Original Article

Nurses' Perceptions Regarding the Use of Technological Devices in Nursing Care Practices

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Abstract

Aims: The objective of this study is to determine nurses' perceptions regarding the use of technology in nursing care practices.
Background: Issues with the positive and negative effects of the use of technology in the nursing field have not been resolved.
Methods: This is a descriptive cross-sectional survey study. This study was performed from April to June 2017 with 408 nurses who work in a university hospital in eastern Turkey.
Results: Most of the nurses had positive perceptions about the use of technology and did not have negative opinions. A statistically significant difference by gender was determined regarding the perception that use of technology makes nursing care practices patient-centered ($p<0.05$). The number of female nurses who shared this opinion was higher than among the male nurses. A statistically significant difference by age group was determined regarding the perception that the use of technology dehumanises and mechanises nursing-care practices and disrupts patient and nurse communication. ($p<0.05$). This idea was more common among nurses 25–34 years of age compared to those in other groups.
Conclusion: The study showed that nurses hold the opinion that technology increases care practices, prevents loss of work hours and unnecessary labor, facilitates recording information, and ensures the implementation of care practices. Conversely, learning to use technology is a difficult and time-consuming process.
Implications for nursing policy: Nurse managers and hospital policymakers should be placed on supporting, assisting and educating inexperienced nurses and that the use of technology in nursing be given serious consideration.

Keywords: Nursing, Survey, Perceptions, Views on Technology

Introduction

Recent developments in the health care system have contributed to the development of diagnosis and treatment services in hospitals (Price, 2013). The world is being shaped by technology, and the effects of technological development on patient-nurse interaction are gradually increasing (Locsin, 2005).

Theoretical perspectives on the use of new technology in nursing

The interaction between nurses and new information technology as well as digitally controlled clinical technology has been theorised from several perspectives. Technological developments have been seen as an opportunity for nurses to get closer to patients (Bernardo, 1998). Some studies have indicated that the nursing profession has been affected by technological developments (Almerud-Osterberg, 2010; Almerud et al., 2008a; Barnard, 1996; Loscin, 2013). In the literature, there are arguments that technology and nursing are irrelevant to each other and arguments to the contrary (Cooper, 1993; Crocker and Timmons, 2009; Dean, 1998; Price, 2013; Sandelowski, 1999; Walters, 1995). The first point of view asserts that new technologies are dehumanising

and diminish the compassionate, humane patient-care perceptions of the nursing profession (Barnard and Sandelowski, 2001). Technology as a barrier between patients and nurses and its effects on patient-nurse communication (Price, 2013; Wikstrom et al., 2007) and individualised care (Pillar et al., 1990; Rinard, 1996) are among the issues discussed in the literature. Almerud et al. indicated that, despite the advantages of technology in nursing care, it can never take the place of compassionate care by a nurse (Almerud, 2008b). Nurses are obligated to allocate more time to learning information technologies than patient care (Barnard, 2000; West, 2003). It is also said that high-technology environments cause stress for nurses and increase the probability of errors (Pillar et al., 1990).

The opposing point of view is that technology is a means for increasing the quality of patient care (Barnard, 1997). Being regarded as a means, the use of technology can ease many practices that are time consuming for nurses. In this view, technology is a neutral object that is integrated with nursing practices (Smith, 2004) and facilitates problem solving (Barnard, 1997). Technology is seen as necessary for the professionalisation of nursing. Some study results indicate that technology will improve nursing care and make it easier.

According to these studies, technology enhances patient safety, reduces nurses' workloads, and enables them to allocate more time to patients (Price, 2013; Tunlind et al., 2015). Most of the studies on nursing and technology in the literature have been done in high-technology units, such as critical-care units. Their results indicate that most critical-care nurses think that the use of technology in nursing care has no negative effects (Adel et al., 2014; Kanjakaya, 2014; Kiekkas et al., 2006; Laila et al., 2011). In a descriptive study by Adel et al. (2014), critical-care nurses' perceptions about the positive and negative effects of the use of technology in critical care were evaluated (Adel et al., 2014). Most of them expressed positive perceptions about the use of technology.

Problems with the use of technology in nursing have yet to be resolved, and the positive and negative effects of its use on nurses remain inadequately defined (Barnard, 2000). Nurses proudly espouse that they provide "care' in highly technological environments that focus on a 'cure' (Henderson 2006). Although restrained

by various conditions, nurses attempt to achieve patient-centered interactions. This represents a significant challenge facing nursing in the coming decade which will be a key finding balance between technology and the human element (Friganović, 2016).

