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Derleme/Review

Digital Nursing: A Walker and Avant Concept Analysis

Dijital Hemşirelik: Walker ve Avant Kavram Analizi

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ABSTRACT
Objective: Digital nursing is a concept of increasing importance in the nursing literature. Today, digital technologies have an important place in nursing care. In order for nurses to integrate rapidly developing technology into their effective care, the concept of digital nursing needs to be clarified. The aim of this article is to explain the concept of "digital nursing".
Methods: Walker and Avant's eight-step concept analysis method was used to explain the concept of digital nursing.
Results: As a result of the concept analysis, it was found that the concept of digital nursing is related to many features such as information, data, digital transformation, digital nursing technologies, etc. Model cases, counter cases and borderline cases were discussed in line with these characteristics. It is thought that the concept of digital nursing is important for reasons such as improving the quality of care, saving labor force, rapid access to/sharing of data and reducing costs in the long term.
Conclusion: The concept of digital nursing has recently started to be used frequently in the field of nursing with the advancing technology. With the digital nursing concept analysis, it is recommended that the concept should be introduced to the nursing literature and it is thought that it will contribute to the nursing profession conceptually and guide the care process. The inclusion of digitalization processes in undergraduate and graduate education programs is recommended as it will increase a successful education process and adaptation to developing technology.
Keywords: Digital technology, concept formation, models, nursing, nursing theory.

ÖZ
Amaç: Dijital hemşirelik, hemşirelik literatüründe önemi giderek artan bir kavramdır. Günümüzde dijital teknolojiler hemşirelik bakımında önemli bir yere sahiptir. Hemşirelerin hızla gelişen teknolojiyi etkin bakımlarına entegre edebilmeleri için dijital hemşirelik kavramının açıklığa kavuşturulması gerekmektedir. Bu makalenin amacı "dijital hemşirelik" kavramını açıklamaktır.
Yöntem: Dijital hemşirelik kavramını açıklamak için Walker ve Avant'ın sekiz adımlı kavram analizi yöntemi kullanılmıştır.
Bulgular: Kavram analizi sonucunda dijital hemşirelik kavramının bilgi, veri, dijital dönüşüm, dijital hemşirelik teknolojileri vb. birçok özellik ile ilişkili olduğu bulunmuştur. Model vakalar, karşıt vakalar ve sınırda vakalar bu özellikler doğrultusunda tartışılmıştır. Dijital hemşirelik kavramının uzun vadede bakım kalitesinin artırılması, iş gücü tasarrufu, veriye hızlı erişim/paylaşım ve maliyetlerin azaltılması gibi nedenlerle önemli olduğu düşünülmektedir.
Sonuç: Dijital hemşirelik kavramı, gelişen teknoloji ile birlikte hemşirelik alanında son zamanlarda sıklıkla kullanılmaya başlanmıştır. Dijital hemşirelik kavram analizi ile kavramın hemşirelik literatürüne kazandırılması önerilmekte ve hemşirelik mesleğine kavramsal olarak katkı sağlayacağı ve bakım sürecine rehberlik edebileceği düşünülmektedir. Lisans ve lisansüstü eğitim programlarında dijitalleşme süreçlerine yer verilmesi, başarılı bir eğitim sürecini ve gelişen teknolojiye uyumu artıracağı için önerilmektedir.
Anahtar Kelimeler: Dijital teknoloji, hemşirelik, hemşirelik teorisi, kavram oluşumu, modeller.

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Introduction

Today, digital technologies have an important place in nursing practices. There is an increase in research and development studies for the application of digital technologies (Merda, 2017; Seibert et al., 2020). The importance of digital technologies, data, and innovation for resilient global health and care systems was highlighted in the 2020 Riyadh Declaration. The declaration outlines key priorities and recommendations for data and digital health that the global health community should adopt to address the challenges posed by the COVID-19 pandemic and future health crises. The World Health Organization (WHO), as stated in its Global Strategy on Digital Health 2020-2025, emphasizes that digital health must be an integral part of health priorities and encourages countries to develop a digitally skilled healthcare workforce (WHO, 2021). Nurses have to be patient-oriented in their working life, make quick decisions and show the ability to use digital technology. They are also expected to have social skills that establish therapeutic communication with patients, have high problem-solving skills, and keep up with the developing technology (Männistö et al., 2019; Yoo and Park, 2014).

