufficient personal protective equipment, and unknown conditions of patients increased anxiety and depression (Doo, Kim, Lee, Lee, & Lee, 2021; Çakıcı, Avşar, Çalışkan, 2021). Moradi et al. reported that the challenges of providing care to COVID-19 patients by nurses included the "organization's inefficiency in supporting nurses", "physical exhaustion", "living with uncertainty", and "psychological burden of the disease" (Moradi, Baghaei, Hosseingholipour, & Mollazadeh, 2021). Another study found that the main complaints of nurses during the pandemic were moderate-to-severe burnout, emotional exhaustion, depersonalization, and low personal accomplishment (Jose, Dhandapani, & Cyriac, 2020). Akkuş et al. found that the problems of nurses were related to psychosocial adaptation, protection, and difficulties in care and treatment, access to information, and working conditions during the pandemic (Akkuş, Karacan, Güney, & Kurt, 2021).

Despite numerous challenges, nurses fulfill their care roles and responsibilities 24/7 (Çakıcı, Avşar, Çalışkan, 2021). Since the Florence Nightingale, nurses have assumed the role of providing care in extraordinary situations because nurses have adapted to the pandemic-related conditions in a short time and keep providing healthcare to patients safely and following patients' individual needs. Increasing patient care burdens and difficulties may negatively affect nurses' caregiving roles (Fourie, McDonald, Connor, & Bartlett, 2005). In addition, the fear of contamination and death under pandemic conditions may negatively affect the caregiving roles of nurses (Kaplan et al., 2021). Yıldırım et al.'s study suggests that the COVID-19 pandemic has a negative impact on nurses' caregiving roles and attitudes (Yildirim et al., 2022).

The crisis-creating pandemic has brought a worldwide search for effective solutions, as it has placed an unprecedented burden on all healthcare professionals worldwide (Hiçdurmaz & Üzar-Özçetin, 2020). Some countries have turned to developing technology and used robot nurses to support the protection of nurses who care for patients infected with COVID-19 (Yang et al., 2020). Several collaborative robots developed and used during COVID-19 were able to perform certain routine duties of a nurse, such as recording vital signs from the bedside monitor and transferring data collected from patients to the healthcare team (Dickens & Cook, 2006; Lin, Abney, & Bekey, 2011; Sharkey & Sharkey, 2012). A study examined the attitude of nurses toward the utility of robots as negative in managing the COVID-19 outbreak (Taryudi et al., 2022). The other study reported that nurses had a negative attitude toward the use of robots for nursing care activities, but a generally positive attitude toward their use for service, monitoring, and communication tasks (Sharts-Hopko, 2014). Understanding nurses' views on robotics can help integrate them into patient care, and robots can be developed according to the cultural views of countries. In Türkiye, nurses provided care for COVID-19 patients, robots were not used, and nurses were at a high risk of contracting the disease, which could affect their caregiving role. On the one hand, nurses' views on the use of robots and the caregiving roles they attribute to robots were a matter of curiosity; on the other hand, how were the attitudes of nurses toward their caregiving roles affected under pandemic conditions?

Method

Study Aim and Desing: This study was conducted to determine nurses' views on the use of robots and the caregiving roles they attribute to robots, as well as nurses' attitudes toward their caregiving roles, under pandemic conditions.

Study Sample and Implementation: We conducted a cross-sectional study with 64 nurses caring for COVID-19 patients. The research data were collected using the snowball sampling method due to the pandemic-related measures, resulting in a small sample size. The data were collected through an online survey through using a sociodemographic form, a COVID-19 care form, and the Attitude Scale for Nurses in Caregiving Roles.

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The snowball sampling method was used to contact the nurses. Due to the COVID-19 pandemic quarantine and isolation measures, the snowball sampling method was suitable for this study (Leighton, Kardong-Edgren, Schneidereith, & Foisy-Doll, 2021). The researcher contacted the nurses (COVID-19 care services and intensive care) and sent them the forms via WhatsApp®, Facebook®, and Instagram®. The nurses then communicated with other nurses via WhatsApp®, Facebook®, and Instagram®.

