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Review Article

Virtual Nursing: A Conceptual Analysis

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Abstract

Introduction: Nursing has developed a variety of innovative strategies to meet the growing demand for nurses and changes in the care provision methods. Among these strategies is virtual nursing. However, there is still no comprehensive and functional definition of this concept. So, this study was conducted to clarify the concept of virtual nursing.

Methods: Walker and Avant's approach was used to analyze the concept of virtual nursing. The keywords virtual nursing and virtual nurse were searched without time limit in English databases such as Science Direct, SCOPUS, PubMed, and Google Scholar. Finally, 38 studies with inclusion criteria were included in the study.

Results: The concept of virtual nursing has emerged as a result of performing nursing activities in a virtual space. Virtual nursing means the provision of nursing services to recipients in a virtual space using technology and communication technology. This concept has six defining attributes including communication, provision of nursing services, Evidence based nursing, and no location restrictions, no time limit, and occurrence in virtual media. This concept has also nine antecedents, and four major consequences.

Conclusion: A theoretical definition of the concept of virtual nursing was presented. The results of this study can be used to improve care delivery and nursing training and expand the use of this concept in care, education, and research.

Introduction

In recent years, healthcare systems, particularly in the field of nursing, have been under increasing pressure due to several converging challenges. These include rising healthcare costs, persistent labor shortages, and a growing population with chronic illnesses and long-term care needs. As a result, financial and human resources have become increasingly strained, making it difficult to deliver high-quality care using traditional methods alone.[1,2]

Telenursing is one approach used to address these challenges and deliver high quality care. The first documented telenursing case was reported in 1974 when Mary Quinn cared for patients remotely at Boston's Logan Airport.[3] In 1998, the American Nursing Association redefined telenursing to encompass more than just follow-up phone calls.[4] According to this definition, telenursing encompasses all steps of the nursing process, including assessment, planning, implementation of care plans, and evaluation of care outcomes.[3,5]

Over time, telenursing practices have continued to evolve in parallel with technological advancements. As part of this progression, virtual nursing has emerged as a modern extension of telenursing, utilizing more interactive and real-time technologies to support remote care delivery.[3,5] This shift represents a natural development in the use of digital tools by nurses to meet growing healthcare demands and improve patient access and outcomes.[6]

With the worldwide increase in the use of virtual space, the number of people seeking health care through virtual space is also increasing.[1] As the largest group of care providers, nurses play a major role in delivering virtual care.[7] Although virtual nursing is not a complete substitute for clinical nursing, especially in aspects of care that require physical interventions, it can serve as an effective and supportive tool for health education and care training.[8] The importance of this approach was especially highlighted during the COVID-19 pandemic, when a large number of patients required care during home quarantine, and many nurses needed training and in-service education.[9] Based on Rogers' innovation diffusion theory, Lewin's change theory, and Lai's technology acceptance model, when patients and nurses encounter new conditions or environments, care provision methods should also adapt accordingly.[5]

Telenursing has also undergone changes with the onset of the COVID-19 pandemic, with nurses increasingly turning to virtual care delivery methods to meet society's needs.[10] These methods have enabled nurses to reduce their workload and provide the right care, at the right time, and in a more cost-effective manner to clients and people in need of health care.[5,11]

Review Highlights

What is the current knowledge?

- Nursing has adopted innovative strategies to address workforce shortages and changes in care delivery, including virtual approaches.
- Virtual nursing has emerged with advances in information and communication technologies and increased demand for remote care.
- There is no clear and comprehensive definition of virtual nursing, which has led to conceptual ambiguity in practice and research.

What is new here?

- This study clarifies the concept of virtual nursing using Walker and Avant's concept analysis method.
- A theoretical definition along with six defining attributes of virtual nursing was identified.
- The findings provide a clear conceptual framework that can support nursing practice, education, and research.

Over time, various definitions of virtual nursing have been presented. However, there is still no consensus on the definition of this concept. Schuelke et al[12] considers virtual nursing as a part of nursing, in which an expert nurse oversees patient care remotely from a command center located away from the patient care unit. However, according to Bickmore et al[13] virtual nursing is provided by a nurse assisted by a robot. The nurse first collects information, categorizes it, and presents it to the robot. The patient then interacts with a virtual nurse, represented as an avatar that conveys information.

In the Mercy virtual care center recognized as the first care facility providing services exclusively through telemedicine care providers use technologies such as cameras and sensors to examine patients in the hospital, physicians' office, or even at home. Care is then guided by the virtual nurse and in collaboration with nurses working in the hospital, in the office and with the involvement of the patient's family.[14]

In recent years, with the increase of chronic and emerging diseases and the growing elderly population, nurses need to use virtual nursing more than ever. Although nurses are at the forefront of health technology use and development[15], the lack of a clear definition for virtual nursing that can cover the various dimensions of this term continues to hinder its widespread application. By identifying key elements and attributes of virtual nursing, this analysis can assist nurses in delivering better care and training. Furthermore, the clarification of this concept can support its application in nursing management, education, and research.

