SYSTEMATIC REVIEW

Electronic nursing documentation for patient safety, quality of nursing care, and documentation: A systematic review

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Abstract

Objective: To evaluate the impact of electronic nursing documentation on patient safety, quality of nursing care and documentation.

Method: The systematic review was conducted in December 2022, and comprised a comprehensive search on Scopus, ScienceDirect, ProQuest, PubMed, Cumulative Index to Nursing and Allied Health Literature, Sage Journals and Google Scholar databases for English-language human studies published between 2018 and 2022. The key words used in the search included "Nursing", "care", "documentation", "record", "electronic", "process" and "health services". The risk of bias was assessed using Strengthening the Reporting of Observational Studies in Epidemiology tool.

Results: Of the 469 items initially identified, 15(3.2%) were analysed in detail, indicating a positive influence of electronic nursing documentation on patient safety, care quality, and documentation. However, shortcomings were observed in the development of electronic nursing documentation for optimal effectiveness.

Conclusion: Electronic nursing documentation significantly enhanced patient safety, care quality and documentation. To facilitate its integration into clinical settings, a standardised and logically structured electronic nursing documentation system is essential.

Keywords: Documentation, Electronic health documentation, Nursing, Patient safety, Quality of healthcare.

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Introduction

Nursing professionals have a pivotal role in establishing measures to ensure the quality of care as they maintain continuous interactions with patients and the general public.[1,2] The progress and expansion of information technology (IT) have also been instrumental in advancing fields, such as Nursing Sciences.[3] One method of achieving this advancement is by progressively transitioning from traditional paper-based nursing documentation to electronic nursing documentation.[4-6] Nursing documentation involves the process of recording nursing information related to patient care in the medical records. It is imperative that this documentation is effective, well-structured, and aligns with the various phases of the nursing process, including assessment, diagnosis, care planning, implementation of interventions, and care evaluation.[1,3,5]

In many hospitals in Indonesia, nursing documentation is still predominantly paper-based, which can lead to various challenges. Paper-based documentation can be time-consuming, prone to errors, and difficult to manage, store and retrieve.[2] It may also hinder the efficient exchange of information among healthcare professionals, potentially compromising the quality of care. The transition to electronic nursing documentation in Indonesian hospitals is imperative to address these challenges.[7] Electronic documentation systems can streamline the documentation process, reduce errors, improve legibility, and facilitate better information-sharing among healthcare professionals. Additionally, electronic systems can provide decision support tools, alerts and reminders, enhancing patient safety and the overall quality of care.[8] However, the implementation of electronic nursing documentation in Indonesian hospitals may face challenges, such as resistance to change, inadequate infrastructure, limited resources, and the need for training and support for nurses. It is crucial to address these challenges and ensure that the transition to electronic documentation aligns with the various phases of the nursing process.

The highest standards must be upheld when completing nursing documentation, as it serves as a significant indicator of the quality of patient care. It is essential to ensure patient safety, the quality of healthcare services, and the continuity of care.[9,10] Accurate and comprehensive nursing documentation is widely acknowledged for its positive impact on patient care quality and continuity. It facilitates communication and teamwork, supports the legal aspects of care processes and outcomes, aids in

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patient care decisions and safety, and aligns with professional and practice standards.[1,3,5] As per the findings of a previous study, electronic nursing documentation surpasses paper-based health records in terms of methodology, structure, quantity and content quality. However, despite holding a positive attitude towards electronic nursing documentation, most nurses remain unaware of its benefits. Furthermore, electronic nursing documentation implementation results in a reduction in infection rates, falls, and documentation errors, while also saving time[4,6,9]

A previous review focussed on electronic nursing documentation and its implications for patient safety and the quality of care, with an emphasis on documenting practices and content as the primary findings.[4]

The field of nursing is significantly influenced by the global concern for patient safety across all healthcare aspects.[11] Electronic nursing documentation has proven to be a valuable tool in enhancing the quality of care and patient safety, while also improving the comprehensiveness and legal aspects of nursing care documentation.[4,10,12] Electronic nursing documentation incorporates modern elements, such as copy-and-paste features, electronic interfaces, and preset dropdown menus that contribute to the enhancement of nursing care quality and the efficiency of nurses' documentation.[6]

The current systematic review was planned to evaluate the impact of electronic nursing documentation on patient safety, the quality of nursing care, and documentation through a systematic investigation.

