(REVIEW ARTICLE)

Nursing care aspects and indicators impacted by information and communication technology: Systematic review

Dalal Abdullah Al.Fandi [1, *], Zainab ibraheem Al Fadhel [2], Fatimah Abdullah Alzouri [2], Zahraa Abdulkarim ALnass [2], Zainab Qassim Alhassan [2], Fatimah rashed alahmari [3], Asma Naji Al Huwaidi [4], Suzan saud alsaeed [5], Yasmeen Abdrabulshaheed Alsukairi [6] and Maryam Hassan Al Hamadah [7]

[1] Clinical Resources Nurse /ER, Nursing Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.
[2] Staff nurse 1 / ER, Nursing Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.
[3] Respiratory therapist, Respiratory Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.
[4] Staff nurse, Medical Imaging Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.
[5] Staff Nurse, Nursing Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.
[6] Staff Nurse 1, OR-PACU, Nursing Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.
[7] Nursing shift coordinator, Nursing Department, Imam Abdulrahman bin faisal Hospital, NGHA, Dammam, Saudi Arabia.

Abstract

Background: Information technology is used in healthcare to solve the problems of an aging population, an increase in chronic illnesses, and the growing need for autonomy, independence, and quality of life. The adoption rate of IT applications among professionals such as nurses is relatively low, and it appears that not using them is the norm. Finding nursing care aspects and indications that have been altered by IT was our goal in doing this research.

Method: The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement (9) was adhered to in this systematic review. Our search objective was to locate papers that addressed nursing care aspects and indicators that were changed by IT. The search method was used in the Google Scholar, CINAHL, and PubMed databases between 2015 and 2023.

Result: Five publications were included in this systematic review. Four studies found elements related to teams that affect the adoption of telemedicine. The organizational and team culture is one of the main determinants of technology adoption. One study found that creative companies support employees in adjusting to new circumstances and that telemedicine implementation requires cultural transformation in enterprises. Implementing telemedicine in a company can be hindered by working in a changing environment and resisting change. Employees felt overwhelmed by all of the changes they experienced at work. Workloads increased as other advances were sometimes considered more significant than the use of telemedicine.

Conclusion: When technology is used improperly, nurses can get disillusioned with its use for tasks that are traditionally completed by humans. Therefore, if healthcare professionals want to include telemedicine into their regular workflow, they must remove hurdles.

Keywords: Nursing Care; Information Technology; Adoption; Nurse Team

1. Introduction

One way that the healthcare industry is addressing the issues of an aging population, a rise in chronic illnesses, and the growing need for autonomy, independence, and quality of life is through the use of information technology (IT) (1,2). IT can be utilized for at-home medical rehabilitation and may be able to detect diseases early on (3). With the use of activity trackers or other wearable sensors, such as fall detection systems or lifestyle monitoring, it can help people keep an eye on their vital indicators (4). This makes it possible for elderly individuals who are at risk of institutionalization to stay in their own homes for an extended period of time.

IT deployment is critical and urgent from the standpoints of efficiency and cost effectiveness as well as to make up for the anticipated shortages of nursing and care professionals. When used, it can increase the effectiveness of care (4,5), such as when telecare is used for patients with heart failure or at home. Officials from developed nations that utilizing IT in healthcare is crucial for boosting productivity and quality of life, but it hasn't yet fully realized the potential it presents (6).

Among professionals like nurses, the percentage of acceptance of IT applications is very low, and it seems that not using them is typical (7). The components of success and failure factors are not entirely obvious, though. Adoption, according to Straub (8), is the choice a person makes on whether to incorporate an innovation into their life or reject it. This process is not a one-time occurrence; rather, an individual's evolving views and attitudes shape their decision to accept an invention. It differs from using just one, for instance, because it is an organizational direction. Our objective in conducting this research was to identify nursing care features and indicators that have been impacted by IT.

2. Method

In this systematic review we followed, The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement (9). Finding studies discussed nursing care features and indicators altered by IT was our goal of our search. Search approach was launched in order to make sure that no literature was lacking that explained one or more of these elements and so provided fresh scientific insights in order to establish a scientific basis for this idea. The systematic literature search was designed by a group of four scholars. Between 2015 and 2023, the search technique was run in the databases of Google Scholar, CINAHL, and PubMed.

The search strategy was built using a combination of Medical Subject Heading terms and keywords related to IT, nursing, cooperation, adoption, leadership, and teams. Academic journals and peer-reviewed English-language studies covering nursing care aspects and indicators changed by IT were the only publications eligible for inclusion.