To achieve a Precise definition of a concept, it is useful to use concept analysis approaches. Concept analysis is carried out with different approaches that vary in both method and purpose. In this study, we employed the Walker and Avant approach, which is one of the methods of conceptualization and concept evolution.[16] In this eight-step approach, the process of analyzing and dissecting is carried out to reach a clearer understanding. In this approach, the characteristics of a concept are first determined and then the concept is distinguished from other similar concepts.[16]

The novelty of this study lies in its systematic conceptual analysis of virtual nursing using the established Walker and Avant approach, aiming to identify its key attributes, antecedents, and consequences. By offering a clarified and operational definition, this study contributes a theoretical framework to support further research and informed practice in the field. The purpose of this study was to conduct conceptual analysis of virtual nursing using Walker and Avant's model. Accordingly, we reviewed the existing literature and proposed a conceptual definition of virtual nursing within the context of nursing.

Materials and Methods

This Conceptual Analysis was conducted according to the method proposed by Walker and Avant. This widely used approach in nursing is well known among nursing researchers. However, some researchers argue that its rigid structure may restrict rather than clarify concept but it is very useful for researchers new to concept analysis. Walker and Avant's method involves eight steps: Select a concept; determine the aims or purposes of analysis; identify all uses of the concept that you can discover; determine the defining attributes; identify a model case; identify borderline, related, contrary, invented, and illegitimate cases; identify antecedents and consequences; and define empirical referents.[16]

The keywords virtual nursing, virtual nurse, online nursing, online nurse, digital nursing, and digital nurse were used to search the title, abstract, and keywords of articles accessible in Science Direct, SCOPUS, PubMed, Google Scholar, and medical dictionaries. The search results were linked using the Boolean operator "AND". Articles were saved with the author's name, title and year to check for duplicates. The Boolean operator "AND" was used to combine the search results (Box 1). To check for duplicates, articles were saved with the author's name, title, and year. EndNote20 software was used for this purpose.

The initial search yielded 514,106 articles. Articles were excluded if they were duplicates, unrelated to the topic, lacked authorship, or did not have full-text access (Figure 1). Relevance was determined primarily through title and abstract screening; in cases where relevance remained unclear, full-text review was conducted. The Critical Appraisal Skills Programme (CASP) checklists were used to assess the quality of the remaining studies.[16] The checklists for interventional, cross-sectional, case-control, and cohort studies comprised 11, 12, 11, and 12 items, respectively. The items were then scored as "yes: 1", "cannot say = 0.5" or "no = 0", based on the recommendation of Ricoy-Cano (2020). Articles that

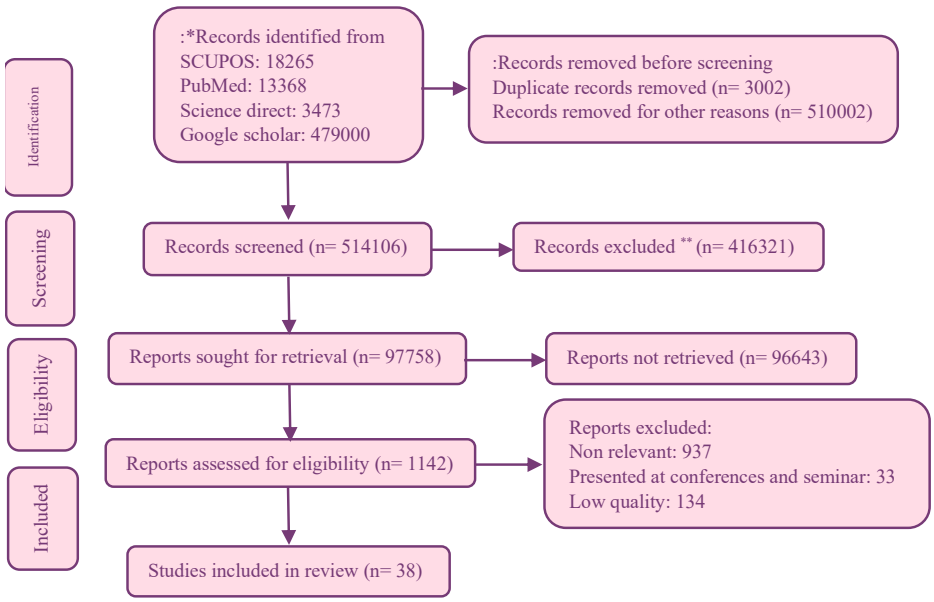

Figure 1. Flowchart of the study selection process of the Conceptual Analysis

received two-thirds, half, or less than half of the respective points were categorized as high, medium, and low quality, respectively.[17,18]

Inclusion criteria were including: Availability of the full-text article; having an English abstract; publication date up to September 30, 2023; examination of the concept of virtual nursing or its application, characteristics, predictors, consequences, and related instruments; a medium or high-quality score on the relevant CASP scale. Duplicate articles and articles deemed irrelevant after review of their titles and abstracts were excluded from the study.

It should be noted that Walker and Avant state that reviewing all the literature for concept analysis will be extensive and may lead to feelings of failure and helplessness for the researcher. However, it is not necessary to read all the sources. Definitions and applications of the concept should be sought.[16] Studies were included if they provided information on definitions of virtual care and its characteristics, antecedents, consequences and measurement methods, had inclusion and exclusion criteria and met most or all of the checklist criteria (they were classified as high quality because they showed greater methodological rigor and validity). Any uncertainty related to the paper selection was resolved through discussions between these all authors. Finally, 38 articles were used in the present conceptual analysis (Table 1).