Inclusion criteria for the study:
• Providing care for patients diagnosed with COVID-19
• Nurses who volunteered to participate in the study

Exclusion criteria for the study:
• Not providing care for patients diagnosed with COVID-19
• Not volunteering to participate in the study.

The Ministry of Health granted written permission to conduct the study. Ethical approval was obtained from the Hospital Ethics Committee. This study followed the guidelines of the Declaration of Helsinki proposed in 1975 and revised in 1986. All nurses provided informed consent via Google Forms. This study followed the STROBE guideline.

Instrument: The data collection forms (Google Forms) included the Sociodemographic Form, the COVID-19 Care Form, and the Attitude Scale for Nurses in Caregiving Roles.

The Sociodemographic Form: This form was developed based on previous studies to determine the sociodemographic characteristics of the nurses. The form included seven questions about the sociodemographic data (age, education, employment status, occupation, number of children, and chronic disease status) of the patients.

The COVID-19 Care Form: The form included seven questions and was created based on previous studies to determine the fear of transmitting COVID-19 infection, contracting COVID-19 infection, or death, or opinions on using robot nurses to provide care to COVID-19 patients (Dickens & Cook, 2006; Lin et al., 2011; Sharkey & Sharkey, 2012; Xu et al., 2020; Yang et al., 2020).

The Attitude Scale for Nurses in Caregiving Roles: The Attitude Scale for Nurses in Caregiving Roles (ASNCR) was developed by Kocak, Albayrak, and Duman (2014). The scale determined the level of nurses' caregiver roles based on a five-point Likert-type rating with 16 items. The scale had three subscales, which included 'attitude toward nurses' self-care needs and counseling role' (self-care), 'attitude toward nurses's role in protecting individuals and respecting their rights' (safety), and 'attitude toward nurses' role in the treatment process' (treatment) (Koçak, Albayrak, & Büyükkayacı Duman, 2014). The Cronbach's alpha value was 0.906, and the KMO value was 0.887.

Study Procedure: The participants were contacted online through social media platforms, including WhatsApp®, Facebook®, and Instagram®. Interested nurses clicked on the link, opened the information about participating in the study, and clicked on the option to continue if they wanted to participate. The Sociodemographic Form, the COVID-19 Care Form, and the Attitude Scale for Nurses in Caregiving Roles took approximately 8−20 minutes to complete. All answers were collected via Google Forms and recorded by a researcher on an encrypted computer to ensure data security. The participants were free to withdraw from the study whenever they desired by closing the link to Google Forms without giving any explanation.

Data Analysis: The data were analyzed using IBM Statistical Package for Social Sciences (SPSS), Version 23 (Armonk, NY: IBM Corp., 2015). The categorical variables were presented as numbers and percentages, and the continuous variables were presented as means and standard deviations. The data obtained from the 64 nurses ($n > 30$) were analyzed using nonparametric tests (the Kolmogorov-Smirnov coefficient was 0.2 for the total score on the Attitude Scale for Nurses in Caregiving Roles). Linear relationships between continuous variables were determined by the *Mann−Whitney U* test, which was used to analyze nonparametric data. All differences between and within groups were considered to be statistically significant at $P < 0.05$.

Ethical Considerations: Ethical approval was given by Ankara City Hospital No. 1 Clinical Research Ethics Committee (E1-20-710/28.05.2020). The nurses gave written informed consent. They were assured of the confidentiality of the data collected from them.