Data was extracted by team work with contribution of all authors; Google sheet and Google Document were used to extract data in predesigned table to avoid information missing or duplication.

3. Results

In this systematic review we included 5 articles (Fig 1). Four research studies (10–13) identified team factors that impact telemedicine adoption. One of the primary factors influencing technology adoption is the culture within the organization and team. According to Shah et al. (13), innovative organizations help staff adjust to changes, and cultural change is necessary for organizations to implement telemedicine. Working in a changing environment and resisting change (10,12) are barriers (12) for organizations to implement telemedicine. Staff members described the numerous changes they encountered at work as overwhelming. Other developments were occasionally deemed more important than the use of telemedicine, increasing workloads.

The significance of teamwork and communication was examined in three studies. According to Taylor et al, (12) one of the variables that contribute to enabling the deployment of telehealth is that workers work closely inmulti-disciplinary teams comprising of clinicians and technological personnel. Dunford et al. (10) state that nurses seek help from their peers rather than their superiors, highlighting the need of collaboration. According to Taylor et al. (32) trust is built between team members through information and success sharing. Task shifting results from work routines; one study examined the effects of telemedicine, BCMA, and EHR deployment on team performance (11).

Each of the five research that made up this study identified specific elements that affect telemedicine adoption. Three of the included research came to the conclusion that the adoption process of an IT system is influenced by the staff's familiarity with it (12–14). For instance, ignorance and doubt regarding a patient's fitness are the root causes of the first

unpleasant encounters (12). Conversely, the technology acceptance process is aided by nurses' perceptions of its value and simplicity of use, as outlined in the Technology Acceptance Model (14). Staff self-motivation to utilize the system is influenced by attitudes and contentment with the system, assessments of its quality, and expectations for it (14). According to one study (12) comprehension of the system's objectives and worth, along with its recognized advantages, impact the adoption procedure (Table 1).
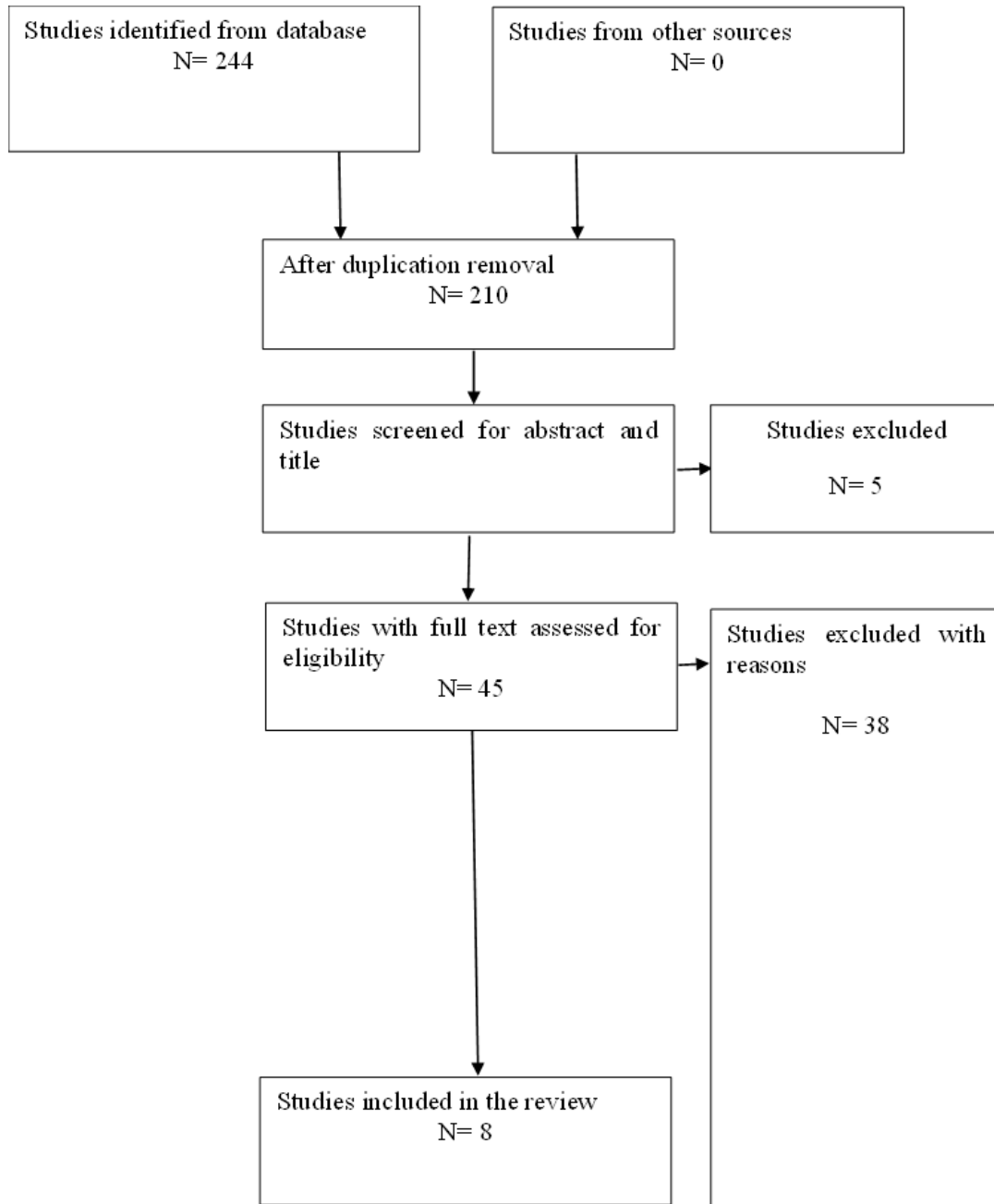
Figure 1 PRISMA consort chart of the selection process