Results

In recent years, virtual nursing has expanded significantly for various reasons, including technological developments and the spread of emerging diseases such as COVID-19.[37,48] Virtual nursing is a practical tool for developing patient-centered care.[10] This concept can be used in all kinds of nursing interventions, such as behavior change, treatment support, health monitoring, education, triage, support, and screening.[10] Because of the importance of virtual nursing, researchers have conducted various studies on this topic in recent years, but due to the dynamic and evolving nature of virtual nursing, there is still no complete and working definition for it. Therefore, clarifying and analyzing this concept will help identify, evaluate, and improve nursing services and care at all levels, including education, research, and care management.

The current study aimed to investigate the meaning of the concept of virtual nursing and its attributes. To operationalize this concept, examples of the application of virtual nursing are also described to enhance the understanding of this concept.

Identify all uses of the concept

The concept of virtual nursing consists of two concepts: Virtual and nursing. The English word "virtual" is made up of two words: "visible" and "vanishing". Visible means to be seen, and the states of being visible while vanishing means disappearing from sight.[29]

In the Oxford Dictionary, the term "virtual" means something created using computer software.[49] In the Merriam-Webster Dictionary, the term "virtual" defines being on or simulated on a computer or computer network.[50] The Oxford Dictionary nursing as the profession or skill of caring for the sick or injured.[51] The Merriam-Webster Dictionary the duties of a nurse, a person who cares for the sick or infirm.[52]

The first evidence of telenursing dates back to 1974, when a nurse cared for patients remotely at Logan Airport. Over time, this type of nursing took various forms; one of its branches is virtual nursing, which was initially used to a limited extent.[3] However, in the 21st century, with the rapid development of technology and the emergence of COVID-19 disease and the special need for extensive remote communication, virtual nursing as a model of nursing care spread rapidly worldwide.[53] Virtual nursing improves access to remote care, removes communication barriers between nurses and clients, and

Table 1. Articles used for concept analy

	Consequences	attribute	Antecedents	Author, year
1	HMA Ali[19]	-	Establishing good communication between the nurse and care recipient. Providing services that are consistent with nursing goals, accurate and practical.	Profession-related consequences: efficient and safe nursing care.
2	Roberson et al[20]	-	Information transmitted by monitors to the nurse	-
3	Park and Kim [15]	-	-	Consequences related to the service recipient: easier and faster access to care. The consequences related to the service recipient: receiving optimal care. Organization-related consequences: fewer healthcare errors.
4	Shin and Rim [21]	-	-	Consequences related to the service recipient: easier and faster access to care. Organization-related consequences: fewer healthcare errors, fewer near invent
5	Tudorache et al [22]	-	-	The consequences related to the service recipient: streamlined discharge process. Organization-related consequences: patient satisfaction with the organization, prevention of readmissions, and provision of high-quality interpersonal interactions.
6	Haryanti[23]	Care recipient-related antecedents: familiarity with the virtual space, access to the virtual space, and the ability to use virtual nursing.	Making decisions based on the knowledge and experience of the nurse and the characteristics of the person. Access to different levels of services in all locations.	The consequences related to the service recipient: receiving timely evidence-based answers from a health care provider, reduced hospital readmissions and costs.
7	Zhao et [24]	Organization-related antecedents: legislation related to the provision of virtual nursing services.	-	The consequences for nurses: reduced risk of infectious diseases. Profession-related consequences: improved nurses' professional identity.
8	Wynn et al[25]	-	-	The consequences related to the service recipient: improved quality of life, fewer complications, and greater competence in self-care.
9	Tasnim[26]	-	-	The consequences for nurses: increased job satisfaction.
10	Li et al[27]	-	-	The consequences for nurses: reduced burnout, improved critical thinking skills.
11	Osztrogonacz et al[28]	-	-	The consequences for nurses: a safer and more stable work environment. Profession-related consequences: provision of efficient and safe nursing care. The consequences related to the service recipient: improved care.
12	Ball[11]	-	Reducing the workload of nurses and providing cost-effective care.	-
13	Sandelowski[29]	-	The English word "virtual" is made up of two words: "visible" and "vanishing."	-
14	Cole et al[30]	-	-	The consequences related to the service recipient include Improved critical thinking skills.
15	Kolcun et al[31]	-	Impact positively on students' logical thinking, clinical judgment, knowledge application, emotional learning, communication and teamwork, self-confidence, and satisfaction.	-
16	Bryant[32]	-	One of the main attributes: Communication	-
17	Cloyd and Thompson[1]	Nurse-related antecedents: nurses' trust and comfort with virtual space. Organization-related antecedents: the existence of the necessary infrastructure. Organization-related antecedents: the existence of the necessary infrastructure.	Communication should be professional. Making decisions based on the knowledge and experience of the nurse and the characteristics of the person.	-
18	Zhao et al[33]	-	-	The consequences for nurses: reduced workload, fewer indirect tasks and more time for direct duties.
19	DeVolt et al[34]	-	-	The consequences related to the service recipient: deeper learning, greater self-confidence. The consequences related to the service recipient: improved critical thinking skills.

Table 1. Continued.