Digital technologies in nursing practice are diverse, and there is currently no classification of technology types. Among all types of digital technologies, information and communication technologies are considered to be the most researched branch. It is known that robots have started to play a role in the preparation and administration of medication, in the process of providing nutrition and psychosocial support and are integrated into the nursing care process (Abdi et al., 2018; Archibald and Barnard, 2018; Rubeis, 2021). It is seen that this situation also plays an active role in documentation analysis, planning, clinical decision making and risk assessment (Bräutigam et al., 2017; Merda, 2017; Rubeis, 2021).

The integration of digital technologies into nursing is seen as a radical change. Moreover, an ambiguous relationship between nursing and digital technology is still controversial (Čaić et.al., 2018; Rubeis, 2021). Although current technology has been available in nursing practices, its integration into these practices has been very slow. Digital technology has not been identified as an opportunity because nurses and decision-makers are skeptical and reject innovation. In addition, using technology at every stage of practice may lead to a decrease in practical applications and desensitization of nurses (Čaić et al., 2018; Peirce et al., 2020; Rubeis, 2021).

Digital technologies can improve the nursing care process, increase patients' quality of life and comfort, and reduce patient care costs (Čaić et al., 2018; Pepito and Locsin, 2019; Pilotto et al., 2018). Nurses are seen as professionals who manage the care process, carry out some of their tasks through technology, and coordinate patient-centered care (Pepito and Locsin, 2019). In this role, the nurse makes sure that technological applications are appropriate to the needs of patients. For example, electronic patient records are known to relieve nurses in terms of workforce. In this way, nurses can manage the care process more effectively as some tasks are done through technology (Harrington, 2019). Nurses must adopt a more holistic and humanistic approach than usual in the digital age. In this context, coordinating care, mastering technology and ensuring it is appropriate for the patient's needs is an essential part of the process (Brennan and Bakken, 2015).

Technology in nursing care should be seen as a tool to improve holistic patient care, not as a substitute for the nurse or to compensate for its deficiency. Thus, nurses can contribute more to holistic patient care instead of fighting the adverse effects of technology. Thanks to this contribution, technology allows nurses to become stronger and more involved in the digital age in addition to patient benefit (Rubeis, 2021). In addition, the economic evaluation of digital nursing technologies in terms of health is important in providing information that will help avoid unwanted developments and practices and increase the chances of success of the applications developed (Huter et al., 2022).

The nursing profession accounts for a large proportion of the world's health workforce and nurses are directly influencing innovations in health technologies from their implementation in the sector. The technologies used to provide healthcare services will enable nurses to explore and develop new roles that address the challenge of the nursing workforce, as well as the drive to provide more health-promoting and disease-preventive care (Fotis, 2022).

When national and international studies were examined, it was seen that studies on digital nursing were limited, and they focused on the place of technology use in nursing practices. Although the concept of digital nursing has an essential place in the literature, it has various definitions. It is thought that clarity of meaning will contribute to the

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organization of nursing education and the nursing process.

Methods

Walker and Avant's concept analysis method was preferred to better understand the concept of digital nursing and increase its use. Concepts are the basic structures that makeup theories. Therefore, strong concepts are fundamental in theory development. It is essential that the concept is articulated and fits the basic cornerstones of the theory. Concept analysis aims to research the structure and function of a concept. In this way, descriptive qualities can be identified formally and linguistically. Examinations should be detailed, but the conclusion reached is not absolute; it can be tested, and the process can be renewed (Walker and Avant, 2011) (Table 1).

