The Impact Of Technology On Nursing Responsibilities And Practice In The Future: A Systematic Review Of Recent Evidence

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Abstract

Background: Nurses are increasingly using information and communication technologies (ICTs) to provide high-quality healthcare. The manner that nurses plan, provide, record, and evaluate clinical care can all be altered by their use of ICTs.

Aim: This research aimed to create a comprehensive picture of the reviews.

Results: The practicing environment for nurses, nursing procedures, satisfaction with work, and nursing-sensitive results

were the main results. The viewpoints of nurses regarding their level of satisfaction or discontent with ICTs comprised the additional results.

Method: A comprehensive examination was conducted on 20 studies or descriptions to determine whether they were eligible and 10 publications' complete texts were obtained for in-depth analysis. 10 reviews that were released during 2018 - 2023 were determined to be eligible.

Conclusion: ICTs significantly influence nursing care themes like time management, patient care, documentation, information quality, nurse autonomy, collaboration, competencies, patient-patient relationships, evaluations, treatment planning, patient teaching, communication, care coordination, satisfaction, comfort, life satisfaction, empowerment, and functional status.

Keywords: Nurses, Information and communication technologies (ICTs), Health care, Documentations, Patients, Satisfaction. aspects and markers of nursing care that might be impacted by technology use in the future by conducting a review of systematic

Introduction

Background

In the contemporary landscape of nursing, the utilization of Information and Communication Technologies (ICTs), also known as e-health services, is becoming increasingly indispensable. According to Martinez and Jones (2018), this integration heralds a significant paradigm shift, fundamentally altering the traditional processes through which nurses acquire and assess diagnostic data, make clinical decisions, engage with patients and their families, and administer therapeutic treatments. The article contends that the widespread adoption of ICTs in nursing practice holds the promise of not only streamlining these critical aspects but also ushering in improvements in efficiency and the overall quality of patient care. (Altalhi et al., 2023; Yakout et al., 2023; Noshili et al., 2023)

As per Schmidt et al. (2023) studies, ICTs are employed in many different ways to assist and deliver healthcare.

Computerized (CDSSs) comprises information systems, systems for management, and communication networks are the four broad e-Health areas that Mair et al. proposed. These fields encompass a wide range of technology. Electronic health records (EHRs) and electronic medical records (EMRs) are examples of patient-related procedural or medical activities that may be collected, stored, transmitted, and displayed with the use of management systems. Systems of communication can be employed for administration, guidance, instructional assistance, or diagnosis (Schmidt et al., 2023; Al Ali et al., 2022; Alselaml et al., 2023; Alselami et al., 2023; Alruwaili et al., 2023).

They may be used to improve interactions among medical personnel and patients, as well as between medical experts. There are many different kinds of communication systems, ranging from telemedicine and telecare systems to email and cell phones. Automated CDSSs are systems that may be accessed by a variety of devices, including PDAs, computers, and mobile phones. These help health professionals make decisions and help them follow clinical standards and care pathways in their practice According to author Nevers and Burgers (2022) The term "information systems" refers to the utilization of internet technologies for accessing sources of information concerning health, including Web-based services and eHealth portals (Nevers & Burgers, 2022)

According to McGonigle and Mastrian (2020), Many ICTs may be used to assist intricate and varied nursing practices and interventions, however not without difficulties. Certain ICTs, such electronic health records and digital nursing care initiatives, make patient data easier to access and aid in the planning and documentation of nursing care. (Alruwili et al., 2023; Noshili et al., 2023). Still, nurses are required to switch from records maintained on paper to electronic systems in order to document patient care using these technologies. The preciseness and intellectual stimulation of electronic nursing records may be impacted by features (such as drop-down options, electronic interfaces, and copy-and-paste capabilities) (McGonigle & Mastrian, 2020). As per research of Curley and Stone (2023) When it comes to tele-monitoring, or remote patient monitoring, nurses need to be able to evaluate a lot of data from the system (such as symptoms and vital signs) and then apply clinical judgment to appropriately address each individual's condition. To interpret signs from

electronic encounters, specialized communication skills active listening, discussion facilitation, asking questions, reorienting, and verifying remain crucial (Curley & Stone, 2023)

As per Walker and Jackson (2019) research, ICTs are starting to encourage nurses to provide high-quality healthcare. Studying how nurses utilize technology in the clinical setting and how technology affects nursing procedures is therefore pertinent. Any kind of technology used to give patients direct or indirect treatment has the potential to change nurses' daily work practices. Such evaluations lacked a conceptual framework that would have allowed for reflection on how ICTs could affect nursing care outcomes and poorly defined practices in nursing or care. To close this discrepancy, we adopted a multifaceted view of nursing care by using a wide and thorough conception of nursing care that was centered on the nursing care performance framework (NCPF). Three separate but connected subsystems make up the NCPF: patient conditions, nursing services, and nursing funds. In order to create nursing services that successfully improve patients' circumstances, an organization or organizational unit must possess the capacity to obtain the necessary resources for nursing and employ them in an environmentally friendly way (Walker & Jackson, 2019)