	Consequences	attribute	Antecedents	Author, year
20	García-Perea et al[35]	-	Lack of time limits	-
21	Wu et al[36]	-	Different applications in the nursing clinic	-
22	Lei et al[37]	-	In healthcare, virtual, digital and online technologies are being used to improve patient outcomes and facilitate access to healthcare.	-
23	Evans-Amalu and Claravall [38]	-	In healthcare, virtual, digital and online technologies are being used to improve patient outcomes and facilitate access to healthcare.	-
24	Anthony and Noel[39]	-	In healthcare, virtual, digital and online technologies are being used to improve patient outcomes and facilitate access to healthcare.	-
25	Yi et al[40]	-	-	Profession-related consequences: improved adherence to principles of professional ethics. The consequences related to the service recipient: access to primary and specialty services, particularly for vulnerable patients, patients with reduced mobility, and patients living in remote areas.
26	Sanderson et al[14]	-	Providing services can be direct or indirect. In the indirect form: services as a guide or facilitator. In educating patients: services as an educational package for patients. Making decisions based on the knowledge and experience of the nurse and the characteristics of the person.	The consequences for nurses include: easier job performance, better quality and more efficient care. The consequences for Profession: improved compliance with standards of care. Organization-related consequences include cost savings.
27	Goodwin et al[41]	-	-	Profession-related consequences: improved international communication among nurses.
28	Milne-Ives et al[10]	-	Using different virtual approaches to meet society's needs.	-
29	Sepasgozar [42]	-	In healthcare, virtual, digital and online technologies are being used to improve patient outcomes and facilitate access to healthcare.	-
30	Schuelke et al[12]	-	Communication established via a large-screen TV, ceiling cameras, and speakers a part of nursing, where an expert nurse oversight patient care virtually, from a command center remote from the patient care unit.	-
31	Christoffers et al[43]	organizational support, resource allocation, administrative support for the virtual nursing team, creating opportunities for skills development	lack of time limits evidence based practice	-
32	Schuelke et al[2]	-	-	The consequences related to the service recipient: increased satisfaction with the care.
33	Schultze et al[44]	-	Improving nursing students' knowledge, skills, self-efficacy, clinical reasoning, communication, data collection skills.	-
34	Fronczek[5]	-	No time limit Occurrence in virtual media	-
35	Boston-Fleischhauer[45]	-	Lack of location restrictions	Organization-related consequences: Facilitated collaboration between care team members, use of more innovative care models. The consequences for nurses: easier access to patient.
36	Abbott and Shaw[46]	-	-	Profession-related consequences: Improved adherence to principles of professional ethics. The consequences related to the service recipient: Access to primary and specialty services, particularly for vulnerable patients, patients with reduced mobility, and patients living in remote areas.
37	Côté et al[47]	-	The need for intimate, comfortable, and genuine communication.	-
38	Bickmore et al[13]	-	A combination of nurse and robot kiosk in education provision.	-

enables efficient and high-quality care.[19] In this way, services are provided quickly and at the right time for the person in need.[24] Given the increasing demand for nurses, the high workload and the difficulties in clinical work, virtual nursing can support nurses in the admission and discharge of patients, as well as in the implementation of care programs and patient education.[26] Studies have provided different definitions and strategies for virtual nursing. Ali HMA [19] considered virtual nursing as a form of nursing care in which nursing services are delivered remotely in an efficient, safe and cost-effective manner via technologies such as telephone, online chat and video platforms. In a study by Bryant[32] a virtual nurse provided care to patients remotely via electronic devices in hospitals, clinics or at home. With this type of nursing, there are no time or place limitations and the nurse is always in charge. Côté et al[47] used video recordings of a nurse training a patient. These videos could be accessed by patients when needed. In this way, patient felt the nurse was there when needed. In another study, applications, videos and remote monitoring systems were used to implement virtual nursing.[22] In a study by Schuelke et al[12] communication between the patient and the virtual nurse was established via a large-screen TV, ceiling cameras, and speakers. Cloyd and Thompson[1] consider virtual nursing as the provision of healthcare services by experienced non-clinical nurses through virtual space. Zhao et al[33] also consider virtual nursing as a form of nursing care in which nurses and patients interact in a completely artificial world.

Studies have also shown that virtual nursing can help nurses admit and discharge patients, monitor the quality of care and patient safety, schedule visits, monitor and confirm medication dosages, and answer patient questions online. Virtual nursing has also been shown to be helpful in assessing and documenting the care process, providing patient education and instruction to novice nurses and students,[32,36,47] providing discharge instructions, monitoring patient symptoms and pain, and promoting patient safety.[22] Effective use of virtual nursing has also been shown to improve patient satisfaction, prevent readmissions, and reduce the workload of clinical nursing staff.[22]

Virtual nursing also helps nurses apply nursing theories.[5] For example, when a nurse applies Orem's self-care theory, virtual nursing can be used to provide educational, supportive, and emotional care. When using Roy's adaptation model (Roy and Andrews, 1999), virtual nursing improves patients' access, and understanding, reduces their costs, and facilitates adaptation. When applying King's goal attainment theory (1981, 1992, 2007), virtual nursing can help clients achieve health goals that are appropriate to the conditions of contemporary society. Increasingly, virtual systems also promote patients' power and decision-making abilities, helping them achieve their goals. In Peplau's model of interpersonal relationships, virtual nursing helps people use the virtual space's platforms to receive suitable care while preserving their privacy.[9]