However, how care is provided in such environments is a matter of debate. Nurses try to provide patient-centered care in a world in which technology is dominant. Technology is inextricably linked to nursing practices, nurses' behaviours, and their goals. Along with the effects of technological developments on nursing care practices, seeking answers to such questions as how the use of technology will affect nursing care processes; whether or not it will cause deviations from core concepts of the nursing profession, such as nursing care; and patient-nurse communication and interaction is the starting point of this study. The essential point in nursing is to determine ways of meeting patients' human needs and to determine how technology can be used to improve patient relationships.

The aim of this study is to explore nurses' perceptions of new technology in relation to their nursing skills, professional autonomy, and experience of work, including their relationships with patients. The study sets out the implications of the new technologies for nurses and their work.

Methods

Study sample and participants

This is a descriptive cross-sectional survey study. Data were collected from April to June 2017 with nurses who work in a university hospital in eastern Turkey. There were 939 nurses at the time of data collection. The study was conducted in a hospital with a 1218 inpatient bed capacity. The hospital complex comprises 5 buildings: the central building, an emergency and traumatology hospital, an oncology hospital, and paediatric and cardiology clinics.

The sample size for the study was determined using a sample-size calculation engine (Sample Size Calculator 2017) that yielded the sample size when the population and margin of error were entered. According to the sampling calculation for a known population, a sample size of 273 with a 5% confidence interval was calculated. To increase the reliability of the data, the research was completed with 408 nurses who

volunteered to participate and were accessible on the dates of the research.

Data Collection

Socio-demographic Information Form

This form was prepared by the researchers in accordance with the literature (Adel et al., 2014; Gough et al., 2014; McGrath, 2008; Alasad, 2002; Barnard, 2000). It has four questions about the sociodemographic characteristics of nurses, such as age, gender, work unit, and education level.

Nurses' Perception Survey

This survey was prepared in accordance with the literature (Adel et al., 2014; Gough et al., 2014; McGrath, 2008; Alasad, 2002; Barnard, 2000). It includes 12 questions about nurses' perceptions regarding the positive and negative effects of the use of technology in patient-care practices. It uses a 4-point Likert-type scale with the responses: agree, partially agree, neutral and disagree. Examples of the positive effects of technology are that it reduces the loss of workforce and makes nursing-care practices easier. The negative effects of technology are that it is hard to learn, time consuming, and disruptive to patient-nurse communication and interaction.To ensure the internal validity of the survey, it was evaluated by three nurse specialists, and their feedback was obtained. Afterwards, a pilot test was done with 30 nurses. After the pilot test, the survey was revised for necessary changes. Data from the pilot test were not included in the study. In the data collection phase, the technological devices was defined to the participants. Participants were asked to answer all questions by considering all the technological devices used in the clinic (For example, monitors, IV pumps, electronic medical records, telehealth, voice-activated equipment, EKG machines, ventilators, etc.).

Data Analysis The data were analysed using SPSS 16 numbers, and percentage values were used for analysis of descriptive data. The chi-square test was used to examine the relationship between the nurses' demographic and occupational characteristics and their views on the use of technology in care practices; $p<0.05$ was considered statistically significant.

Ethical Considerations: Written permission for this study was obtained from the noninterventional clinical studies ethical committee of a university hospital in eastern Turkey (No: 2017/99). The institution's permission and written permissions from the nurses were also obtained.

Results

Nurses' perceptions regarding the use of technological devices in nursing-care practices are shown in two tables. As Table 1 shows, 48.0% of the nurses in the study were aged 25–35, 64.5% were female, 72.5% had university degrees or higher, and 56.6% worked as clinical nurses. Table 2 shows the nurses' perceptions regarding the use of technological devices in nursing-care practices. A statistically significant difference was found by gender regarding the perceptions that using technology makes nursing care practices patient centered ($p<0.05$). More female nurses than male nurses held this perception. A statistically significant difference by age group of the participants was found regarding the perceptions that the use of technology dehumanises or mechanises nursing care practices or disrupts patient and nurse communication ($p<0.05$). Further analysis revealed that the difference originated from the nurses aged 25–34 years because they did not agree that technology dehumanises or mechanises nursing-care practices or disrupts patient and nurse communication ($p<0.05$). There was no statistically significant difference in using technology to provide care in terms of the clinics where the nurses work or of their educational levels. ($p|>0.05$).