However, according to Ortega and Mariana (2023) due of the diversity of ICTs employed in the literature and the inadequate conceptualization of nursing care, an integrated body of research about the implications of ICTs on nursing care was absent. A review of the systematic reviews is presented in this article to provide a comprehensive picture of the nursing care indicators that the implementation of modern technologies can enhance or limit. An intriguing place to start when comparing and contrasting the findings of different evaluations about the benefits, drawbacks, and neutral impacts of ICTs on the care of nurses is with an overview (Ortega & Mariana, 2023)

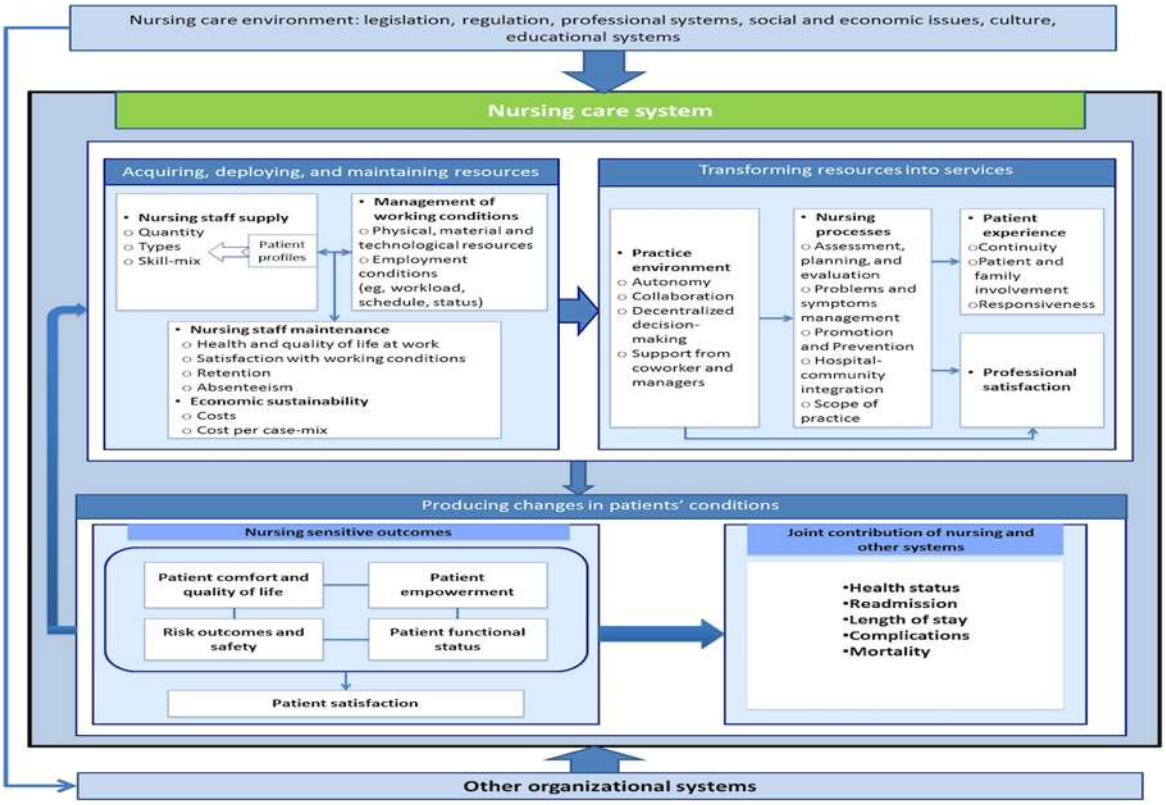
Objectives

To carry out a systematic review overview to methodically compile the evidence pertaining to the impact of technological developments on nursing care that comes from mixed-method, qualitative, and quantitative systematic reviews.

Nursing Care Performance Framework

As per Schmidt et al. (2023) framework for organization was utilized to show how ICT interventions affect nursing care and have an impact on health outcomes. The NCPF is a component of pioneering efforts to understand nursing care performance and is an overview of the latest current advances in the area. The foundation for conceptualizing nursing service efficiency is a system viewpoint that draws on Parsons' theory of social action, Donabedian's earlier writings on the healthcare organization as well as the theory of systems (Schmidt et al., 202)

This model, illustrated in Figure 1



According to McGonigle and Mastrian (2020) studies, the framework, which consists of 14 elements and 51 indicators, illustrates how three nursing subsystems resources, procedures or services, as well as patient outcomes interact to accomplish three primary goals: (1) obtaining, allocating, and preserving nursing resources; (2) converting the resources of nursing through nursing services; and (3) causing modifications in patients' conditions as a

result of nursing care rendered (also known as "nursing-sensitive outcomes"). The very first function talks about the material and human resources such as staff regular consumption, working environment, and nursing staff supply that are required to deliver quality nursing care. Nursing procedures (such as assessment, treatment scheduling, and evaluation; issues and symptom management), practice settings (such as nurse autonomy and cooperation), nurses' fulfillment as professionals, and patient experiences are all included in the second function. Improving patient conditions is the intended outcome of interactions among nursing personnel and nursing procedures. Then, the third function also referred to as "nursing-sensitive outcomes" is defined as the favorable alterations that might be observed in patients (McGonigle & Mastrian, 2020)

Our primary goal in extracting information on nurses from this review was to do so. For example, a systematic review was eliminated if its findings described nursing resources, services, or procedures alone, and only in relation to patient outcomes. However, as far as they could be connected to nurses' use of ICTs, we took nursing-sensitive outcomes that is, patient outcomes into consideration.