Results

Table 1. The descriptive findings attitude scale for nurses in caregiving roles (N=64)

	Mean (SD)	Median (Min-Max)
Self-care	4,06 (0,65)	4,0 (2,29−5)
Safety	4,12 (0,63)	4,10 (1,60−5)
Treatment	4,35 (0,63)	4,25 (1,25−5)
ASNCR	66 (9,10)	64,5 (29−80)

The mean age of the nurses was 30.35 (SD=8.53) years (19−52); most participants were female (78.1%) and single (54.7%). In total, 59.4% of the nurses were working in city hospitals (clinics), and 26.6% were living away from home. Our results showed that 85.9% of the nurses had a fear of COVID-19 infection, 95.3% had a fear of transmitting COVID-19 infection, and 48.1% had a fear of dying. In the ASNCR, the nurses had a high total score (Mean=66, SD=9.10) (Table 1). The mean score on the self-care subscale was 4.06 (SD=0.65), the safety subscale was 4.12 (SD=0.63), and the treatment subscale was 4.35 (SD=0.63) (Table 1).

Table 2. Attitude scale for nurses in caregiving roles scores according to the variables (N=64)

Variable		N	ASNCR*	Self-care*	Safety*	Treatment*
Fear from Covid 19 infection transmission	Yes	61	32,23	32,11	32,34	32,30
	No	3	38,00	40,33	35,67	36,50
	Test and significance		$Z = -0,525$ $P = 0,600$	$Z = -0,750$ $P = 0,453$	$Z = -0,304$ $P = 0,761$	$Z = -0,388$ $P = 0,698$
Fear from Covid 19 infection	Yes	55	31,86	31,5	32,57	32,40
	No	9	36,39	38,61	32,06	33,11
	Test and significance		$Z = -0,677$ $P = 0,498$	$Z = -1,067$ $P = 0,286$	$Z = -0,078$ $P = 0,938$	$Z = -0,108$ $P = 0,914$
Fear from dead	Yes	31	32,90	30,37	38,71	32,89
	No	33	32,12	34,50	26,67	32,14
	Test and significance		$Z = -0,168$ $P = 0,866$	$Z = -0,891$ $P = 0,373$	$Z = -2,608$ $P = 0,009**$	$Z = -0,164$ $P = 0,870$
Opinion for using robotics	Yes	61	32,23	32,11	32,34	32,30
	No	3	38,00	40,33	35,67	36,50
	Test and significance		$Z = -0,525$ $P = 0,600$	$Z = -0,750$ $P = 0,453$	$Z = -0,304$ $P = 0,761$	$Z = -0,388$ $P = 0,698$

*Mean Rank, **$p<0.01$

Comparing the scores on the Attitude Scale for Nurses in Caregiving Roles according to the variables showed that the ASNCR and self-care, safety, and treatment subscale scores did not differ significantly based on the fear of transmitting the COVID-19 infection, contracting the COVID-19 infection, or death while providing care for COVID-19 patients (Table 2).