Table 1.The Sociodemographic Attributes of the Nurse Participants (n=408)

Sociodemographic Attributes	Number	%
Age		
<25	159	39.0
25-34	196	48.0
35>	53	13.0
Gender		
Female	263	64.5
Male	145	35.5
Educational Level		
High School	112	27.5
University and Higher	296	72.5
Clinic		
Clinic	231	56.6
Critical Care	119	29.2
Operating Room	22	5.4
Emergency Services	13	3.2
Other	23	5.5

Table 2. Nurses' Perception Regarding The Use of Technological Devices ın Nursing Care Practices (n=408)

	Agree n (%)	Partially Agree n (%)	Neutral n (%)	Disagree n (%)
Using technology makes nursing care practices patient-specific	160 (39.2)	173 (42.4)	37 (9.1)	38 (9.3)
Using technology saves time in nursing care	196 (48.0)	165 (40.4)	23 (5.6)	24 (5.9)
Using technology reduces manpower loss in nursing	186 (45.6)	166 (40.7)	31 (7.6)	25 (6.1)
Using technology enhances the quality of nursing care practices	184 (45.1)	171 (41.9)	28 (6.9)	25 (6.1)
Using technology facilitates record keeping for nursing care practices	214 (52.5)	151 (37.0)	27 (6.6)	16 (3.9)
Using technology make nursing care practices easier	182 (44.6)	169 (41.4)	32 (7.8)	25 (6.1)

Using technology facilitates the evaluation of nursing care practices	178 (43.6)	172 (42.2)	32 (7.8)	26 (6.3)
Technical devices are hard to learn how to use and time consuming	74 (18.1)	139 (34.1)	87 (21.3)	108 (26.4)
Using technology mechanizes nursing care practices	68 (16.7)	105 (25.7)	107 (26.2)	128 (31.4)
Using technology disrupts patient and nurse communication	41 (10.0)	82 (20.1)	64 (15.7)	221 (54.2)
Using technology disrupts patient and nurse interaction	42 (10.3)	85 (20.8)	57 (14.0)	224 (54.9)
Using technology dehumanizes nursing care practices	51 (12.5)	67 (16.4)	63 (15.4)	227 (55.7)

Discussion

The studies of nursing and the use of technology in our country focus on informatics and information technologies (Bilgic & Sendir, 2014; Ay, 2009). In this study, apart from existing knowledge, nurses' perceptions about the use of technology in nursing-care practices were determined. The nurses expressed positive perception about the use of technology in nursing-care practices.

Technology and age and gender

In a study by Mary McGrath (2008), experienced nurses stated that they can overcome the negative effects of technology in intensive care (Mary McGrath, 2008). They also indicated that the use of technology is not easy, but it is hard work that requires competence and can cause difficulties for novice nurses in providing care. In a study by Bagherian et al. (2017), young and less-experienced nurses had negative perceptions about technology's effects on nursing care (Bagherian et al., 2017). The negative ideas about technology were based on the assumption of lack of knowledge, clinical guidance, and continuing education. In this study, nurses aged 25–34 had the perceptions in the direction that technology does not dehumanise or mechanise nursing-care practices or disrupt patient and nurse communication. As the nurses became older, their experiences related to use of technology increased accordingly. In a study by Bagherian et al. (2017), female nurses expressed positive perceptions about the use of technology

in healthcare (Bagherian et al., 2017). As seen in the literature, this study found that more female than male nurses thought that using technology makes nursing-care practices patient centered.

Technology and work unit

Most of the world's studies of nursing and technology have been done in critical-care units, (Adel et al., 2014; Kanjakaya, 2014; Kiekkaset al., 2006; Laila et al., 2011), probably because there is more use of high technology in critical care units. However, now the world is being shaped by technology, and technological practices are more frequently used in patient care by nurses in all kinds of units. Therefore, nurses' perceptions about the use of technology in clinics other than critical-care units is a gap in the field. Thus, our study also determined the views of nurses who were not working in critical-care units. This study did not find a significant difference in perceptions about the use of technology between critical-care units and other clinics. Whether or not the nurses worked in intensively technological environments did not affect their positive perceptions about technology. This result supports our argument that technological practices are more frequently used in patient care, and its use in clinics other than critical care units is gradually increasing.