Materials and Methods

The systematic review was conducted in December 2022, and comprised a comprehensive search on Scopus, ScienceDirect, ProQuest, PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Sage Journals, and Google Scholar databases for English-language, human studies published between 2018 and 2022. The review was conducted in line with the updated guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA).[13] A combination of key words and medical subject heading (MeSH) terms, such as "Nursing", "care", "documentation", "record", "electronic", "process" and "health services", was employed. The same combination was used during the manual search of references within the selected studies. The review's protocol was registered with the Open Science Framework on 9 February, 2023.[14]

During the search process, the review used detailed inclusion and exclusion criteria in line with the Population, Intervention, Comparison, Outcomes and Study design (PICOS)[15] format (Table 1). From the search results, duplicate publications were identified and removed. This was followed by the screening of titles, abstracts and key words by two reviewers. The selected full-text articles were organised into a table to compile information about the authors, years of publication, research methods, participant details, interventions, and outcomes. Data extraction was carried out by the two reviewers, with a cross-validation process overseen by the third reviewer. Any discrepancies or differences in data extraction were deliberated and resolved through discussion involving all the reviewers. The short-listed articles were then subjected to a thorough

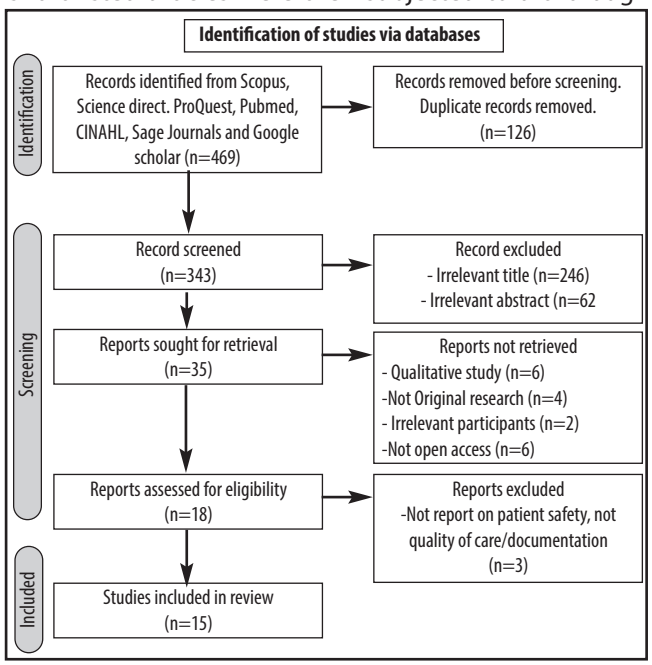

Figure: Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow chart.
CINAHL: Cumulative Index to Nursing and Allied Health Literature.

Table-1: Inclusion and exclusion criteria for literature search.

PICOS	Inclusion Criteria	Exclusion criteria
Patients	Registered Nurses or health workers, nursing documentation or nursing records, and inpatients hospital	Nursing student, not related to patients documentation
Interventions	Questionnaire survey, implementation of electronic nursing documentation or health records, intervention on improving electronic nursing documentation or EHR	Digital systems that are not related directly to patients
Comparators	Studies that used non-electronic documentation methods	Paper-based documentation
Outcomes	Primary focus: patient safety, quality of care, and quality of documentation	Studies focus on the disease
Study design	Quantitative study or mixed method	Qualitative studies, feature studies, systematic reviews, and case reports
Publication Type	Studies published in English in databases chosen from 2018 – 2022 and open access	Single site reports, duplicate publications of the same study

PICOS: Population, Intervention, Comparison, Outcomes and Study design. EHR: Electronic health record.

Table-2: Study quality as assessed using the STROBE tool.

	Item	17	19	23	18	30	26	27	24	10	28	25	20	29	22	21
Title and	1a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
abstract	1b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Introduction	2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Methods	4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	5	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y
Participants	6a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	6b	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y
Variables	7	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y
Measurement	8	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y
Bias	9	CD	CD	N	N	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
Study size	10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quantitative variables	11	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Statistical methods	12a	Y	Y	Y	Y	Y	Y	Y	Y	CD	Y	Y	CD	Y	Y	Y
	12b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	CD		Y	Y	Y
	2c	CD	CD	Y	CD	CD	CD	CD	CD	Y	CD	Y		CD	CD	CD
	12b	Y	Y	Y	Y	Y	Y	Y	Y	CD	Y	Y		Y	Y	Y
	2d	Y	Y		CD	CD	CD	CD	CD	Y				CD	CD	CD
	12e	CD	CD							CD	CD	CD				
Results	13a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	13b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	13c	N	N	N	N	Y	Y	N	Y	N	N	N	N	N	Y	Y
	14a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	14b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	14c	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
	15	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	16a	CD	CD	CD	CD	CD	CD	CD	CD	N	CD	CD	N	CD	CD	CD
	16b	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y
	16c	N	N	N	N	N	N	N	N	CD	N	N	CD	N	N	N
	17	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N	N
Discussion	18	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	19	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	20	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	21	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N	N
Other information	22	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	N	Y	Y

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology, Y: Yes, N: No, CD: Cannot determine.

analysis and discussion, with a focus on electronic nursing documentation, patient safety, and the quality of care or documentation.