Methods

Overview and Eligibility Criteria

The overview was developed using the Cochrane Collaboration approach and other pertinent publications in this field. PICOS (participants, initiatives, contrasts, outcomes, survey design) was used to establish the scope. Eligible papers included all varieties of qualitative aspects, mixed-method, and quantitative analyses published in English starting on January 1, 1995, with the goal of assessing the impact of ICTs (four eHealth domains) utilized by nurses on nursing care. The potential to increase knowledge about how ICTs affect nursing care justifies the selection of evaluations that employ a variety of methodological techniques. The target groups were registered nurses (RNs), aspiring nurses, and nurses in training, and patients who were getting quality RN care via ICTs. The usage of ICTs covered by the four-eHealth domains management systems, communication systems, CDSSs, and information systems suggested by Mair et al. were the interventions that were addressed. The exclusion of certain ICTs

occurred from the following: (1) nurse management programs, that have a primarily administrative in nature and are intended to manage human resources, working conditions (e.g., scheduling), and nursing personnel maintenance (e.g., retention); (2) educational organizations, such as e-learning programs used for nursing student training, unless they are utilized to guide treatment of patients; and (3) telephone systems, which are not technological devices and thus cannot accommodate the electronic capture, preservation, analysis, and distribution of information since they are not classified as ICTs. Table 1 provides more information on the inclusion criteria used to choose systematic reviews.

Table 1. Inclusion criteria for the selection of systematic reviews.

CRITERIA	DESCRIPTION OF INCLUSION CRITERIA
TYPE OF REVIEWS	Reviews that evaluated the impact of ICTs (four eHealth domains) applied by nurses on the care they provide, whether qualitative, mixed-method, or quantitative, all included a methodology (a "Methods" section) with clear eligibility criteria, systematic methods for conducting research to identify selected reviews, and a systematic presentation along with overview of the features and results of the included reviews.
PUBLICATION TYPE	Reviews published in English from January 1, 2018.
POPULATION	RNb, nurses in training, nursing students, or patients receiving care from qualified RN through the medium of ICTs.
INTERVENTION: ICTS COVERED BY FOUR EHEALTH DOMAINS	The review took into account the following four eHealth domains: information systems, electronic systems for decision-making, management systems, and communication systems. ICTs are all information and communication technologies that facilitate the electronic gathering, storing, processing, and sharing of data for the purposes of managing chronic illness, promoting health, and treating disease.
MANAGEMENT SYSTEMS	Computer-based systems known as management systems are used to gather, store, send, and present administrative or medical patient data from many sources. They can assist with clinical or administrative tasks. Some instances of systems for management are health information systems as well as private medical records.

COMMUNICATION SYSTEMS	In situations when users are separated by time or place, telecommunication technologies are used. This type of communication occurs between medical experts, or between patients and their health care providers or caregivers, either synchronously or asynchronously. It entails the deliberate exchange of data for diagnostics, administration, counseling, instructional, or support reasons between particular people, or between people who play different roles. There are many different kinds of communication systems, ranging from healthcare and telecare systems to email and cell phones.
COMPUTERIZED DECISION SUPPORT SYSTEMS (CDSSS)	Alludes to a computerized system designed to assist medical practitioners in adhering to clinical norms and treatment protocols. These systems often run in real-time and use computational intelligence (software, for example) to facilitate decision-making.
INFORMATION SYSTEMS	Are characterized by the utilization of technology for the internet to get access to many information sources, including health and wellness information. The content is still generic and not customized to meet the needs of any one person. Information systems include things like digital health portals and web-based tools for information retrieval.
COMPARISONS	Usual care, any other ICT, and other types of interventions.
OUTCOMES	Nursing resources, the working atmosphere of nurses, nursing procedures or the area of practice, career fulfillment, and nurse-sensitive outcomes (i.e., the satisfaction of patients, such as safety and risk outcomes, the comfort of patients, and the standard of life associated with care) were the main results. The pleasure or unhappiness of nurses and patients with ICTs was one of the additional results.

AICTs: information and communication technologies.

BRN: registered nurse.

Search and study selection Strategy

From January 1, 2018, the following electronic databases were used in research: Web of Science until January 9, 2018; the Cumulative Index to Nursing and Allied Health Literature (CINAHL) until December 25, 2020; PubMed until December 8, 2021;

Embase until January 7, 2022; Cochrane Database of Systematic Reviews until January 15, 2013; Epistemonikos until January 25, 2021).