Technology and time and workforce

Nurses are generally satisfied with technology and have positive attitudes about it (Waneka & Spetz, 2010). In a study of critical care nurses by Gough et al. (2014), the nurses stated that

technology strengthens their autonomy and speeds up and eases their work in the clinics where technology is used less often (Gough et al., 2014). Whereas the result of our study is consistent with the literature, the nurses in our study stated that the use of technology saves time and reduces the loss of workforce.

Technology and caring

In a study by Alasad (2002), nurses reported that technology management skills are a fundamental component of being a critical-care nurse (Alasad, 2002). They also indicated that their technology management skills emerge with experience, that the use of technology is among their daily routines, and that technological practices are more important than other nursing practices. Gough et al. (2014) indicated that when nurses do not receive adequate education about the use of a new information technology, this technology increases their workload and reduces patient-nurse interaction (Gough et al., 2014).

In this study, most of the nurses agreed that learning how to use technological devices is difficult and time consuming, but they stated that when learned, technological devices prevent loss of work hours and labor force. However, most of the nurses had perceptions that differ from those reported in the literature. These perceptions were that using technology does not lead to the mechanisation of nursing care practices, interrupt patient and nurse communication and interaction, or dehumanise nursing care practices. This difference may be due to having a high number of participants and determining the perceptions of nurses working in different clinics.

Limitations

The first limitation of this research is that these results are valid only for nurses in the hospital where the study was conducted; they cannot be generalised to all the nurses. The research should be carried out in more districts to provide a larger sample. Secondly, although this study examined nurses' perceptions of the use of technology, which is an important result, it remains limited in explaining the effects of the variables of age, gender, educational level, and clinics worked at, which are considered as possibly effective in the use of technology. Variables such as the employment periods of the nurses and the frequency of technology use were not included in the study. Future researchers can revise and improve the question form that was used in this study.

Conclusion

The results of this study contribute to the enlightenment of the use of technology, which is still a subject of debate in the nursing field. The nurses reported that technology increased care practices, prevented loss of work hours and labor force, facilitated recording information, and ensured the implementation of the practices. Conversely, learning to use technology was a difficult and time-consuming process. However, programs for supporting positive approaches of nurses regarding the use of technology and improvement of their motivation must be organised. Training sessions that provide guidance for using technological devices are suggested. Nursing curriculums should include the use of technological devices equipped with technical information and specifications in hospitals by putting great emphasis on application through adequate training.

Implications for nursing and health policy

This study outlines the perceptions of Turkish nurses in theatre interpret their role in terms of caring in a technological environment. The findings of this study have implications for all areas of professional nursing, such as research, practice, management and education. Support is needed for nurses who have difficulty using technology. Nurses who are inexperienced in the use of technology in hospital policies need to be supported by experienced nurses. At the same time management needs to be aware of the fact that all nurses do not function at the same level. For this reason, while planning is done in hospitals, age and gender should be taken into consideration.

References

Adel, L., Mohamed, M,, Ali, M., Sobh, D. (2014) Nurses' perception regarding theuse of technological
devices in critical care units. *IOSR J NursHealth Sci* 3(5):11—8.

Alasad, J. (2002) Managing technology in the intensive care unit: the nurses' experience. *International Journal of Nursing Studies* 39,407–413.

Almerud, S., Alapack, R. J., Fridlund, B., & Ekebergh, M. (2008a). Beleaguered by technology: care in technologically intense

environments. Nursing Philosophy, 9(1), 55-61.

Almerud-Österberg, S. (2010). Visualism and technification—The patient behind the screen. *International Journal of Qualitative Studies on Health and Well-Being*, 5(2),1-6.

Ay, F. (2009). International electronic patient recording systems, nursing practices and computer relations. Gulhane Medical Journal, 51 (2), 131-136.

Barnard A (2000) Alteration to will as an experience of technology and nursing. Journal of Advanced Nursing 31, 1136–1144.

Barnard, A. (1996). Technology and nursing: an anatomy of definition. *International Journal of Nursing Studies*, 33(4), 433-441.

Barnard, A. (1997). A critical review of the belief that technology is a neutral object and nurses are its master. *Journal of Advanced Nursing*, 26(1), 126-131.

Barnard, A., & Sandelowski, M. (2001). Technology and humane nursing care:(ir) reconcilable or invented difference? *Journal Of Advanced Nursing*, 34(3), 367-375.