The evaluation of the selected studies was done using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE).[16] The reviewers opted for a binary "yes/no" system to respond to the questions within the appraisal tool during the quality assessment. The appraisal tool consisted of 22 questions, covering various aspects of the study, including research questions and objectives, sample characteristics, interventions, outcome measurements, follow-up procedures, and statistical techniques. Additionally, the potential for measurement, information, and selection bias was addressed in the context of assessing the risk of bias (Table 2).

Results

Of the 469 items initially identified, 15(3.2%) were analysed in detail (Figure).[10,17-30]

The methodology included mixed-method studies[17,18] cohort studies[19-22] pre- and post-intervention investigations[10,23-25] and cross-sectional studies26–30. The majority of participants in the included studies were registered nurses.[10,17,18,22,27-30] The focus of the research spanned various aspects, with a particular emphasis on nursing care documentation or records[19,24,25] and inpatient hospital settings (Table 2).[20,21,23,26]

The integration of information and communication technologies in nursing, which facilitates the electronic management of evaluations, interventions and outcomes, provides valuable tools for advancing healthcare. When

Table-3: Study characteristics.

References	Methods	Participants	Intervention	Outcomes
Paese et al. (2018)[17]	Hybrid research with quantitative and methodological nature	The research involved a Ph.D. professor serving as nursing coordinator, a Doctoral Degree student, a Master's Degree student from UFSC's Graduate Program in Nursing, an undergraduate nursing student who held a CNPq Scientific Initiation scholarship, and two system programmers.	This research followed a methodology that included forming a development team and acquiring resources, adapting clinical situations and interventions for the emergency area, linking diagnoses and interventions using ICNP, organizing and coding clinical evaluation data, diagnoses, and nursing interventions, and finally transferring the data to a computerized platform.	The main idea is that adopting the ICNP in conjunction with information technology can advance nursing care by providing precise and comprehensive information, streamlining access to records, optimizing nurse time, and ultimately resulting in safe care.
Bail et al. (2021)[19]	A retrospective audit	The study randomly examined 20 patient care records at two different periods: (1) during the trial of a digital nursing documentation system (10 records between March and April 2017), and (2) after the trial had ended and paper records had resumed (10 records in April 2018).	The groups in charge made critical choices such as installing the technology in a 26-bed medical ward, selecting eight nurses to be 'super-users' to aid others and test the system, and conducting a four-week pilot. They also decided to convert 11 commonly used paper forms into an electronic format for the system and use a 'paper-lite' method in which existing paper files were still utilized for medication administration, record writing, and nursing assessments outside of the 11 chosen digitized forms.	The study found that while there was no significant difference in the quality of Assessment, Planning, and nursing interventions documentation between digital and paper records, digital records were more complete and had more evidence of completed nursing interventions to address risks.
Dello et al. (2021)[23]	Pre-and post-intervention study	The study included 495 patients who were consecutively admitted to the stroke unit in 2018 and 2019 with a diagnosis of ischaemic stroke or intracerebral haemorrhage. The patients met the following criteria: (1) they were 18 years or older upon admission, and (2) they arrived at the stroke unit within 48 hours of experiencing symptoms.	The standard electronic care plan for stroke patients was modified to align with the FeSS protocol. The protocol was implemented upon admission to the stroke unit, which prompted various electronically planned activities during regular nursing rounds.	The post-intervention group had a higher frequency of documented FeSS elements, especially in temperature monitoring and glycaemia management. However, adherence was not optimal, and nurses often modified care plans in the electronic health record.