Thesaurus words from each database, such as Medical subject heading (MeSH) for PubMed, were used to construct structured search techniques. Free text was used to target the "title" and "abstract" sections. After then, the tactics were modified for both additional databases. Duplicate cites were eliminated after the findings of every database search were compiled into a single source database.

Table 2: Selected Studies for Systematic review

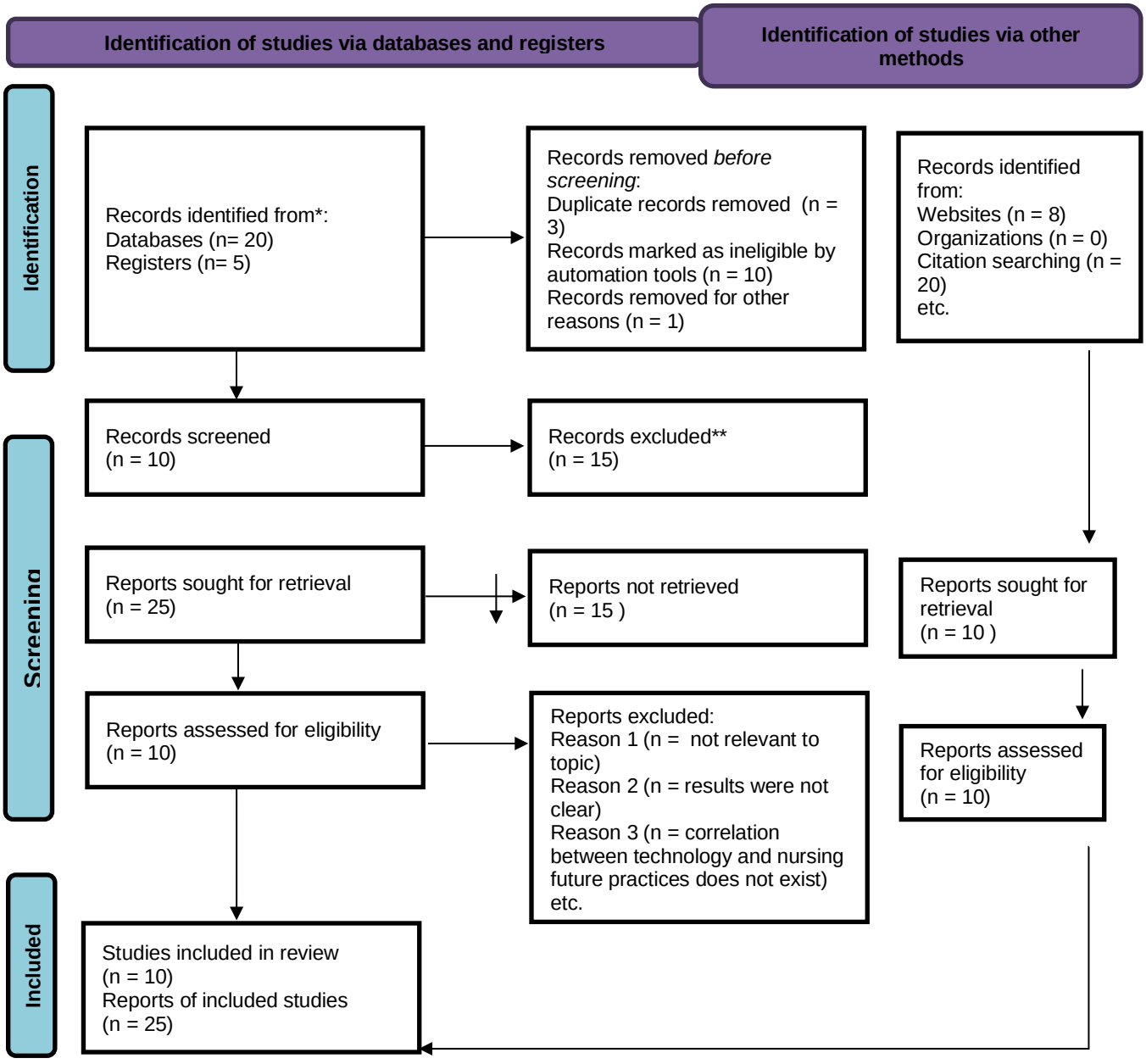
Serial No.	Author	Research	Year
1	Schmidt, Nola & Janet et.al (2023)	Evidence-based practice for nurses: Appraisal and application of research.	2023
2	McGonigle, D., & Mastrian, K. (2020)	Nursing informatics and the foundation of knowledge. Jones & Bartlett Learning.	2020
3	Chang, E., & Hatcher, D. (2021)	Transitions in nursing: Preparing for professional practice. Elsevier Health Sciences.	2021
4	O'Connor, S., Yan, Y., Thilo, F. J., Felzmann, H., Dowding, D., & Lee, J. J. (2023)	Artificial intelligence in nursing and midwifery: A systematic review. Journal of Clinical Nursing,	2023
5	Duffy, J. R. (2022)	Quality caring in nursing and health systems: Implications for	2022

		clinicians, educators, and leaders. Springer Publishing Company.	
6	Lee & Williams. (2019)	The impact of computerized decision support systems on nursing practice: A systematic review.	2019
7	Martinez & Jones. (2018)	Examining the effects of communication systems on nursing care outcomes: A mixed-method review.	2018
8	Clark & Thompson. (2018)	Information systems in nursing practice: A scoping review.	2018
9	Walker & Jackson. (2019)	Advancing nursing care through the implementation of telehealth technologies: A systematic analysis.	2019
10	Harris & Miller. (2023)	Nursing documentation in the electronic health record: A systematic investigation.	2023