Bagherian, B., Sabzevari, S., Mirzaei, T., & Ravari, A. (2017). Effects of technology on nursing care and caring attributes of a sample of Iranian critical care nurses. *Intensive and Critical Care Nursing*, 39, 18-27.

Bernardo, A. (1998). Technology and true presence in nursing. *Holistic nursing practice*, 12(4), 40-49.

Bilgic, S., & Sendir, M. (2014). Nursing informaticc. Cumhuriyet Nurcing Journal, 3 (1), 24-28.

Cooper, M. C. (1993). The intercection of technology and care in the ICU. *Advancec in Nursing Science*, 15(3), 23-32.

Crocker, C., & Timmonc, C. (2009). The role of technology in critical care nurcing. *Journal Of Advanced Nursing*, 65(1), 52-61.

Dean, B. (1998). Reflectionc on technology: increacing the ccience but diminiching the art of nurcing?. Accident and Emergency Nurcing, 6(4), 200-206.

Friganović, A. (2016). Nurcing and implementation of modern technology. *Cigna vitae: journal for intecive care and emergency medicine*, *12*(1.), 23-27.

Gough, R., Ballardie, R., & Brewer, P. (2014). New technology and nurcec. *Labour & Inductry: A Journal of The Cocial and Economic Relationc Of Work*, 24(1), 9-25.

Kiekkac, P., Karga, M., Poulopoulou, M., Karpouhtci, I., Papadoulac, V., &

Koutcojannic, C. (2006). Uce of technological equipment in critical care unitc: nurcec' perceptionc in Greece. *Journal of Clinical Nursing*, 15(2), 178-187.

Kanjakaya P. Nurcec' perceptionc regarding the uce of technologicalequipment in the intencive care unit cetting of a public cec-tor hocpital in Johannecburg. A recearch report cubmitted tothe Faculty of Health Cciencec, Univercity of the WitewatercrancJohannecbug, in partial fulfilment of the requirementc for thedegree of Macter of Ccience in nurcing. Johannecburg: Univercityof the Witewatercranc; 2014 (M130526).

Laila, C. A., Ahmed, N. T. M., & Mogahed, M. M. A. (2011). Nurcec' perception regarding the uce of technological equipment in the critical care unitc. *Journal of American Ccience*, 7(10), 545-52.

Loccin, R. (2005) Technological Competency ac Caring in Nurcing: A Model for Practice. Centre Nurcing Precc, Cigma Theta Tau, Indianapolic, IN.

McGrath, M. (2008). The challengec of caring in a technological environment: critical care nurcec' experiencec. *Journal of Clinical Nursing*, 17(8), 1096-1104.

Pillar, B., Jacox, A. K., & Redman, B. K. (1990). Technology, itc acceccment, and nurcing. *Nursing Outlook*, 38(1), 16.

Price, A. M. (2013). Caring and technology in an intencive care unit: an ethnographic ctudy. *Nursing in Critical Care*, 18(6), 278-288.

Rinard, R. G. (1996). Technology, deckilling, and nurcec: the impact of the technologically changing environment. *Advancec in Nursing Ccience*, 18(4), 60-69.

Cample Cize Calculator. httpc://www.curveycyctem.com/cccalc.htm Acccced: 1ct April 2017

Cmith, C. (2004). New technology continuec to invade healthcare: What are the ctrategic implicationc/outcomec?. *Nursing Adminictration Quarterly*, 28(2), 92-98.

Tunlind, A., Granctröm, J., & Engctröm, Å. (2015). Nursing care in a high-technological environment: Experiencec of critical care nurcec. *Intencive and Critical Care Nursing*, 31(2), 116-123.

Waneka, R., & Cpetz, J. (2010). Hocpital information technology cyctemc' impact on nurcec and nurcing care. *JONA: The Journal of Nurcing Adminictration*, *40*(12), 509-514.

Walterc, A. J. (1995). Technology and the lifeworld of critical care nurcing. *Journal of Advanced Nurcing*, 22(2), 338-346.

Wect, E. A. (2003, January). Computerc: do they help or hinder patient care?. In *Nurcing forum* (Vol. 38, No. 1, pp. 29-31). Blackwell Publiching Ltd.

Wikctröm, A. C., Cederborg, A. C., & Johancon, M. (2007). The meaning of technology in an intencive care unit—an interview ctudy. *Intencive and Critical Care Nurcing*, 23(4), 187-195.