Table 1 Characteristics and main findings of the included studies

Citation	Country	Sample size	Study aim	Method	Main findings
Dunford et al., 2017 (10)	USA	1029	Researchers looked into how nurses felt about smart infusion drug pumps in order to offer evidence-based recommendations for lowering workarounds and enhancing adherence to patient safety regulations.	Through Qualtrics, an anonymous online poll was used to gather data.	A high level of satisfaction with smart infusion pumps was reported by the nurses. They did note a number of organizational, cultural, and psychological factors that contribute to smart pump workarounds, though. From the 1029 open-ended answers to the query, "Why do smart pump workarounds occur?" About 44% of the issues had to do with technology, 47% had to do with organizations, and 9% had to do with personal aspects. Last but not least, a resounding majority of nurses stated that they learned most of their skills on the job and that they asked colleagues for advice when they had smart pump issues.
Rasmussen et al., 2015 (11)	Denmark	17	This study set out to investigate organizational changes by looking at how healthcare professionals perceived the use of telemedicine in treatment delivery.	The authors carried out an organizational analysis in relation to a randomized controlled trial of telemedical assistance for patients in the Southern Denmark region who had diabetic foot ulcers. The Model of ASsessment of Telemedicine (MAST) was used in the trial's design to provide a multidisciplinary evaluation of outcomes. Eight semi-structured interviews were carried out by the authors, comprising focus groups with the clinical staff and individual interviews with leaders and an IT specialist. A qualitative data analysis of the interview data was also conducted.	The telemedical arrangement boosted the visiting nurses from the municipality's wound care skills and gave collaborators more confidence. The impact was associated with direct communication between specialty physicians and visiting nurses. It was noted that putting a strong emphasis on visiting nurse training was essential to the implementation's success. There have been concerns expressed about the absence of multidisciplinary wound care teams, patient accountability, and low patient-physician engagement.It was also emphasized how important clinical recommendations will be for future adoption.
Asiedu et al., 2019 (14)	Australia	49	To comprehend how video telemedicine for neonatal resuscitation is integrated, used, and accepted by	Six connected health system facilities provided 49 healthcare professionals for focus groups and individual interviews. Information was obtained from doctors and nurses. Thematic analysis was used to inductively assess the data, and then	While teleneonatology was acknowledged by the local medical community as a valuable and helpful service, its deployment was seen as a challenge to established professional practices. Perceived benefit, mutual comprehension of the rules and expectations

