Nurses' Job Satisfaction Regarding the Use of Health Technology: A Survey Study

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Abstract

The development of innovative health technology is continuously needed by health workers, including nurses in hospitals. Nurses need to adapt and are required to be able to use various current technological innovations. However, the demand for quality care in maintaining patient safety through the use of technology is still an issue, thereby affecting the achievement of nurse job satisfaction. This study aims to describe the job satisfaction of nurses regarding the use of health technology. It is a descriptive study with a cross-sectional design that included 172 hospital nurses. The sample was selected using the purposive sampling method, and the data were collected through questionnaires. Of the nurses in the sample, 33.1% were between the ages of 26 and 31 years old, while 90.1% were female. Furthermore, regarding educational background, a majority of the nurses (54.1%) held diplomas in nursing, and 23.8% had professional nursing degrees. The maximum length of work experience taking care of patients was over 10 years. The results of this study showed that 40.1% of the nurses were satisfied with the use of health technology, while 59.9% were not satisfied. A significant relationship was found between education level, work position, and nurse satisfaction (p < 0.05). The recommendation of this study is that the manager's role should include supporting, motivating, and providing self-awareness for the nurses regarding technology in order to save time, make communication more effective, facilitate nursing care, and improve patient safety. The manager should also be in charge of implementing easy-to-use technological innovations.

Keywords: health technology, job satisfaction, nurse

Abstrak

Kepuasan Kerja Perawat melalui Pemanfaatan Teknologi Kesehatan: Sebuah Penelitian Survei. *Perkembangan inovasi teknologi kesehatan terus dibutuhkan oleh tenaga kesehatan, termasuk perawat. Namun tuntutan terhadap kualitas pelayanan dalam menjaga keselamatan pasien melalui pemanfaatan teknologi masih menjadi isu sehingga memengaruhi pencapaian kepuasan kerja perawat. Penelitian ini bertujuan untuk mendeskripsikan kepuasan kerja perawat melalui pemanfaatan teknologi kesehatan. Penelitian ini merupakan penelitian deskriptif dengan desain* cross-sectional *yang mengobservasi melalui kuesioner pada 172 perawat rumah sakit, dipilih dengan menggunakan metode* purposive sampling. *Data yang dikumpulkan meliputi 33,1% perawat berusia antara 26–31 tahun, 90,1% adalah perempuan, 54,1% perawat berpendidikan diploma keperawatan, 23,1% adalah perawat professional. Lama bekerja maksimal 10 tahun lebih merawat pasien. Sebanyak 40,1% perawat merasa puas dengan penggunaan teknologi kesehatan, sedangkan 59,9% kurang puas. Analisis data menunjukan hubungan yang signifikan antara tingkat pendidikan, posisi kerja, dan kepuasan perawat (p < 0,05). Berdasarkan hasil penelitian, mayoritas perawat masih merasa tidak puas dengan penggunaan teknologi kesehatan. Peran perawat manajer ruangan seperti memberi dukungan, motivasi, dan edukasi dapat menumbuhkan kesadaran diri bagi perawat tentang manfaat teknologi untuk menghemat waktu, berkomunikasi yang lebih efektif, mendukung asuhan keperawatan, dan meningkatkan keselamatan pasien. Manajer juga bertugas menerapkan inovasi teknologi yang mudah digunakan.*

Kata Kunci: *kepuasan kerja, perawat, teknologi kesehatan*

Introduction

Technology in nursing is an important aspect of improving innovations for maintaining patient safety. The World Health Organization (WHO) (2021a) stated that human-centered technology

using the Internet of Things (IoT) approach, robots, and artificial intelligence was created to find, monitor, and evaluate the interoperability, need, and performance of health services. These innovations are also expected to reduce and avoid risks in the health sector (WHO, 2021b). The IoT is a platform that uses implanted network connections to collect and share data automatically without any human help (Aminizadeh et al., 2023). Its applications are mostly used in the medical environment (at a rate of 45%), such as for image analysis and detecting COVID-19, and include medical deep learning systems that have improved medical decision-making (Aminizadeh et al., 2023; Heidari et al., 2022).