Table 1. Walker and Avant's concept analysis method

1. Selecting the concept	The concept to be analyzed is decided.
2. Determining the aim of the concept analysis	The aim is determined.
3. Determining possible usage areas of the concept	Dictionary definitions are examined, and their use in all possible areas is determined.
4. Determining the defining characteristics of the concept	Literature definitions are examined.
5. Creating the model case	A case containing the defining characteristics of the concept is created.
6. Creating the borderline and countercase	A borderline case containing some of the defining features of the concept or a counter-case containing none of them is created.
7. Determining the preparatory factors and outcomes related to the concept	Preparatory features are the features that enable the concept to form and emerge. Consequences are the features that emerge after the concept is formed.
8. Determining the ways of measuring the concept	The fact that how the concept will be measured is determined.

Data Source

The literature review for this study was conducted between March 2022 and August 2022. In the study, research articles between 2010 and 2022 were searched in Science Direct (n=28), Web of Science (n=23), Pub Med (n=17), EBSCHO (n=0), Elsevier (n=0) databases that can be accessed with the keywords 'digital nursing' and 'digital' and a total of 68 articles were reached. When articles not in English were excluded from the exclusion criteria, 53 were found. When duplicates and articles whose full text could not be accessed were excluded, 46 articles were included in the analysis.

Results

In this section, the concept of "Digital Nursing" was analyzed using Walker and Avant's concept analysis method.

1. Selecting the Concept

In the study, "digital nursing" was determined as the concept to be analyzed.

2. Determining the Aim of the Concept Analysis

The aim of the study is to define and understand the concept of "digital nursing". In addition, it aims to determine the concepts related to digital nursing, to ensure the usability of the concept in the nursing profession, and to provide direction for future studies.

3. Determining Possible Usage Areas of the Digital Nursing Concept

Concept analysis provides a common view on the concept in the nursing profession by defining the concept and determining the possible usage areas. In order to define the possible usage areas of the concept of digital nursing, dictionary definitions, as well as definitions and usage areas in nursing were examined.

Dictionary definitions of the concept of digital nursing: Turkish Language Association: The word digital is defined in the Turkish Language Association as "digital, displaying data electronically on a screen." It is stated that its origin

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is French (Turkish Language Institution Dictionaries, 2021).

Oxford Dictionaries: The word "digital" was searched as "digital," and three different results were obtained (Oxford Learner's Dictionaries, 2021).

- Using a system of sending and receiving information as a sequence of ones and zeros, indicating that an electronic signal is there or not
- Computer technology, especially linked to the use of the internet
- Showing information with numbers, not with hands pointing to numbers (clocks, watches, etc.)

Webster Dictionary: The word "digital" was searched as "digital," and seven different results were obtained (Dictionary by Merriam-Webster, 2021).

- Related to fingers or toes
- Making with one finger
- Calculating with, relating to, or using numerical methods or discrete units
- Especially data in the form of binary digits
- Providing reading in numerical digits
- Concerning a sound recording method in which sound waves are represented digitally (as on magnetic tape), eliminating sound distortion and fluctuation in the recording and reducing background noise
- Electronic

Turkish Language Association: The word "nursing" is defined as "the work of a nurse, sisterhood" in the Turkish Language Association (Turkish Language Institution Dictionaries, 2021).

Oxford Dictionaries: When the word nursing is examined as "nursing", it is defined as "the work or skill of caring for ill or injured people" (Oxford Learner's Dictionaries, 2021).

Webster Dictionary: When the word "nursing" is examined as "nursing", it is defined as "the profession of a nurse, the duty of a nurse" (Dictionary by Merriam-Webster, 2021).

4.Determining the Defining Characteristics of the Concept

In 2015, Prof. Theofanis Fotis used the term "Digital Nursing" to describe the future workforce of healthcare practitioners with specific knowledge and skills to use digital technologies to benefit patients and citizens. Lecturers at the nursing faculty realized that undergraduate nursing students enrolled in the community health nursing course had difficulty comprehending the course content on public health concepts and environmental health areas, which are the two learning units of epidemiology (Day-Black, 2015). Students also stated that they had difficulty understanding the course and "could not relate" to the content. Evaluations of the course made by students provided faculty with insights into students' perceptions of the course. Using open-ended feedback, students described the course content as "boring" and "too abstract". They commented that "instructors should have better teaching methods to make the course content more understandable and effective" (Day-Black, 2015).. As a result of the evaluation, low grades, student dissatisfaction, and disappointment in the teaching staff prompted the faculty to seek innovative learning activities that support learning goals and improve students' learning outcomes. In this innovative process, digitalization and digital nursing came to the forefront (Day-Black, 2015).