Although the terms "virtual", "digital" and "online" overlap in the literature and are often used interchangeably, there are certain differences between these terms that distinguish them. Virtual refers to something that does not physically exist but is simulated in a computer or online environment as if it does. Virtual reality experiences, virtual meetings, and virtual assistants are among virtual phenomena. Digital refers to something electronic or computerized. It can be used to describe anything that is stored or transmitted digitally, such as text, images, or data. Digital phenomena can include digital cameras, digital music, and digital marketing. The term "online" applies only when the beneficiary and nurse use the Internet at the same time. In healthcare, virtual, digital and online technologies are being used to improve patient outcomes and facilitate access to healthcare. Virtual technologies such as telemedicine and remote monitoring are being used to provide care to patients in remote and underserved areas. Digital technologies, such as electronic health records and mobile applications, are being used to improve communication and collaboration between healthcare providers. Online activities are those in which both the care provider and the care recipient communicate simultaneously via the Internet.[37-39, 42]

Determine the defining attributes

The central core of conceptual analysis is identifying the defining attributes of a concept. These attributes should most accurately explain the concept and help distinguish it from similar concepts. Each concept has more than one defining attribute. The researcher must decide which attributes are more useful in explaining the phenomenon.[16] The defining attributes of virtual nursing are:

Communication: Communication is one of the main attributes of virtual nursing.[5,32] Both the nurse and the patient need to establish intimate, comfortable, and genuine communication.[47] This communication should be professional.[1] Communication takes place regardless of whether the virtual nurse is offline, an avatar, or a robot.[47]

Providing nursing services: Virtual nursing involves a virtual nurse providing a range of nursing services to a person in need of care. These services can be direct or indirect. In the indirect form, the service provided serves as a guide or facilitator for the service recipient. When educating patients, nursing services are an educational package for patients.[14] In some forms of virtual nursing, information from bedside monitors and nurses is transmitted to a virtual nurse who then makes the necessary decisions.[26,38]

Evidence based nursing: Virtual nursing involves making decisions based on the knowledge and experience of the nurse and the characteristics of the person being served. Indeed, decisions are made based on evidence.[1,14,23,43] In evidence-based care, not all patients receive the same package of services, but care is provided based on the patient's condition and the nurse's knowledge and experience.

No location restrictions: The lack of location restrictions

is another feature of virtual nursing.[45]Virtual nursing provides access to basic services such as consultations, visits, and education, as well as more specialized services such as monitoring and care in special departments for patients in any geographical area.[23] In addition, nurses can communicate with clients and patients and provide them with the care they need, no matter where they are.[45]

No time limit: Virtual nursing can be available at any time.[5] Therefore, people have more choices about when to request care.[5]

Occurrence in virtual media: In all types of virtual nursing, there are media such as smartphones, monitors, and robots that serve as a means of providing services.[5]

Cases

A model case exhibits all the defining attributes of concept.[16]

Identify a model case

Sarah is an 80-year-old woman who fell at home two weeks ago and experienced a femoral fracture. She underwent surgery at a specialized hospital 200 km from her home. Her fracture was fixed with an internal fixator. Sarah has only one daughter who cares for her mother, although she works outside the home. After hospital discharge, Fatimah took on the responsibility of caring for Sarah virtually. A few days after Sara's discharge from the hospital, Sara and her daughter noticed that the appearance of the surgical dressing had changed and immediately made a video call with Fatimah via a Smartphone. Fatimah warmly communicated with them, invited them to calm down, and asked them to show her the dressing area. After observing the dressing, Fatimah explained that the color change was due to natural secretions from the wound. She then posted an evidence-based booklet on postoperative wound care, showed them a video clip on wound care and dressing change, and based on her knowledge and experience, taught them how to prepare the needed materials, change the dressing, and how to move the injured leg. She observed and guided them during the dressing change. In addition, due to Sara's history of slipping in the house, Fatimah asked Sara's daughter to send her videos and photos of different parts of the house so that she could check the safety of the house. After carefully reviewing the videos and photos, Fatimah advised Sarah's daughter to install handles in the bathroom and toilet and fix the carpets on the stairs and the edges of the carpets in the hall to reduce the risk of another fall. This model case demonstrates a virtual nursing case and all its defining attributes: communication, care delivery, evidence-based care that is not limited to one place or time, and delivery in virtual media.

Additional cases

In some cases, it is difficult to define a concept based solely on its defining attributes, and the intended concept may overlap with some other concepts. Walker and Avant suggest providing examples of related, borderline, and opposite concepts to help readers distinguish these concepts from the intended concepts (Figure 2).[16]

Borderline case

A borderline case is an example that is very similar to a model case and has many, but not all, of its attributes.[16] The following example shows a borderline case for the concept of virtual nursing.

Maryam was responsible for the post-discharge care of Nazanin, a type 2 diabetic patient, who was hospitalized for several days due to a diabetic foot ulcer. During the discharge, Maryam provided Nazanin with her phone number and ID in cyberspace. When Nazanin returned home, she had questions about her diet and wound care. She communicated with Maryam online at 9:00 P.M. Maryam gave her the necessary training about consuming a snack before exercise, but also asked Nazanin to come to the hospital to be trained on how to care for her wound and change its bandages. Nazanin could only come to the hospital in the evening, but Maryam worked every morning. Finally, they made an appointment for a week later. In this case, the provision of virtual nursing was limited by time and location.'