Technology provides benefits to job satisfaction, and rapid advances in technology, along with self-efficacy and previous experience, can influence job satisfaction and nurse competency (Alshammari & Alenezi, 2023). Nursing services with a digital approach are important because they play a role in the competence of nurses (Hack-Polay et al., 2023; Razavi et al., 2022). Therefore, nurses need to adapt to the new environment surrounding these innovations (Zadvinskis et al., 2018). New technologies challenge nurses' sense of professionalism and competence and may negatively influence their use due to past negative experiences with new technologies (Batt-Rawden et al., 2021). However, they are needed to improve and increase staff and patient safety during treatment, as well as to allow communication to become more effective (Batt-Rawden et al., 2021).

Most nurses' expectations of the technology system are not met in any hospital. Various positive and negative impacts can be felt by nurses when applying the technology, with some nurses having negative perceptions and others feeling satisfied, for example, when using an alarm device for safety (Thilo et al., 2020). A previous study revealed that, in terms of patient safety, 65% of the respondents depended on a good alarm system, while 44% of nurses stated that damage to the system could affect the patients and lead to wasted time and stress. Further-

more, 50% of nurses said that they do not believe that the IoT can have a big impact on health (Alsuyayfi & Alanazi, 2022; Taryudi et al., 2022). Negative perceptions can affect nurses' workloads, communication, and management due to the inappropriate use of technology (Golay et al., 2021). However, other studies have found that health information technology (HIT), such as assistive devices, information and communication technologies, sensors, and robotics, has a positive impact of 74% in care since it reduces length of stay, time to patients, workload, and allows nurses to participate in quality design, implementation, and electronic documentation (Drexler, 2020; Huter et al., 2020).

Technology's impact on job satisfaction or dissatisfaction has caused some frustrations for health workers. A previous study reported that 32.7% of health workers were frustrated, leading to emotional exhaustion due to excessive work demands and unbalanced resources (Tawfik et al., 2021). The application of information technology is perceived negatively by nurses, and this causes frustration, moral pressure, isolation, psychological distress, anxiety, and confusion (Golay et al., 2021). The study's results by Zadvinskis et al. (2018) showed that participants were dissatisfied with HIT due to equipment, systems, functionality, and inefficient documentation. Meanwhile, some were satisfied because of workflow simplification, patient protection, better care, complete documentation, and reminders (Zadvinskis et al., 2018).

Nurses stated that monitoring vital signs using technology, such as wearable wireless devices, may support the timely early detection of clinical deteriorations, making it easier to work with inpatients (Leenen et al., 2022). Furthermore, in the digital care setting, the use of video consultations was said to be interesting, as it provides patient interactions with a short preparation time and allows for gathering enough information about the patient. The process was said to be a fun activity that is easy to use, allows for effective communication, and provides leadership support. Nurses' experience increased their

level of satisfaction with their work in a digital care setting. However, the nurses did experience some situations in which they lacked direct social interaction with coworkers or faced patients who had misunderstandings in the consultation (Razavi et al., 2022). Thus, despite the benefits and satisfaction, technology problems are still felt by nurses and patients due to various factors.

Some types of technological innovations have been used to provide patient nursing care and have become a part of nurses' competencies. One study found that 53% of nurses said that, when they experience setbacks in using nursing process systems and do not receive help from senior staff, this can affect job satisfaction, as they can only rely on their own knowledge, skills, and experience (Ho et al., 2019). Nurses have been found to lack knowledge in the use of new computers (Tsarfati & Cojocaru, 2022). Therefore, computer technology is more easily accepted if nurses receive training from the computer team (Tsarfati & Cojocaru, 2022). Those who use technology such as nursing process systems are influenced by the information quality, service quality, and system quality, all of which depend on the nurse's perceptions during use and impact job satisfaction (Ho et al., 2019). Therefore, this study aims to describe the job satisfaction of nurses regarding the use of health technology in Indonesia, especially during the COVID-19 pandemic.

Methods

The data were obtained from a descriptive survey with a cross-sectional design. The data were collected from November 2021 to January 2022, and this study was carried out with 172 nurses.