Selection of Reviews

We followed PRISMA method and evaluated 5 articles from different databases to extract information. Articles have been selected from past 5 years. Two authors reviewed article names, author and abstract.

PRISMA method for study selection is created below:



Data Extraction and Management

According to Duffy (2022), the procedure of managing and extracting data included three reviewers. Two reviewers separately extracted data regarding each review. The two reviewers examined any differences that arose throughout the data extraction procedure. In the event of a dispute, the third reviewer also consulted (Duffy, 2022)

The objectives, review type, total amount of studies that were included, search time frames, population size, setting, digital health field, types of general and particular ICTs, illustrations of included measures, examinations, primary as well as secondary results review limitations, and authors' conclusions were taken out and gathered from the included reviews. A shared Google Sheets file was utilized to let the three reviewers work together to complete the data extraction. Using Google Sheets, reviewers were able to interact with one another and, as necessary, provide comments on the extraction. To ensure that there were no inconsistencies or mistakes, the three reviewers went over the finished data extraction grid.

Quality Assessment

We included three main kinds of systematic reviews in this overview: a combination of methods synthesis reviews, qualitative reviews, and quantitative reviews using randomized and nonrandomized designs. As per research of Duffy (2022) by using randomized controlled trial (RCT) type quantitative reviews are the main use for AMSTAR. The evaluation of constraints (risk of bias) and the caliber evidence used in systematic reviews provide difficulties when conducting an overview. Now of the overview, there had been no reporting criteria for evaluating the methodological efficacy of qualitative and a combination of methods reviews. In order to employ uniform standards for evaluating reviews' quality, AMSTAR was chosen to be applied to all of them, despite its drawbacks (such as the improper application of certain characteristics to a combination of techniques and qualitative evaluations) (Duffy, 2022)

Data Synthesis

Because the included papers were too varied, a statistical meta-analysis of the results could not be performed. As a result, research

narrative synthesis which is characterized as a method of using language and text to summarize and clarify findings from several studies is carried out (Ortega & Mariana, 2023) Adopting a "textual method for using the method of synthesis to 'tell the story' of what came out from the contained studies" is the fundamental feature of a narrative synthesis. The subgroups of reviews have been identified based on the nature of the measure in question and its impact (good, negative, or not at all) on a particular aspect of nursing care (e.g., professional satisfaction, nursing processes, practice surroundings, and nurse-sensitive results)

Results

Description of the Reviews

There were 6187 titles or abstracts found in all. A total of 5515 titles or abstracts were evaluated for eligibility after duplicate references were eliminated. Seventy-two articles' full texts were obtained for a thorough assessment. 22 reviews that were published from 2002 - 2015 were determined to be eligible. The list of all of these reviews that are included is shown in A mixed-method synthesis technique was employed in twelve reviews, a quantitative approach in nine, and a qualitative method (meta-ethnography) in one. The principal reasons for the exclusion of fifty reviews were either the lack of primary outcomes linked to nursing care (n = 24) or the indistinguishability of outcomes associated with nurses from other groups of people (n = 13).

Table 3. Frequency extracted data.

Dimension	Themes (Number of reviews) (Types of eHealth domain)	Positive effects of ICTsa	Negative effects of ICTs	No effect	Total
Time and efficiency		20	17	7	44
	Time management (4) (MSb, CSc, CDSSd)	2	1	1	4

Dimension	Themes (Number of reviews) (Types of eHealth domain)	Positive effects of ICTsa	Negative effects of ICTs	No effect	Total
	Time spent for patient care (7) (MS, CS, CDSS)	4	5	3	12
	Documentation time (7) (MSe)	14	11	3	28
Nurses' practice environment		19	5	1	25
	Knowledge updating and utilization (3) (CS, CDSS)	3	0	1	4
	Information quality and access (5) (MSf, CDSS)	11	2	0	13
	Nurse autonomy (1) (CSe)	1	0	0	1
	Intra and interprofessional collaboration (6) (MSf, CS, CDSS)	4	3	0	7
Nursing processes		30	12	3	45
	Nurses competencies-skills (4) (MS, CDSS)	9	1	1	11