Related case

These are cases that are related to the intended concept, but do not include all of its attributes. The related case is somehow related to the intended concept.[16]

Fatimah is a nurse who tends to teach health issues to patients through virtual space. She has created a weblog listing the various trainings that patients need. When she becomes responsible for a patient's care after being discharged from the hospital, she provides the patient with the blog address. By visiting her blog, patients can get general information about their conditions and the care they need.

Contrary case

The contrary case is an example that has none of the attributes of the intended concept.[16]

Zahra is a nurse in a general hospital located in a small town. She is responsible for the follow-up care of Narges, a 62-year-old woman recently discharged after a mild stroke. Narges lives nearby and prefers to visit the hospital in person rather than use any online service. She does not own a smartphone and feels uncomfortable with video calls or virtual platforms. Zahra and Narges meet face-to-face once a week in the outpatient clinic. During these visits, Zahra checks Narges's progress, gives advice, and answers her questions. There is no use of digital communication, no online education, and no remote monitoring. Both Zahra and Narges feel more confident with in-person interactions, and virtual nursing is neither offered nor requested in this setting.

Antecedents and Consequences of Virtual Nursing

Knowing the antecedents and consequences of each concept can help us understand not only the attributes of the concept, but also the social context in which the

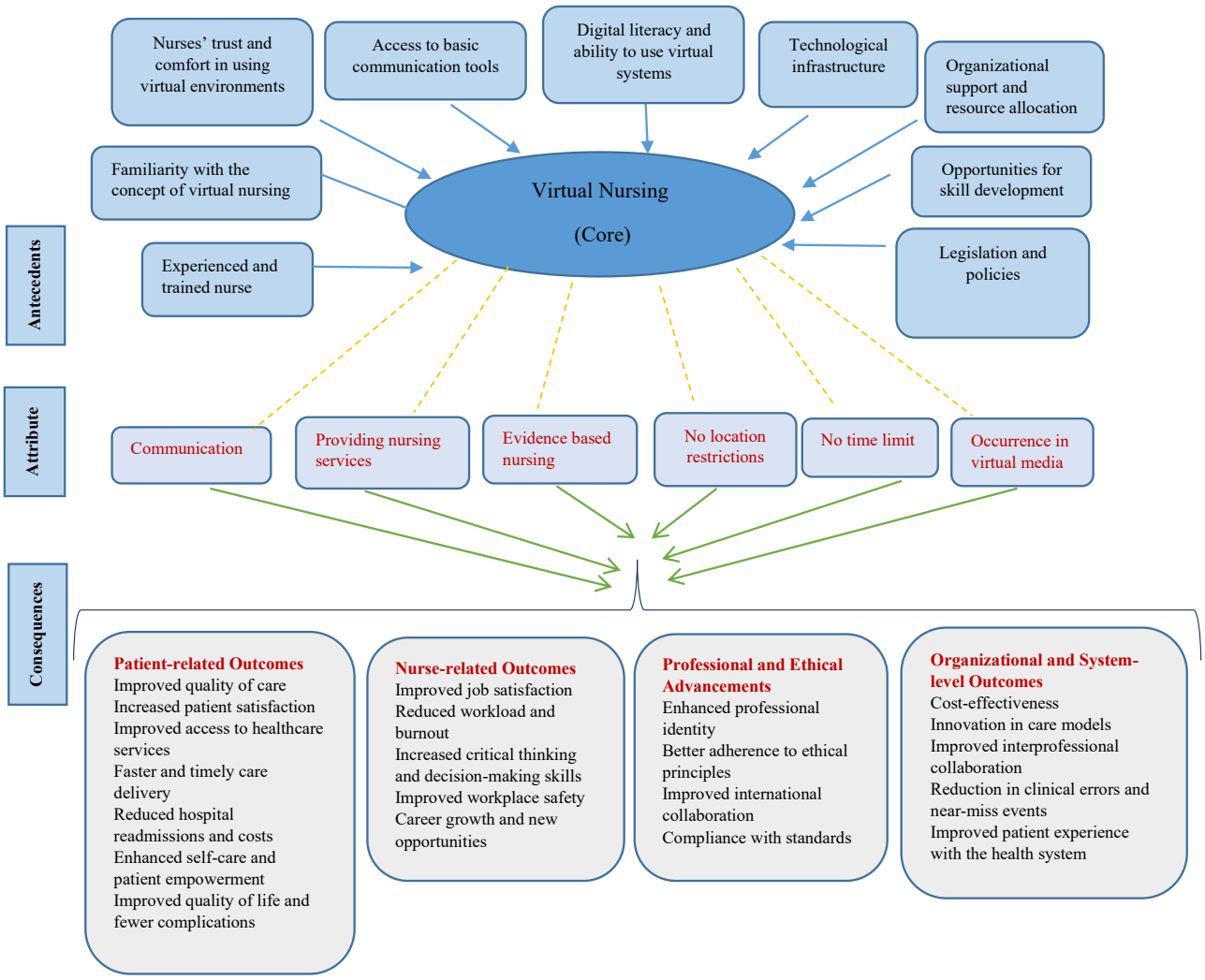

Figure 2. Attributes and Antecedents and Consequences of the concept of virtual nursing

concept is used.[16]