Setting. This study used the purposive sampling method, and the inclusion criteria were a minimum of one year of working experience in an inpatient department.

Some questions were adapted from previous re-search by Fadel et al. (2020), Orhan and Serin (2019), and Ozan and Duman (2020). A questionnaire on nurses' job satisfaction with the use of health technology was used for data collection. The questionnaire consisted of 43 questions answered on a five-point Likert scale ranging from strongly agree to strongly disagree (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree). A total of 21 positive and 22 negative statements were obtained. For the positive questionnaire items, the highest number on the Likert scale meant that the nurse strongly agreed with the questionnaire items and was in the "very satisfied" category, while the lowest number meant that the nurse strongly disagreed and was in the "very dissatisfied" category. The opposite was true for the negative questionnaire statement items. Items with negative sentences were first converted to positive by the researcher; then, the data were interpreted, with the minimum score in the category being strongly disagree and agree and the maximum in the cate-gory being strongly agree. The range of scores for overall satisfaction is as follows: low 43–100, medium 101–158, and high 159–215. Based on these scores, overall satisfaction was classified into three classes: dissatisfied, satisfied, and very satisfied. However, the results did not include the very satisfied category; instead, satisfaction was determined in the categories of satisfied and dissatisfied. The questionnaire was in the Bahasa language and was thus easy for the nurses to understand. The questionnaire was tested for validity and reliability using 30 nurses. The reliability coefficient of the tool was 0.953, based on Cronbach's alpha value, and the content validity was determined using Pearson's product moment. After the two tests were carried out, the process continued with the data collection.

This study discussed nurses' job satisfaction regarding the use of health technology. Data were collected through an electronic Google form that was sent through WhatsApp, as the study was carried out during the COVID-19 pande-

mic. The Google form included a telephone number for the researcher, who could be contacted if any item was not understood. The procedure for this study was to collect the data from nurses in direct patient care, with the assistance of five nurse managers to motivate them to fill out the questionnaire. Nurse managers were given incentives at the end of the study. This study was spread across several cities in Indonesia. The size of the study sample had determined using the Lemeshow formula. The population of this study included nurses in direct patient care working in inpatient settings. The researchers distributed the questionnaires with the assistance of nurse managers to include nurses who fit the inclusion criteria. After the data were obtained, the information was automatically transferred to the sheet application.

For the obtained data, a Chi-square test was used to determine the relationship between the nurses' characteristics and satisfaction with the use of health technology, where a p-value of 0.05 was considered significant. Furthermore, the characteristics examined included age, gender, education level, working experience, work po-

sition, and job satisfaction. The nurses involved in the research were given rewards in the form of souvenirs from the researchers. The target population, namely, nurses in several cities in Indonesia, was unlimited, as the total number of nurses is uncertain; thus, the number limit was determined based on the time spent conducting the research. The sample size was calculated as 185 nurses (including the dropout value). The study used univariate and bivariate analyses in the form of categorical data for nurse demographic variables for the questionnaire on nurse job satisfaction in using technology. The analysis process was carried out by the researchers using computer processing systems. This study tested the normality of the data first through the Kolmogorov–Smirnov test.

The study ethics, which included respecting principles based on the Belmont Report–namely, beneficence, nonmaleficence, respect for human dignity, and justice—were properly followed. This study was ethically approved by the Faculty of Nursing, Universitas Indonesia, reference number 215/UN2.F12.D1.2.1/PPM.00.02/2021.

Table 1. Demographic Characteristics of Nurses (N = 172)

Variable	Frequency	%
Age		
20–25	28	16.3
26–31	57	33.1
32–37	43	25.0
> 38	44	25.6
Gender		
Male	17	9.9
Female	155	90.1
Education degree		
Diploma	93	54.1
Bachelor of nursing	38	22.1
Professional nurses	41	23.8
Length of working		
< 5 years	74	43.0
6–10 years	36	21.0
> 10 years	62	36.0
Work position		
Team leader	46	26.7
Direct patient care	126	73.3

Results

The results were obtained from 172 nurses based on the population distribution at the time of the hospital data survey described in the nurses' demographic data, the satisfaction and dissatisfaction variables, and items related to nurses' satisfaction or dissatisfaction with the use of health technology. Table 1 presents the nurses' demographic characteristics, while Table 2 and Table 3 present the data on nurses' job satisfaction regarding the use of health technology.