When nurses were asked about their opinions on the use of robots, 95.3% of the nurses wanted to use robot nurses. Also, the scores on the attitude scale for nurses in caregiving roles (ASNCR score, self-care, safety and treatment) did not differ significantly based on the opinion on using robots for providing care to COVID-19 patients.
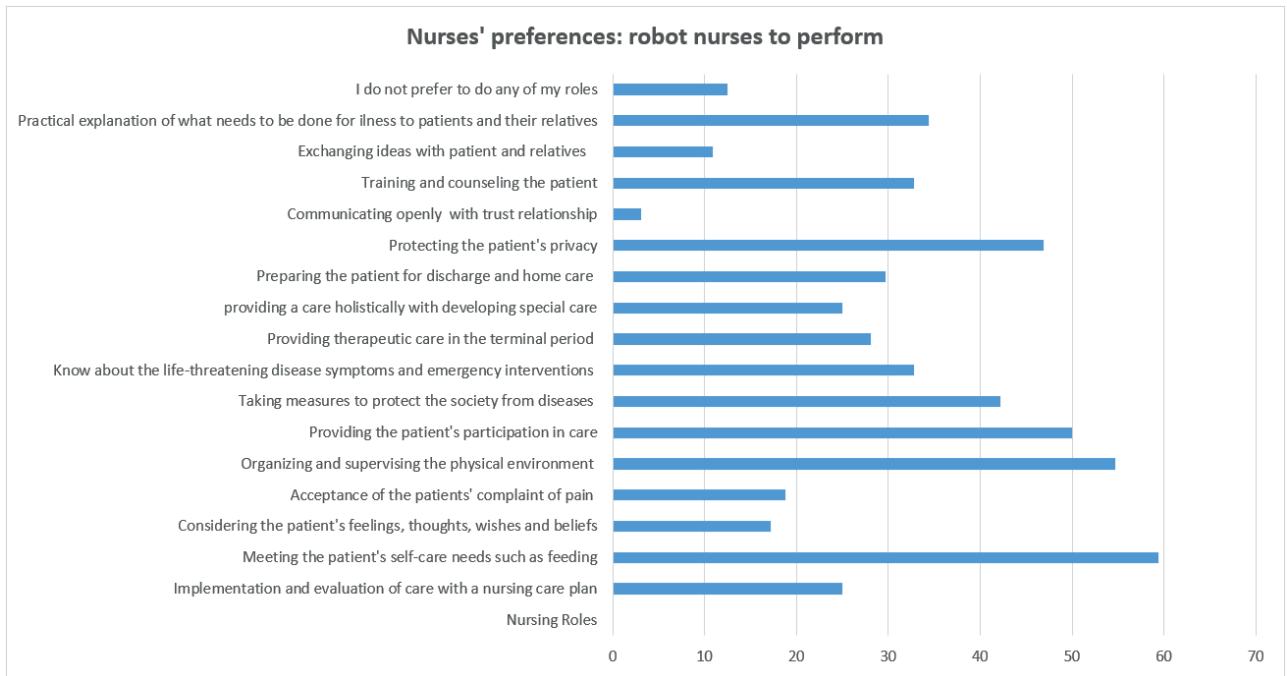
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Figure 1. The preferences of the nurses regarding the tasks to be performed by robot nurses

The nurses preferred assigning some caregiving tasks to the robot nurses during the pandemic. The tasks that the nurses wanted robots to perform (and the percentage of nurses supporting each task) are as follows: "meeting the self-care needs of the patients, such as feeding" (59.4%), "organizing and supervising the physical environment" (54.7%), "providing care to the patients" (50%), "protecting the patient's privacy" (46.9%), "taking measures to protect society from diseases" (42.2%), "explaining to patients and their relatives what needs to be done during illness" (34.4%), "training and counseling patients" (32.8%), "knowing the symptoms of life-threatening disease and emergency interventions" (32.8%), "preparing the patient for discharge and home care" (29.7%), "open communication with a trusting relationship" (28.1%), "providing holistic care by developing special care" (28.1%), "implementing and evaluating care with a nursing care plan" (25%), "receiving complaints from patients regarding pain" (18.8%), "considering the patient's feelings, thoughts, wishes, and beliefs" (17.2%), and "exchanging ideas with patients and relatives" (10.9%). However, 12.5% of the nurses did not want robot nurses to perform any tasks (Figure 1).

Discussion

In this study, we determined the attitudes of nurses toward their caregiving roles and their views on the use of robot nurses during the COVID-19 pandemic.

Nurses' attitudes toward their caregiver roles can be assessed as high because they had a high score on the Attitude Scale for Nurses in Caregiving Roles (ASNCR) during the pandemic. Studies in the literature reported similar high scores for ASNCR (Uzelli Yılmaz et al., 2017; Bakır, 2019; Altınbas & Derya- İster, 2020; Solak, 2021; Yildirim et al., 2022). The altruistic nature of nursing may have contributed to nurses' commitment to their caregiving roles and to the development of positive attitudes in all circumstances. The results showed that the nurses's attitude toward meeting the self-care roles, counseling, protecting the individual, respecting the individual's rights, and their role in the treatment process was positive. In contrast, the study conducted by Taryudi et al. investigated the nurses' attitudes toward the utility of robots and found a negative outlook on their role in managing the COVID-19 outbreak (Taryudi et al., 2022). We also found that the attitude of the nurses toward their caregiving roles (nurse safety, self-care, and treatment) was positive despite fear of transmitting the COVID-19 infection, contracting the infection, and death. Similarly, the study by Bakır et al. found no relationship between nurses' fear of death and their caregiver roles in nurses during COVID-19. Nursing's defense of patients' right to live in a healthy environment and to receive quality nursing care with a holistic and humanistic perspective may have caused caregiver roles to be unaffected by the fear of contamination and death.