Nation et al. (2019)[18]	The mixed methods study utilized quantitative and qualitative data	The research study comprised full-time, part-time, and PRN nursing professionals working at a 54-bed specialty hospital located in south-central Kansas.	The Usability Evaluation of Electronic Health Records for Nursing Professionals was sent to 100 nursing personnel via electronic means.	The study found that while some nurses found the hospital's EHR to be helpful for accessing patient information and legibility of documentation, others found it cumbersome, slow, and a hindrance to spending time with patients, with time management identified as a significant challenge.
Whalen et al. (2021)[30]	A cross-sectional study method	The survey was completed by 432 nurses working in the inpatient department.	A 20-question electronic survey was created by the investigators for inpatient nurses using Code Narrator. It was distributed to all inpatient staff nurses via email, and it could be accessed on any desktop computer or smartphone. The survey was designed to be completed in 5 to 8 minutes.	The study found that despite the majority of respondents being comfortable with using computers for personal use, a small percentage felt confident in documenting codes in real-time in the EHR, with many admitting to documenting codes on paper with later entry, and suggested improvements in the EHR interface and practicing code documentation using simulated events.
Ardic et al. (2021)[26]	A descriptive cross-sectional design	The study was conducted in Turkey between April and May 2020, at a hospital that serves as both a training and research facility. The study included 25 COVID-19 patients who were not on a ventilator.	The researchers gathered information through various means, including a form for socio-demographic and clinical characteristics, guidelines for COVID-19 response, and software such as Omaha System and Nightingale Notes.	The Omaha System was used to identify prevalent health issues and observe significant improvements in patients' scores for knowledge, behavior, and status.
Ausserhofer et al. (2021)[27]	A multicenter cross-sectional study	The study involved a convenient sample consisting of 1-7 NHS, 302 care units, and 1975 registered nurses and licensed practical nurses (care workers) working in the German and French-speaking areas of Switzerland.	The study evaluated care workers' perceptions by having them fill out questionnaires about the following topics: documentation of implicit rationing of nursing care, usefulness of the HER system, availability of computers, staffing and resources, leadership ability, teamwork, and safety climate.	The study found that care workers value the EHR system for its ability to improve resident safety and provide prompt access to information, but there were concerns about the availability of computers and occasional or frequent rationing of care documentation.
Karp et al. (2019) [24]	Experimental pre and post-nonrandomized prospective cohort design	The research site reduced its Admission Patient History (APH) from 215 data elements to 58 data elements, which represented a 73% reduction in the APH essential clinical data set (APH ECD), after comparing and adjusting for local and state requirements.	After the APH ECD became viewable to clinicians on November 1, 2017, the post-implementation period involved analyzing the 30-day period of APHs completed from November 20, 2017, to December 17, 2017. The researchers measured efficiency by tracking the time and clicks required to finish an admission history.	The study evaluated documentation quality in electronic health records and found that system timers and event logs can be used to assess clinical workflow efficiency and quality, leading to improvements in essential data element capture and admission patient history completion.
Hariyati et al. (2019)[10]	Quantitative research: a report study with pretest-posttest designs with the comparison group	Both intervention and control groups had 34 samples of nursing care documentation. The questionnaire used for the study was based on previous research.	The nursing electronic documentation application is assessed by comparing documentation before and after its implementation.	The use of Nursing Electronic Documentation improved legal and completeness documentation significantly, thereby enhancing the quality of nursing care.

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Table-3: *Continued from previous page.*