Based on the results, most of the participants were nurses with long working hours who were also very experienced in providing nursing care directly to patients. Apart from that, it can be seen in Table 1 that many of the nurses were over 30 years old and had worked in inpatient settings for more than 10 years.

The nurses also revealed that it is not easy to overcome the obstacles associated with the use of technology and that they need motivation from a leader. Based on the whole questionnaire, 9.9–26.2% of nurses chose the "neither" option, indicating that they still doubt that technology can provide job satisfaction, as shown in Table 3.

Based on the nurses' characteristics, the significant demographic data were education degree (p = 0.012) and work position (p = 0.001). The data show that the level of nurses' education can influence the level of job satisfaction regarding the use of health technology and that the work position can influence nurses' job satisfaction. Nurses with a diploma level of background education had the highest level of dissatisfaction, while those with bachelor's degrees were the most satisfied. Participants who

worked in a direct patient care team had the highest level of dissatisfaction, as shown in Table 2. Based on the results, education level and work position have a significant relationship with nurse satisfaction with using technology, as shown in Table 4.

Discussion

The technology used by nurses can influence job satisfaction in hospitals. Those who feel satisfied can improve the quality of their self-development and achieve an increased level of professional work. Technology plays a role in supporting and assisting nursing care to improve patient safety, but changes and innovations are needed in health systems technology. The use of new technology during the COVID-19 pandemic was necessary for various health and information technology sectors to prevent deaths and reduce the burden on patients in hospitals. For example, the use of computers through artificial intelligence was a top priority for health workers (Zaman et al., 2023). The results of this study reveal that more nurses feel dissatisfied with using technology in hospitals. The results also showed that the nurses expressed negative feelings about using information technology due to the resulting psychological problems (Golay et al., 2021). Lewandowska et al. (2020) found that nurses feel dissatisfied that they lack time to learn new technology, do not receive support from other medical staff in the use of alarm systems, and are unable to prevent alarm fatigue. Suprapto et al. (2023) revealed that nurses who receive training for self-development have greater feelings of happiness and increased competence in achieving nursing care standards.

Depending on their experience, nurses often feel burdened due to the simultaneous use of se-

Table 2. Nurse's Job Satisfaction Regarding the Use of Health Technology (N = 172)

Variable	Frequency	%
Less satisfied	103	59.9
Satisfied	69	40.1

Table 3. Data on Nurses' Job Satisfaction regarding the Use of Health Technology (N = 172)

Variable	Statement Frequency (%)				
	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Technology saves time.	6 (3.5)	10 (5.8)	30 (17.4)	80 (46.5)	46 (26.7)
Technology improves the quality of care.	4 (2.3)	9 (5.2)	33 (19.2)	74 (43.0)	52 (30.2)
The use of technology makes nursing care easier.	3 (1.7)	7 (4.1)	29 (16.9)	75 (43.6)	58 (33.7)
Nurses avoid using technology in providing care to patients.	14 (8.1)	23 (13.4)	22 (12.8)	57 (33.1)	56 (32.6)
Nurses are not able to use technological devices properly.	9 (5.2)	24 (14.0)	17 (9.9)	60 (34.9)	62 (36.0)
The technology used by patients often interferes with nursing care.	7 (4.1)	27 (15.7)	27 (15.7)	55 (32.0)	56 (32.6)
Technology reduces the nurse's workload.	5 (2.9)	16 (9.3)	29 (16.9)	85 (49.4)	37 (21.5)
Nurses need motivation from a leader.	12 (7.0)	22 (12.8)	35 (20.3)	73 (42.4)	30 (17.4)
My supervisor does not directly monitor the care carried out by nurses.	49 (28.5)	48 (27.9)	25 (14.5)	41 (23.8)	9 (5.2)
The use of technology does not make it easy to overcome the obstacles.	22 (12.8)	31 (18.0)	45 (26.2)	60 (34.9)	14 (8.1)
Nurses need the help of an innovation tool to make it easier to work.	9 (5.2)	21 (12.2)	35 (20.3)	75 (43.6)	32 (18.6)
Nurses need the help of an innovative tool to be able to detect the risk of infection in patients with medical devices installed.	8 (4.7)	15 (8.7)	35 (20.3)	80 (46.5)	34 (19.8)
Involving technology in care means nurses are required to spend more time caring for patients.	30 (17.4)	73 (42.4)	28 (16.3)	27 (15.7)	14 (8.1)