Antecedents of Virtual Nursing

Antecedents are events that occur before the concept.[16] The main antecedents of virtual nursing include:

Experienced and trained nurse: The presence of a nurse with adequate training and clinical experience in virtual nursing is a key antecedent.[5]

Familiarity with the concept of virtual nursing: Nurses need to understand the principles and scope of virtual care delivery.[5]

Nurses' trust and comfort in using virtual environments: Trust in the effectiveness and usability of virtual tools enhances engagement.[1]

Access to basic communication tools: The availability of internet access and telecommunication devices (e.g., telephones, smartphones) is essential for both nurses and patients.[1, 23]

Digital literacy and ability to use virtual systems: Both providers and recipients should possess the ability to navigate virtual platforms effectively.[23]

Technological infrastructure: Reliable internet connectivity, appropriate digital devices, and platform functionality are foundational elements.[1]

Organizational support and resource allocation: Support from the administration, including funding, equipment, and team structuring, facilitates virtual nursing.[43]

Opportunities for skill development: Continuous professional development and training programs for virtual care delivery are important.[43]

legislation and policies: Legal frameworks governing virtual nursing services are essential to legitimize and standardize care.[24]

Consequences of Virtual Nursing

Consequences are events or outcomes that occur as a result of the concept.[16] The consequences of virtual nursing can be categorized into four key domains: patient-related outcomes, nurse-related outcomes, professional and ethical advancements, and organizational or system-level outcomes.

Patient-related Outcomes

Improved quality of care: Patients benefit from better continuity, coordination, and personalization of care services.[28]

Increased patient satisfaction: Higher levels of satisfaction are reported due to convenience, accessibility,

and timely communication with nurses.[2]

Improved access to healthcare services: Virtual nursing enhances access for vulnerable individuals, those in rural areas, and patients with limited mobility.[40,45,46]

Faster and timely care delivery: Virtual systems enable quick and evidence-based responses from healthcare providers.[15,21]

Reduced hospital readmissions and costs: Effective follow-up and remote monitoring lower readmission rates and healthcare expenses.[22, 23]

Enhanced self-care and patient empowerment: Patients gain critical thinking, confidence, and competence in managing their own health. [25, 30, 34]

Improved quality of life and fewer complications: Through regular virtual follow-up, patients report better overall well-being and reduced adverse events.[25]

Nurse-related Outcomes

Improved job satisfaction: Virtual practice supports nurse autonomy, flexibility, and meaningful interaction with patients.[26]

Reduced workload and burnout: Decrease in indirect tasks leads to more efficient time management and less stress.[33]

Increased critical thinking and decision-making skills: Remote assessments encourage deeper reflection and clinical reasoning.[27]

Improved workplace safety: Reduced physical exposure to infectious diseases creates a safer working environment.[24,28]

Career growth and new opportunities: Nurses experience expanded roles in technology-driven care and telehealth specialties.

Professional and Ethical Advancements

Enhanced professional identity: Engagement in virtual care boosts nurses' self-image and sense of professional value.[24]

Better adherence to ethical principles: Virtual care facilitates justice, especially in reaching underserved or marginalized populations.[40,46]

Improved international collaboration: Virtual environments foster global communication among nurses and interdisciplinary teams.[41]

Compliance with standards: Nurses are better able to follow clinical and ethical standards through structured digital systems.[14,19,28]

Organizational and System-level Outcomes

Cost-effectiveness: Virtual care reduces hospital operating costs by minimizing unnecessary in-person visits.[14]

Innovation in care models: Institutions adopt flexible and scalable care delivery systems, promoting innovation.[45]

Improved interprofessional collaboration: Virtual platforms enable seamless communication among healthcare team members.[22]

Reduction in clinical errors and near-miss events: Enhanced monitoring, documentation, and communication improve patient safety.[15, 21]

Improved patient experience with the health system: Patients perceive the organization as responsive, efficient, and modern.[22]

Empirical references

Empirical referents are recognizable features of the concept and their appearance is a sign of the existence of the concept itself. The purpose of defining empirical referents is to facilitate the measurement and identification of the concept and to support the development of research instruments.[16]

Although no tools were found in the literature that directly measure the concept of virtual nursing, some studies have examined the effectiveness of different forms of virtual nursing. For example, Schuelke et al[12] showed that virtual nursing can reduce missed care. Furthermore, Kolcun et al[31] reported that virtual nursing can positively impact students' logical thinking and clinical judgment, knowledge application, emotional learning, communication and teamwork, self-confidence, and satisfaction. On the other hand, virtual nursing may cause increased anxiety, frustration with technology and access, difficulty in asking questions, and increased costs.[31] Given the nature of the concept of virtual nursing and its dependence on various factors such as the patient's condition, the type of media, and the type of care provided, it seems impossible to measure it with only one exclusive and comprehensive instrument. Therefore, the studies have only focused on the consequences of this concept. Further studies are needed to develop virtual nursing measurement tools.