With the development of technology, the concept of digital has been used in many fields, such as industry, trade, economy, health, and culture. As technology improves, a transformation occurs in healthcare services as healthcare service users seek ways of digital care. Integrating information and communication technologies into healthcare provides many benefits for patients and nurses (International Council of Nurses (ICN), 2023).

Digitally enhanced technologies are used in units that provide long-term patient care, such as psychiatry services and intensive care units. The use of these new technologies has an important place in nursing practice (Barrera et al., 2020; Dugstad et al., 2019). The main basis of these applications is artificial intelligence and wearable technologies or applications effective in data collection, such as tele-nursing. Artificial intelligence (AI)-based systems are built on algorithms that can predict risk factors and symptom changes related to the disease, thus supporting effective decision-making in care in the clinical process (Rubeis, 2023). Tele-nursing allows for meticulous monitoring of vital functions and behavioral patterns. In particular, health practices related to collecting and interpreting data that maximize patient compliance with treatment are implemented through tele-nurses using computer and communication technologies (Bilgiç and Şendir, 2014). The American Nurses Association (ANA) defines telenursing as "a nursing activity that includes applications such as obtaining information about the health status of patients, providing care, and patient education using communication technologies" and defines telenursing as a specific professional practice for nursing as a sub-dimension of telehealth. The International Council of Nurses

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(ICN) defines telenursing as "the use of communication technologies in nursing to improve patient care" (Bilgiç and Şendir, 2014). All these digital applications will optimize nursing activities and shape the nursing care process.

Digital Nursing Services will strengthen the nurse's capacity to interact with individuals and their families who use healthcare services to promote adherence to treatment and support the "social capital" that dynamizes healthy communities (Lapão, 2020).

Nursing represents the largest workforce within various health systems worldwide. In this context, nurses' leadership should be key in organizing work and driving innovative solutions. Their leadership is crucial in facilitating the adoption of digital-based innovations in nursing. As a result, the ongoing digital health transformation offers an opportunity to enhance nursing practices (Mosier et al., 2019). However, this also presents a challenge, as nurses must acquire specific digital skills. Highly skilled professionals will support future nursing focused on advanced practice, capable of reorganizing care processes in collaboration with other healthcare professionals and engaging closely with health service users. Digital systems, using "smart" clinical protocols based on interprofessional agreements, will streamline the adoption of therapeutic interventions, fostering more transparent teamwork and stronger connections with patients (Marques et al., 2017). The interaction between digital nurses and patients is expected to center care around the patient, encouraging them to become more engaged as active participants in managing their own health. Nurses with deep knowledge of healthcare organizations will be able to leverage design science to drive innovation in healthcare services. By collaborating across disciplines, nurses will help create a new care paradigm, improving the care process and interactions with patients through digital platforms (Lapão, 2020).

The knowledge gained through technology also draws attention to the impact of technology on nursing care. Technology has the power to shape the data we consider important in care. A digital monitor can alarm when a patient's heart rate drops, creating an environmental notification of the issue. The integration of technology into nursing care will provide a highly predictive perspective. Nursing has a history of applying technology without critical examination (Archibald and Barnard, 2018). When we look at historical approaches, the nurse's role is defined as care-oriented. Nursing has an ethical obligation to develop, synchronize, and exchange essential technical and clinical knowledge while ensuring safe and effective coordination of patient care. With this obligation, it is crucial to understand how the goals of nursing science and technological advances fit and follow them accordingly (Peirce et al., 2020).