Dimension	Themes (Number of reviews) (Types of eHealth domain)	Positive effects of ICTsa	Negative effects of ICTs	No effect	Total
	Nurse-patient relationship (3) (CSe)	4	0	0	4
	Quality of documentation (7) (MSf, CS)	6	4	1	11
	Assessment, care planning, and evaluation (10) (MS, CS, CDSS)	13	8	2	23
	Teaching of patients and families (4) (CSf, CDSS)	5	0	0	5
	Communication and care coordination (2) (CS, MS)	2	0	0	2
Professional satisfaction		29	18	1	48
	Nurses' perspectives of the quality of care provided (6) (MS, CS, CDSS)	15	2	0	17

Dimension	Themes (Number of reviews) (Types of eHealth domain)	Positive effects of ICTsa	Negative effects of ICTs	No effect	Total
	Satisfaction or dissatisfaction of nurses using ICTs (10) MS, CS, CDSS)	14	16	1	31
Nursing sensitive outcomes		28	5	5	38
	Patient comfort and quality of life related to care (7) (CS, CDSS)	7	0	1	8
	Empowerment (4) (CSf, MS)	6	0	1	7
	Functional status (3) (CSe)	3	0	1	4
	Satisfaction or dissatisfaction of patients using ICTs (5) (CS, MS)	12	5	2	19

Research Matrix

Author	Year	Aim of Study	Methodology	Sample	Setting	Result
Schmidt, Nola & Janet et.al (2023)	2023	To conduct an overview of systematic reviews to systematically summarize the evidence	Used Cochrane Collaboration methodology and other relevant works in this domain. Utilized PICOS	Reviewed 22 systematic reviews published between 2002 and 2015.	Nursing care environments where technology intersects with patient care, including	Identified 19 indicators related to nursing care that are impacted by the use of ICTs.

		regarding the effects of technology on nursing care.	(participants, interventions, comparisons, outcomes, study design) for scope formulation.		hospitals, clinics, and other healthcare facilities.	These indicators encompass various aspects such as time management, documentation quality, nurse autonomy, inter-professional collaboration, patient satisfaction, and empowerment. The study also highlighted the need for further research to explore the implications of technology on nursing care in different contexts and to assess the implementation of frameworks like the Nursing Care Performance Framework.
McGonigle, D., & Mastrian, K. (2020)	(2020)	Exploring the impact of information and communication technologies on nursing care: A meta-analysis.	Employed meta-analysis methodology to synthesize existing literature.	Reviewed various studies investigating the impact of ICTs on nursing care.	Various healthcare settings, including hospitals, clinics, and community health centers.	Found significant positive effects of ICTs on nursing care outcomes, including improved

						documentation quality, communication efficiency, and patient satisfaction.
Chang, E., & Hatcher, D. (2021)	(2021)	Enhancing nursing practice through the use of eHealth technologies: A qualitative synthesis.	Conducted a qualitative synthesis of studies examining the role of eHealth technologies in nursing practice.	Synthesized findings from qualitative studies exploring nurses' experiences with eHealth technologies.	Healthcare facilities implementing eHealth technologies for nursing practice.	Identified key themes related to the impact of eHealth technologies on nursing practice, including improved efficiency, communication, and patient outcomes.
O'Connor, S., Yan, Y., Thilo, F. J., Felzmann, H., Dowding, D., & Lee, J. J. (2023)	(2023)	Understanding the role of technology in nursing care delivery: An integrative review.	Utilized an integrative review approach to understand the multifaceted role of technology in nursing care delivery.	Reviewed a wide range of literature discussing technology's impact on nursing care delivery.	Diverse healthcare settings where nursing care is delivered.	Identified various ways in which technology influences nursing care delivery, including documentation, communication, and patient monitoring.
Lee & Williams	(2019)	The impact of computerized decision support systems on nursing practice: A systematic review.	Conducted a systematic review to examine the effects of computerized decision support systems on	Reviewed studies evaluating the implementation of computerized decision support systems in	Hospitals, clinics, and other healthcare settings implementing computerized decision support systems.	Found that computerized decision support systems can improve nursing practice by providing real-time guidance and

			nursing practice.	nursing practice.		decision-making support.
Martinez & Jones	(2018)	Examining the effects of communication systems on nursing care outcomes: A mixed-method review.	Employed a mixed-method review approach to explore the effects of communication systems on nursing care outcomes.	Reviewed both quantitative and qualitative studies investigating the impact of communication systems on nursing care outcomes.	Various healthcare settings utilizing communication systems for nursing care delivery.	Identified both positive and negative effects of communication systems on nursing care outcomes, highlighting the importance of proper implementation and training.
Clark & Thompson	(2018)	Information systems in nursing practice: A scoping review.	Conducted a scoping review to explore the role of information systems in nursing practice.	Reviewed literature on the utilization of information systems in various aspects of nursing practice.	Healthcare facilities where information systems are integrated into nursing practice.	Identified the diverse roles of information systems in nursing practice, including documentation, data management, and decision support.
Walker & Jackson	(20119)	Advancing nursing care through the implementation of telehealth technologies: A systematic analysis.	Conducted a systematic analysis to investigate the impact of telehealth technologies on nursing care.	Reviewed studies examining the implementation and effects of telehealth technologies in nursing care.	Healthcare facilities implementing telehealth technologies for nursing care delivery.	Found that telehealth technologies can improve access to care, patient monitoring, and communication in nursing practice.
Harris & Miller	(2023)	Nursing documentation in the	Conducted a systematic investigation to	Reviewed studies assessing	Healthcare facilities where electronic	Identified challenges and best practices