Discussion

In this study, the concept of virtual nursing was analyzed using Walker and Avant`s approach.[16] Considering the rapid development of technology, analyzing this concept can help to theoretically modify the concept, increase its validity, differentiate it from similar concepts, and thereby clarify ambiguities in nursing practice and help use the concept as best as possible.[16]

Based on research findings, virtual nursing can be defined as the provision of nursing services without time and place restrictions through communication in virtual media between a virtual nurse or virtual nursing team and a healthcare recipient. The concept of virtual nursing has six defining attributes including communication, provision of nursing services, evidence based nursing, and no location restrictions, no time limit, and occurrence in virtual media.

The main antecedents of virtual nursing include having experienced and trained nurses; familiarity with the concept of virtual nursing; nurses' trust and comfort in using virtual environments; access to basic communication tools; digital literacy and the ability to use virtual systems; adequate technological infrastructure; organizational support and resource allocation; opportunities for skill development; and the presence of supportive legislation

and policies. Virtual nursing also has consequences for the nurse, the nursing profession, the service recipient, and the organization.

The most important element of this definition is the communication between the nurse and the person receiving the service. Establishing good communication between the nurse and care recipient is central to all types of virtual care, for the care to be effective.[19] For example, in a qualitative study by Côté et al., patients reported that although they communicated with the virtual nurse via video clips, they experienced a warm, humanistic, comfortable, and pleasant relationship while listening to or watching the virtual nurse.[47] Furthermore, people who received health care through virtual nursing robots reported that they did not feel like a robot was talking to them, but that they felt like they were interacting with a real human.[47]

The provision of nursing services is the second basic attribute of virtual nursing. With the increasing use of the virtual space, variety of services is provided in this way. However, in virtual nursing, the services provided, such as training, must be consistent with the goals of nursing and provide correct and practical nursing services.[19,20] In a study by Schuelke et al[2] the virtual nurse was a professional nurse who provided the nursing services needed by patients through virtual presence. Roberson et al[20] also consider a virtual nurse as an expert and knowledgeable nurse who supports patients and novice clinical nurses. The clinical nurses who participated in this study considered the continuous availability of virtual nurses as essential element in the process of virtual nursing.

Studies show that the service recipient can be a patient, a nursing student, or other nurses. [1,44,54] Schultze et al[44] reported that virtual nursing and simulation systems can be used to improve nursing students' knowledge, skills, and self-efficacy, and improve their clinical reasoning, communication, and data collection skills.

Virtual nursing is evidence-based. According to his/her experience and knowledge, the virtual nurse organizes specific services for each client.[14,43] In a study, a clinical nurse entered all the nursing information required for a specific patient on a virtual site in parallel with the paper prescriptions. Nursing education services were then provided to the patient by a robot-like kiosk located in the patient's room. If information needed to be modified or completed, the clinical nurse made modifications based on available evidence.[13]

Lake of place limitation is another feature of virtual nursing.[45] According to Schuelke et al[2] virtual nursing is a form of nursing care in which the nurse provides nursing services from a command center located far from the patient care unit. Communication between nurses and patients may also occur via wall cameras, ceiling speakers, large video screens, or small iPads. With the expansion of healthcare facilities and accessibility issues, virtual nursing can use technology and various creative and artistic methods to eliminate or minimize the difficulties in accessing healthcare services.[5,32]

Virtual nursing has no time limits. This type of care does not require arranging specific times to visit a hospital, clinic, home, classroom, etc. The nurse and the service recipient can communicate at any time.[5] Fronczek[5] and García-Perea et al[35] consider the lack of time limits as one of the main features of virtual nursing.

Another key feature of virtual nursing is that it takes place in a virtual media. As technology advances and virtual spaces become accessible to most people in different parts of the world, there is a growing desire to receive services in virtual spaces. Therefore, virtual nursing is also emerging and progressively modified to meet the needs of society in this virtual platform.[47] Schuelke et al[2] consider virtual nursing as a growing method of telemedicine. Virtual nursing was formed to complete the idea of using technology in medical science and to offer the nurse and the recipient of healthcare services the possibility of professional interaction in a virtual environment.

Conclusion

Virtual nursing is rapidly evolving and expanding. According to the results of the present study virtual nursing refers to the provision of nursing services without time and place restrictions through communication in virtual media between a virtual nurse or virtual nursing team and a healthcare recipient. The service recipient can be a patient, a nursing student, or other nurses.

The antecedents for virtual nursing fall into three categories related to the nurse, the service recipient, and the organization. The consequences of virtual nursing are also categorized into four main areas related to the nurse, the nursing profession, the service recipient, and the organization. The definition attributes, antecedents, consequences, and empirical referents of virtual nursing identified in this study can be used to improve the conditions of providing nursing services, training nursing students, training novice clinical staff, and improving the nurses' working conditions. It is recommended to carry out more quantitative and qualitative studies about virtual nursing in different patients, and to familiarize more nursing students with virtual nursing. This concept should be included in the curriculum of different level of nursing education, including undergraduate and postgraduate levels.

Among the strengths of the present study is the use of the "Walker and Avant" method, which is one of the valid and structured methods in concept analysis and can clearly help to separate and clarify the different characteristics and dimensions of a concept. Furthermore, the analysis of the concept of "virtual care" in the current situation where technology and telemedicine are expanding is very necessary and helps to better understand and develop this field.

However, the analysis carried out can remain rather theoretical and, in some cases, its practical and case-based applications in specific situations are less considered.

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Conflict of Interests

There is no Competing interest.

Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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