			medical personnel in community hospital settings.	deductive application of normalization process theory (NPT) constructs was made. In order to explain and evaluate how care teams view the application of teleneonatology and how they engage with this telemedicine service in their local context, NPT provided a general framework.	of use, as well as other relational, interpersonal, contextual, and systemic elements, may all influence utilization. Participants in this study agreed on the need for group work to successfully integrate teleneonatology into the local practice.
Taylor et al., 2015 (12)	United kingdom	105	The acceptance of telehealth by front-line workers will be examined, and obstacles and facilitators to the effective implementation of remote monitoring for patients suffering from chronic heart failure and chronic obstructive pulmonary disease will be noted.	Qualitative interview thematic analysis	Regarding the reasons for investing in telehealth and its possible influence on nursing responsibilities, staff attitudes ranged from reluctance to enthusiasm. Having reliable and adaptable technology and committed resources for telehealth work were highlighted as vital in helping to overcome early barriers to acceptability, coupled with adequate staff training and a partnership approach to implementation. Early successes were crucial in promoting telehealth use among staff members, enabling clinical learning, and boosting uptake.
Shah et al., 2019 (13)	United kingdom	34	As end users of mobile technologies, healthcare workers' perspectives were examined in this study to help shape the conditions for a successful transition to a mobile-first workplace culture in secondary care.	At a UK academic hospital, extensive interviews and focus groups with nurses and other healthcare professionals were undertaken. During the interviews, nurses and other healthcare professionals shared their opinions on using mobile technologies in their clinical work as well as their experiences with prior technology rollouts.	Participating were 34 nurses and other medical professionals. Three main topics emerged: managing the speed of change, addressing data governance and accountability for mobile working, and incorporating mobile working into medical care. The degree to which mobile working improves clinical practice while maintaining end-user confidence will determine whether it is accepted. Other important considerations include assessing the effect of administrative burden on workload, alterations to professional accountability, and patient data security. The rate of change must also be suitable for all parties involved.

4. Discussion

Finding nursing care features and indicators altered by information and communication technology was our goal in doing this review. The results imply that the adoption of IT in the healthcare setting is influenced by the cooperation of nurses within the team as well as by other disciplines.

Most of research offer broad insights into the adoption of innovations; however, precise information regarding the elements that impact the adoption process is lacking. There was no study that offered details on a combined strategy that considered teamwork, leadership, individuality, and collaboration. This could be brought about by the lack of a thorough summary of the relevant factors and a strong theoretical foundation to support such a research strategy. All things considered, even though the studies' scientific validity is debatable, this review sheds light on the significance of leadership, cooperation, and teamwork.

The visiting nurses in the Rasmussen et al., 2015 (11) study thought the new mode of communication was a stimulating process for their professional and educational development. This impression is consistent with prior research Along with Quinn et al., Ameen et al. discovered a notable improvement in the areas of dressings, management, and claim, which may have a positive impact on patient outcomes (15–17).

There was a significant patient empowerment problem brought up. The visiting nurses believed that patients were less empowered while utilizing asynchronous telemedical consultations because there was no connection between the patient and the physician. Due to the direct communication between the patient and the doctor from the outpatient clinic, synchronous telemedical consultations appear to enable patients to actively engage. Patients can access their online health records during the asynchronous telemedical consultation, which can significantly improve their psychological well-being (18,19).

Barrett et al. came to the conclusion that one of the main reasons the telemedical setup's adoption failed was a staffing deficit (20). During vacations or sick days, the participants in the Rasmussen et al., 2015 study faced a similar difficulty. Because there were only so many visiting nurses with telemedicine and wound care training in each municipality, no other visiting nurse was able to perform the telemedical consultation in these circumstances.

The most recent discovery that occurs when a pandemic spreads over the world intensifies the need for IT to be used in healthcare (21). It is also important to understand how IT may support nurses, their patients, and families, as well as how care companies should structure their teams, particularly in light of the COVID-19 epidemic. A pandemic, for example, could affect the adoption level in addition to influencing elements like leadership, teamwork, and individual or collaborative characteristics. IT use may be positively stimulated by the pressing need to use technology, which may outweigh all other factors (21). However, more empirical data is required to determine the relationship between nurses' use of IT and the influencing elements of teamwork, leadership, individual, and teamwork.

5. Conclusion

When there are obstacles to the proper use of technology, nurses may get disenchanted with its use for duties that are customarily performed by humans. Therefore, removing obstacles is essential if healthcare workers are to integrate telehealth into their daily workflow. NPT discovered that strong interpersonal linkages between care teams, ongoing programmatic training and education, and effectively explaining the therapeutic value of IT—including its advantages and opportunities—may all contribute to the successful implementation of IT program. There are several significant characteristics, such as the training provided by visiting nurses on wound care, the emphasis on management, the economy, time off from work, and clinical treatment.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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