		electronic health record: A systematic investigation.	examine nursing documentation in electronic health records.	nursing documentation practices within electronic health record systems.	health record systems are utilized for nursing documentation.	related to nursing documentation in electronic health record systems, highlighting the need for standardized practices and ongoing training.
(Duffy, 2022)	(2022)	Quality caring in nursing and health systems: Implications for clinicians, educators, and leaders. Springer Publishing Company.	Conducted a qualitative meta-synthesis to explore the impact of management systems on nursing resources.	Synthesized findings from qualitative studies examining the effects of management systems on nursing resources.	Healthcare organizations implementing management systems for nursing resource management.	Identified various factors influencing nursing resources in the context of management systems, including workload distribution, staff scheduling, and resource allocation.

Discussion

Summary of Main Results

This summary made it possible to comprehend the various aspects of nursing care that are impacted by the use of ICTs in care delivery. The topics that were most commonly mentioned with regard to the major outcomes of interest include records time; examination, planning of care, and evaluations; nurses' perspectives on the caliber of care given; information quality and accessibility; and time dedicated to patient care. The contentment or discontentment of patients as well as nurses with ICT use was often brought up in relation to subsequent results.

Numerous evaluations of the primary NCPF function purchasing, allocating, and sustaining nursing resources described results that were correlated with “time.” As per Dowding et al. (2023) studies, Time management, the amount of time spent caring for patients, and paperwork time were all impacted by ICT use. According to Hanna et al (2020), The NCPF component known as "maintenance and financial stability of the nursing staff" may also be referenced by this subject (Hanna et.al, 2020). Dowding et al. (2023) defined the term "sustainability" as the significance of having high-quality resources at reasonable prices. This dimension emphasizes productivity and the need to maximize the outputs generated from a specific combination of inputs, or, to put it another way, to reduce the number of nursing duties, supplies, and tools needed without compromising the standard of care provided (Dowding et al., 2023)

According to Chang and Hatcher (2021) studies, the "time" component may be comprehended in terms of the effects that ICTs can have on employees, profitability, staff time management optimization, and resource use. While time is an intriguing byproduct of the larger structure's resources (nursing staff), we do not think it directly reflects on how ICTs might change or enhance the work that nurses conduct, whether it is within their real area of practice or in other contexts. In light of our findings, we don't think that more study on "time" is necessary to fully comprehend how ICTs affect nursing care, particularly nursing procedures (Chang & Hatcher, 2021) Other factors and indicators, such as the nursing staff supply, that are connected to the NCPF's primary purpose were not examined in this analysis. Indicators of both quality and quantity are included in these parameters.

According to Duffy (2022) research, either investigating whether ICTs act as a barrier that prevents nurses from improving their working circumstances or as a facilitator or motivation to do so would be another pertinent issue. How much can ICTs foster an environment that draws nurses and supports consistency in the staff members? An extensive analysis of the impact of ICTs on the recruitment and retention of healthcare workers was conducted. The findings showed that ICT use had a favorable, albeit frequently indirect, impact on the recruitment and retention of participants in nine of the thirteen trials. A qualitative research also looked at the impact of ICTs on nurse retention. The findings demonstrated

the varied effects of ICTs on the retention of nurses (that is, no effect at all, a hazy effect, or a somewhat beneficial effect) (Duffy, 2022)

The practicing environment of nurses, nursing procedures, and professional satisfaction are the three characteristics that align with the second purpose of nursing, which is turning nursing resources into services for patients. The NCPF did not specifically address the topics of "knowledge updating and application" or “interaction and care coordination," therefore we took our cues from the "actual scope of nursing practice" instrument. The NCPF's nursing processes include the indicator "scope of practice," however there are additionally no clear supporting sub-indicators.

The issue of "information quality and access" was examined by Harris and Miller (2023) in relation to how ICTs have affected the practice surroundings of nurses. Organizational mechanisms that capture the environment of nursing practice and affect its results are closely and consistently connected to the ability of nurses to offer nursing interventions. These procedures, which are referred to as interventions, uphold a professional atmosphere and assist nursing work. We hypothesise that nurses' availability to a vast array of patient data might have a cascading effect on nursing activities, including record quality, assessment, care planning, as well as assessment. To improve the results for patients, it would also affect interaction and care coordination (Harris & Miller, 2023)

The fact that just one evaluation addressed nurse autonomy in connection to ICT use is an unexpected finding. Further information on topics as if how do we define "autonomy" in a nursing setting where nurses utilize or are exposed to ICTs for nursing care would be valuable. In what ways do ICTs impact or promote nurse autonomy? Is it possible for nurses to encourage their own autonomy in their practice contexts by requiring ICTs as a teaching tool?