Table 4. Nurses' Job Satisfaction Regarding the Use of Health Technology Based on Their Characteristics (N = 172)

Nurses' Characteristics	Nurse' Job Satisfaction				Total		p
	Less Satisfied		Satisfied				
	Frequency	(%)	Frequency	(%)	Frequency	(%)	
Age							
20–25 years old	17	(60.7)	11	(39.3)	28	(100)	0.793
26–31 years old	36	(63.2)	21	(36.8)	57	(100)	
32–37 years old	23	(53.5)	20	(46.5)	43	(100)	
> 38 years old	27	(61.4)	17	(38.6)	44	(100)	
Gender							
Male	9	(52.9)	8	(47.1)	17	(100)	0.538
Female	94	(60.6)	61	(39.4)	155	(100)	
Education degree							
Diploma	65	(69.9)	28	(30.1)	93	(100)	0.012*
Bachelor of nursing	17	(44.7)	21	(55.3)	38	(100)	(0.002)
Professional nurses	21	(51.2)	20	(48.8)	41	(100)	
Length of working							
< 5 years	45	(60.8)	29	(39.2)	74	(100)	0.752
6–10 years	23	(63.9)	13	(36.1)	36	(100)	
> 10 years	35	(56.5)	27	(43.5)	62	(100)	
Work position							
Direct patient care	85	(67.5)	41	(32.5)	126	(100)	0.001*
Team leader	18	(39.1)	28	(60.9)	46	(100)	(0.00025)

veral electronic medical record systems, lack of workflow, time consumption, and unreliability (Wynter et al., 2022). The results of the current study are consistent with several studies by Krel et al. (2022), Nakano et al. (2021), and Ozan and Duman (2020) findings that some nurses believe technology does not make it easy to overcome obstacles and to work efficiently. They also doubt that the use of technology creates more care time for patients. However, this is not in line with other studies finding that technology can be used to meet patient needs and place the patient at the center of care.

Technology was created to make it easy and comfortable for nurses to complete tasks without feeling burdened while providing healthcare. Costa et al. (2020) stated that nursing technology was created to support knowledge, as well as nursing management and nursing care in various fields of science. Health technology innovation during digital transformation has an impact on health efficiency, quality, and performance (Akinwale & AboAlsamh, 2023; Stoumpos et al., 2023). According to the results of the current research study, although technology saves time, improves the quality of care, and makes nursing care easier, nurses need the help of an innovative tool to make it easier for them to work.

Based on the results of this study, almost half of the nurses were satisfied with technology. This is not in line with a previous study finding that 69% were satisfied with the quality of the information system, while 88% believed it could reduce medical errors (Baghini & Baniasadi, 2020). An innovative workplace and leadership support has been found to encourage nurses to recommend the workplace and technology to others, while a sense of needing innovation and being happy and willing to use it have been found to be forms of job satisfaction (Leenen et al., 2022; Vainieri et al., 2021). Innovative leadership is needed by nurses to achieve job satisfaction. Job satisfaction has a relationship with innovative organizational performance, thereby increasing effectiveness and efficiency

in the competitiveness of the digital era (Putriyadi et al., 2020; Riana et al., 2020). Digital technology in nursing is intended to support accepted, effective, and efficient (AEE) nursing care, such as sensors, monitoring, and other technologies (Krick et al., 2019). AEE is the outcome dimension of digital technology for measuring whether a technology has a realistic chance of being transferred to nursing practice (Krick et al., 2019). This is in line with the current study's result that most nurses believe that the use of technology can make nursing care easier and nurses more satisfied.