Concepts related to digital nursing

To better understand digital nursing, related concepts were examined. Related concepts are ones that are related to digital nursing but have different defining characteristics. It was determined that the concepts of "technology," "information," "informatics," "digital transformation," "digital nursing technologies," and "workforce" are related to digital nursing.

Technology: With the ongoing developments in science, there are changes in socio-cultural and economic dimensions. These changes lead to increased efficiency and developments in technology. The term medical technology includes many engineering fields. Developments in these fields also affect the products developed in medical technology. The technologies used in the production of health services also affect the patients as well as their relatives and the health professionals who use them (Krick et al., 2020).

Knowledge: Much knowledge in nursing has been acquired through reasoning, trial and error, experience, and traditional means. The true knowledge and essence of nursing constitute nursing science. Nursing science guides nursing practice. Knowledge in nursing can be obtained from many sources, such as experience, reflection, and values. However, knowledge is nursing science when it is systematically transformed into general laws and rules for predicting, explaining, and describing phenomena of special interest to the nursing discipline.

Nursing Informatics: Nursing informatics of combines information technologies with nursing science to improve the health of people, communities, and families. Nursing informatics combines nursing and computer science (Kaynar and Secginli, 2021). It is the specialty that combines the identification, collection, processing and management of information to support nursing practice, administration, education, research and the expansion of nursing knowledge. Information and communication technologies in health are important to enable nurses to provide quality care, reduce workload, increase the reliability of records, and

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create a database for personal and professional development (Daniel and Oyetunde, 2013).

Digital transformation: Digital transformation is the intensive use of information technologies to move business processes and information to the digital (electronic) environment in a fast, money- and time-saving way. In healthcare, digital transformation is the integration of digital technology into all aspects of how a healthcare business interacts with patients, healthcare providers and regulators (International Council of Nurses (ICN), 2023; Stoumpos et al., 2023).

Digital nursing technologies: Digital nursing technologies (DNT) represent a growing and highly varied field of research, explored through numerous methods and tools. This diversity makes comparing study outcomes challenging, leading to the question of how the effectiveness of DNT can be appropriately evaluated (Rouleau et al., 2017). The current methodologies may not always be suitable for specific nursing environments. DNT may be employed in various situations, such as providing real-time support to caregivers (e.g., decision support systems for adherence to guidelines), promoting patient independence to reduce the need for direct on-site care (e.g., ambient assisted living solutions at home), replacing specific nursing tasks with technological assistance (e.g., robots monitoring vital signs before consultations), or enhancing nurse training (e.g., high-fidelity simulation systems). Technological assistance can target the care recipient, formal or informal caregivers or focus on improving organizational processes (Krick et al., 2020).

Workforce: One of the important production inputs hospitals use is labor. Nurses are the indispensable labor force of the healthcare system. An effective care service can be provided to the extent that the nurse assumes her/his responsibilities within the framework of her/his authority (Smiley et al., 2021).

5. Creating the Model Case

The case includes all the descriptive qualities related to the concept of digital nursing. "This is the first pregnancy of Mrs. R., a 30-year-old woman who is 41 weeks pregnant. Ms. R. presented to the delivery room for a postmaturity delivery. Nurse H. took Mrs. R.'s medical history while she was resting in a chair and recorded it in the hospital record system. Nurse H. took Mrs. R. to the private room, made her lie on the stretcher, and measured her vital signs. Seeing that her blood pressure was 165/118 mmHg, Nurse H. said she would administer the medication for induction according to blood pressure monitoring. Nurse H. then assessed fetal well-being with NST (Non-stress Test). Nurse H. monitored Mrs. R. and programmed the blood pressure monitor to measure her blood pressure every 15 minutes so that she could follow up on the monitor on the nurse's desk. After 30 minutes, Nurse H. measured the blood pressure as 128/89 mmHg, reported the result to the doctor by phone, and administered the induction drug (Propess) vaginally."