Most of the participants preferred using robot nurses while caring for patients with COVID-19. The most preferred tasks for robot nurses included "meeting the self-care needs of the patients, such as feeding", "organizing and supervising the physical environment", and "providing care to the patients". Kang's study reported that the participants emphasized the importance of bidirectional communication as one of the essential functions of a care robot (Kang et al., 2023). In Freeman et al.'s study, the repeatability and reliability of robotic attempts for the IV pump device "continue" button, ventilator knob adjustment, ICU monitor silence, oxygen knob adjustment, and call button deactivation were tested and found to be successful (Freeman et al, 2021). Several studies have also shown that humanoid robots, including *Mitra* (which admitted individuals with COVID-19 symptoms such as fever or cough to the hospital), *Rwanda* (which took vitals, i.e., checked the temperature, monitored the patients, and recorded messages to give feedback to the human healthcare staff, thus decreasing the transmission of the virus), and *Sophia*, (which developed facial gestures, promoted human-machine communication, empathy, and compassion), performed many frontline nursing care activities during the pandemic (Beaubien, 2020; Ozturkcan & Merdin-Uygur, 2021). Few nurses wanted robots to perform tasks such as "considering the patient's feelings, thoughts, wishes, and beliefs". Kang et al.'s study highlighted that care robots "cannot communicate like humans" and that they still have limitations in various abilities, which may lead to communication difficulties and frustration, depending on the type of socially assistive technology (Kang et al., 2023). Therapeutic interaction appeals to the feelings, thoughts, wishes, and beliefs of patients as they can interact with human nurses. Such personal interactions make patients perceive themselves as unique individuals. Service robots are in demand to assist nurses and healthcare workers increase productivity, limit human contact, and replace healthcare workers infected with the coronavirus.

Consequently, nurses preferred robots to perform certain tasks during this period even though they adopted their caregiving role with positive attitude. Beside, the use of robots does not affect nurses' attitudes toward their caregiving roles. A major challenge in this field is accepting and having a positive attitude toward service robots. Many argue that patients cannot achieve these benefits through neutral interactions with "mechanical" or "pre-programmed" robots. As long as people exist, nursing care activities will continue in some form, with or without technological support, so it is important to develop nurses' understanding of robotics (Taryudi et al., 2022).

Limitations: Limitations of this study include a small sample size related to pandemic isolation measures. Second, the study was conducted in one city, and thus, the results cannot be generalized.

Implications for nursing practice: Healthcare systems aimed at improving care quality need to focus on the nursing burden and pandemic challenges. Researchers may want to utilize the study results to develop new strategies to utilize nursing robots. Based on our findings, we argue that the use of humanoid robots to assist with caregiving can greatly benefit the healthcare system. The attitude of these nurses toward their caregiving roles was extremely important in managing patients during the pandemic, therefore nurse leaders can support nurses in pandemic challenges. The use of nursing robots to assist and support nursing care can be seen as an opportunity.

Conclusion

In this study, we found that nurses adopted safety, self-care, and treatment caregiver roles during the pandemic. Fear of transmitting COVID-19 infection, contracting the infection, and dying did not influence the safety, self-care, and treatment caregiver roles of the nurses. More than half of the nurses wanted robot nurses to look after the patients during the pandemic. Based on the findings of this study, we argue that using humanoid robots to perform different tasks and assist with caregiving might benefit the healthcare system.

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