Nurses have performance expectations, social influence, facilitating conditions, self-efficacy, and perceived incentives that affect their job satisfaction in monitoring patient conditions with mobile nursing applications (Pan & Gao, 2021). Workflow, work satisfaction, and workloads have an impact on the intention to use digital applications, as nurses' performance depends on several performance expectancies regarding the new technology (Hasebrook et al., 2023). In addition, new technology can reduce nurses' workloads (Fadel et al., 2020; Huter et al., 2020). Furthermore, this is in line with several studies finding that the use of technological innovations can save time and provide convenience in patient care. Nurses who use digital technology feel that they have the skills and competencies in using the platform to access data, the point of care, and medical records (Brown et al., 2020). This finding is consistent with another study finding that nurses have a positive response to the use of new technology, as it saves the time needed to provide care to patients and reduces the length of stay (Brown et al., 2020).

The results of this study showed that nurses' level of education and work position have more effect on job satisfaction than age, gender, and length of work (p < 0.05). This is in line with previous study finding that level of education affects awareness about the use of technology, although findings regarding other characteristics were inconsistent (Orhan & Serin, 2019).

Furthermore, in the current study, nurses with diploma degrees were more dissatisfied than those with bachelor's and professional degrees. This is in line with other study finding that the majority of nurses with diploma education did not follow technological developments, and only half believed that technology is beneficial for health services (Taryudi et al., 2022). In addition, the results of the current study differ from other study finding that having an undergraduate level of education influences nurses' job satisfaction more than other levels of education (Chapman et al., 2016).

Work position also affects nurse satisfaction, and the current study revealed that team leaders were more satisfied than implementing nurses. This finding is consistent with previous findings that organizational innovations are created from the characteristics and cohesion of leaders (do Adro & Leitão, 2020) and that staff perceive satisfaction at work due to the organizational support and supervision from leaders (Hegarty et al., 2019; Lee et al., 2018; Wnuk, 2017).

The current study's results are inconsistent with previous studies finding that the most influencing factors for patient-centered technology are gender and age (Ozan & Duman, 2020). Furthermore, in the current study, participants aged 26–31 years and females had the highest level of dissatisfaction with the use of the innovations compared to others aged 32–37 years. This finding is supported by Chapman et al.'s (2016) study, which found that nurses aged 20–29 years tend to have low satisfaction with technology and that the older they are, the higher the job satisfaction, while younger people tend to have negative perceptions of technology, reflecting their dissatisfaction. Based on the statistical data, most of the current study's respondents were female; hence, a higher level of job dissatisfaction was observed among them.

The results also revealed that job satisfaction is influenced by the efficiency and effectiveness of the technology, as well as internal factors.

The higher the nurse's job satisfaction, the more effective and efficient their efforts will be and the more they will improve performance, which will have an impact on work safety and productivity (Thiagaraj & Thangaswamy, 2017). In addition, the work environment, service quality, innovation, work commitment, and other factors have been found to affect satisfaction (Al Maqbali, 2015). Furthermore, the use of technology was accepted because it is easy to use, reduces workload, saves time in completing patient care, provides support from leadership, and increases nurses' competence and job satisfaction.

This study was carried out in the nursing unit only, not in the entire hospital, and thus did not obtain a complete picture from other units. The sample size needs to be increased in several areas, especially in hospitals that have large human resources. This study also only discussed several technologies in general and did not cover specific ones that are often used by nurses in hospitals.

Conclusion

This study found that nurses feel more dissatisfied with the use of technology due to incomplete completion of tasks, lack of training in using the tools, and management, causing increases in nurses' workloads. However, some nurses feel satisfied when using health technology, as they have knowledge of using health technology and thus feel they are easy to use, efficient, and effective in completing tasks, leading to a less heavy workload. Level of education and work position were found to be associated with job satisfaction. Appropriate management, such as providing education and training, support, and motivation, is needed for the use of health technology for nurses.

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