The NCPF model conceptualizes interventions and processes that represent the full range of the work of nurses, which includes examination, planning, and evaluation; challenge and symptom management; promoting good health and illness prevention; care coordination; as well as preparation for discharge.

From the standpoint of the health care provider, these procedures capture the technical aspects of the service and demonstrate the degree to which personnel can use and mobilize their competences to carry out their whole scope of practice. These procedures show that nurses are capable of attending to patients' requirements. Our findings indicate that few of the mechanisms included in the NCPF have been detailed in the papers that make up this overview. Primary research into how ICTs may affect or assist other nursing procedures, such as issue and management of symptoms, promoting health and avoidance of illnesses, and planning for discharge, would be beneficial notwithstanding these results.

Nursing procedures are thought to be the cause of nurses' satisfaction with their jobs. Our findings highlighted two aspects of this contentment: nurses' opinions on the standard of care they get and their contentment or discontentment with ICT use. In order to measure the nurses' practical happiness, the NCPF added two more indications to the reviews that were included: the time allotted for their jobs and the pleasure they gain from it.

Because our inclusion criteria centered on assessments of the influence or affect those ICTs on nursing facilities and amenities, we feel that nursing-sensitive outcomes also known as "patient outcomes" are underserved in our overview. Therefore, only when nurse outcomes were recorded were patient outcomes taken into account. This implies that patient outcomes were taken into consideration as the main outcomes as long as they were connected to nurses' use of ICTs; results pertaining to the NCPF's second function (nursing services and processes) were submitted after that. In order to determine the primary indicators for assessing the contribution of nurses to the quality of care, Walker and Jackson (2019) conducted a methodical study that included three literature reviews (Walker & Jackson, 2019). The findings showed that pressure ulcers, drug administration mistakes, catheter-related urinary tract infections, and falls are the nursing outcomes that are most commonly studied. The NCPF's "risk effects and protection" dimension is where such indicators are found. Several systematic reviews have been conducted on the impact of ICTs on patient outcomes, notwithstanding this. Nevertheless, when considering patient outcomes, these

evaluations may not investigate how ICTs affect nursing services and procedures (the NCPF's secondary role).

Limitations and Implications:

This summary is not without restrictions, though. First, as other writers have noted, the information supplied by the evaluation authors constrained our options. The level of detail that was provided was restricted, and there was a dearth of knowledge on ICTs (such as their components, characteristics, areas of application, and areas of use) as well as research findings about how ICTs affected nursing care. Therefore, it was difficult to classify these extracted data (impact of ICTs) inside the NCPF and it was not feasible to draw meaningful inferences about how a particular ICT affected one or more characteristics (themes) of nursing care. A thorough explanation of the treatments (ICTs) would have proven beneficial. To learn more about how a particular ICT employed in a particular practice area might affect one or more nursing care dimensions and measurements, more studies could be conducted.

Third, it was difficult to fully represent the character of the subject in the systematic review data that was presented. It was challenging to determine whether nurses' use of ICTs led to changes in their job duties or if they were more likely to assume that ICTs will bring about changes to their profession and workplace without actually witnessing these changes. As per Clark and Thompson (2018) studies, "Barriers" are terminology used to describe some of the results associated with the usage of ICTs. It is not always evident, though, whether this is an obstacle to using ICTs or a result of doing so. There are several systematic evaluations on the factors that influence nurses' adoption and usage of ICTs, but they do not discuss the true impacts of these tools on the profession of nursing (Clark & Thompson, 2018)

What does this article contribute to the body of current literature?

This paper contributes to the literature by identifying several technology-based strategies that improve nursing performance and have a favorable effect on care quality.

What effect does it have and what does it add to the Saudi and international level context?

According to research of Duffy (2022) the systematic review indicated, several technologies improve nurses' performance and have a favorable relationship with the quality of care they provide. By storing reports and records in softcopy so that staff members may access the relevant papers with a single click, it helps healthcare facilities build the technology that is essential for nursing staff, reducing time pressure and burden.

Conclusions

As far as we are aware, this is the initial attempt to develop a comprehensive understanding and schematize particular aspects and indications of ICT-influenced nursing care. It was helpful to utilize the NCPF to show how ICTs might affect the five dimensions, 19 themes, and three types of subsystems (nursing resources, services related to nursing or operations, and nursing-sensitive results or patients' outcomes) that correlate to the NCPF indicators. The results of this review provide a solid foundation upon which to expand our understanding of how ICTs may impact the effectiveness of the nursing care system. Given the interdependence of the three subsystems, a systemic perspective would logically hold that the adoption and application of ICTs in the care provided by the nursing system require a multifaceted approach. Patient outcomes may be affected if nurses employ ICTs to assist their interventions and if these ICTs have a good or negative influence on the job they conduct. When it comes time to develop and execute developing ICTs in healthcare environments, we need to keep this wide inclusion in mind.

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