Nurse H. took Ms. R.'s history and obtained information about her health status. She obtained data by measuring the patient's vital signs and using the hospital record system technology for recording. Nurse H. took advantage of the benefits of digital transformation by monitoring Mrs. R. instead of manually measuring her blood pressure every 15 minutes. Nurse H. demonstrated the importance of using information technologies in nursing care by using digital nursing technologies by remote monitoring. Nurse H. saved the labor force with the use of digital nursing technologies.

6.Creating the Borderline and Counter Case

Borderline cases are the ones that contain most, but not all, of the defining characteristics of the concept under study, while counter cases are the ones that do not represent the

concept and do not contain any of the defining characteristics.

"In the borderline case, Nurse H. received information about the patient's health status and measured vital signs but did not use technology to record the data. She did not benefit from digital transformation by using a manual sphygmomanometer for blood pressure measurement and did not benefit from information technologies and digital nursing technologies. Thus, there was no gain in the labor force."

"In the counter case, Nurse H. did not take the patient's history and vital signs. She put fetal and maternal health at risk and administered the induction drug. In this process, she did not receive information or make an assessment. As a result, she did not use technological devices, did not benefit from digital transformation, and did not use digital nursing technologies and information technologies because she did not have any data. As a result, she could not gain from the working day."

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7. Determining the Preparatory Factors and Outcomes Related to the Concept

While preparatory factors emerge before the concept is realized, consequences emerge after the concept is formed.

Preparatory features of the concept of digital nursing:

- Collecting data
- Need for technology use
- Information and data processing
- Using information technologies
- Growing need for digital nursing technologies

Consequences of the concept of digital nursing;

- Using technology to access information
- Increasing the speed of accessing/sharing information
- Facilitating storage and use of data, appropriate documentation
- Gaining from the labor force
- Cost reduction
- Improving the quality of nursing care
- Saving time

8. Determining the Ways of Measuring the Concept

Since the concept of digital nursing is a new and still being defined concept that is involved in every stage of the health field, there is no measurement tool specific to the concept. There is a reciprocal effect between the concept of digital nursing and technology, data, information, and informatics. Scales related to these fields can be used by associating them with the concept of digital nursing. In particular, technology is the basic element of the concept of digital nursing. Scales used to evaluate the use, benefits and impact of technology in the field of health and nursing education can be applied. In addition to scales that evaluate the effectiveness of applications developed in nursing practices, the use of mobile applications and digital platforms in education can also be a measurement tool. In addition, methodological studies, case studies, and statistical analysis can be used to measure the effectiveness of digital nursing.

Conclusion and Recommendations

The concept of digital nursing has entered the field of nursing with advancing technology and has started to be used in recent years. In our concept analysis study, the usage areas and descriptive features of the concept of "digital nursing" in nursing were determined and the uses of the nursing profession and the concept of digital nursing were examined. As a result of this analysis, it has been seen that nurses can use technology to access information, improve the quality of care, and save the labor force in storing and using data.

With the concept analysis, many features such as data, digital transformation, digital nursing technologies, etc. were customized with the nursing profession. Accordingly, it is thought that the integration of digitalization with the nursing profession will contribute to clinical practices, gain from the workforce and reduce costs in the long term. With this research, it is suggested that the concept of digital nursing be clarified and brought into the nursing literature. It is thought that this clarity will contribute to the nursing profession conceptually and guide the care process.

In recent years, instructors have emphasized the need to develop teaching practices to help nurses cope with challenges. Furthermore, these challenges have highlighted the need for graduates from nursing programs to be able to communicate fluently, think critically and creatively, learn independently, and function effectively in collaborative multidisciplinary teams. In this respect, including digitalization processes in undergraduate and graduate education programs is recommended as it will increase a successful education process and adaptation to developing technology.

Ethics Committee Approval: The literature used is shown in the references section.
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What did the study add to the literature?

- Digital nursing is an increasingly important concept in the nursing literature. Today, digital technologies have an important place in nursing care.
- It has been stated that the concept of digital nursing should be clarified for nurses to integrate rapidly developing technology into their effective care.
- Awareness has been raised about including digitalisation processes in nursing undergraduate and postgraduate education programmes, increasing a

successful education process and adaptation to developing technology.

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