References	Methods	Participants	Intervention	Outcomes
Mahdizadeh et al. (2022)[28]	Descriptive cross-sectional study	183 nurses are employed at a health centre affiliated with Semnan University of Medical Sciences in Semnan, Iran.	The researcher distributed questionnaires to study subjects at healthcare institutions.	The study assessed the attitudes of participants towards the challenges of implementing and administering the NEHR, reported the average score on the impact of NEHR on nursing documentation, interventions, education & research, and timesaving, and identified several barriers to its successful implementation.
Pérez-Martí et al. (2022)[25]	Quantitative with a quasi-experimental approach	The study involved 310 hours of observation and 130 observations of complete patient records, with observations lasting between 2-3 hours during the afternoon and at the beginning of nurses' work shifts at night from 10:00 PM to 1:00 AM.	The study aimed to conduct a minimum of 10 observations for each nurse, 5 for the control condition and 5 for the experimental condition, using a tablet. A total of 23 professionals were eligible to participate, but only 13 met the inclusion criteria and could participate for 3 months. Each participant could only be in one group.	The main idea of this investigation is that using EHRs at the point of care reduces nursing staff time spent on registration, eliminates unnecessary work, and improves patient care, but certain factors like age, night shift, and nurses' perceptions can have a negative effect on implementation, requiring training and involvement of nurses in the process.
Brundin-Mather et al. (2018)[20]	A retrospective cohort study design	The study randomly selected 207 adult patients from the population of patients admitted to nine adult, medical-surgical intensive care units in Edmonton and Calgary, Canada between January 1, 2014, and December 31, 2014.	The study collected data from 30 fields of a random sample of 207 patients admitted to nine adult, medical-surgical intensive care units. Concordance between manually collected data from the bedside system and electronically collected data from the system warehouse was assessed using Cohen's Kappa for categorical variables and intra-class correlation coefficient (ICC) for continuous variables.	The main idea of this study is to emphasize the importance of managing and maintaining EMR systems that support secondary data use through data repositories and propose an independent approach to validate the quality of patient data collected from a large healthcare data warehouse.
Ayaad et al. (2019)[29]	A cross-sectional, descriptive, and comparative design	The study surveyed healthcare providers working in two selected hospitals, who had at least one year of experience and at least a diploma in a health field. Out of the 450 questionnaires distributed, 410 were returned.	The study distributed two questionnaires to healthcare providers in the EMR-adopted hospital to assess the quality of both EMRs and healthcare services. Healthcare providers in the paper-based record hospital only received a questionnaire to assess the quality of healthcare services. The questionnaires were distributed during both day and night shifts and completed at the beginning of the shifts, with a request to return them at the end of the shifts.	The study concluded that healthcare services provided in hospitals with EMRs were rated higher in quality by healthcare professionals and there was a significant relationship between the perception of EMR quality and the quality of services.
Bingham et al. (2021)[22]	a longitudinal observational time and motion study (Cohort)	Nineteen registered nurses (RNs) provided written consent and had study observations completed.	Observers were trained to use the WOMBAT tool on an Android tablet to collect data on nursing shift times for the EMR rollout process. They had no affiliation with the process and were chosen to ensure a fair capture of data across different shifts.	The study found that implementing an EMR led to a non-significant increase in direct care time with a significant increase in the time per task, no significant changes in medication-related activities but an increase in the average time per task, and a significant reduction in transit and indirect care tasks, without affecting professional communication, direct care, or documentation time.
Lemkin et al. (2020)[21]	A retrospective observational study	The study analysed adult patients who were admitted to one of 14 surgical and medical ICUs between June 2017 and May 2018 using propensity-score analysis.	The study integrated a smart list into electronic health record workflows at hospitals to implement certain preventative measures for critical patients, such as removing unneeded catheters and starting thromboembolic prophylaxis.	The study shows that implementing a smart list into electronic health record workflows for critically ill patients in ICUs led to shorter length of stay and lower charges per day without affecting mortality rates.

HER: Electronic health record, COVD-19: Coronavirus disease-2019, ICU: Intensive care unit, UFSC: University of Federal of Santa Catarina, CPNq: National Council for Scientific and Technological Development, ICPN: International Classification for Nursing Practice, FeSS: Fever, Sugar, Swallowing, PRN: Pro Re Nata or as the need arises, NHS: National Health Services, APH ECH: Admission Patient History Essential Clinical Dataset, National Electronic Health Record, EMR: Electronic Medical Record, WOMBAT: Work Observation Method By Activity Timing.

digital records were compared to traditional paper-based documentation, it became evident that electronic records significantly improved the overall recording of the nursing process. Moreover, specific components of nursing care, such as completed interventions and risk assessments, were more consistently and comprehensively documented in electronic records.[17,19,29] The implementation of electronic health records (EHRs) brought about notable time-saving benefits for nursing staff. The reduced need for data transcription and the streamlining of documentation processes resulted in a more efficient patient registration process. Notably, the completion of EHRs at the bedside, eliminating unnecessary steps, contributed to improved patient care.[25]

EHRs offered a clear and comprehensive overview of the primary goals of patient care and therapy. Nurses found these systems to be highly beneficial, allowing for a more holistic approach to documentation, which enhanced the completeness of patient records.[10,17,23,24,26-28] However, some nurses had a contrasting perspective. They rated the usefulness of EHRs as low and perceived them as hindrances to patient care. Additionally, these nurses believed that EHRs increased their workload.[18] Several

studies cautioned against merely transferring paper forms to digital platforms, as this approach can exacerbate the existing issues, prolong inefficient workflows, lead to data gaps, duplicate efforts, and potentially compromise patient safety.[19,28] Research indicated that nurses aged >40 years tended to be more resistant and apprehensive about adopting health information technology in their practice.[30] To improve the situation, there is a need for an adequate number of computers, more comprehensive record-keeping, enhanced care continuity, and safer treatment practices. Researchers and healthcare systems must work towards standardising procedures, while considering the complexity of care, environmental factors, and the preferences of healthcare providers.[24,27]

A critical aspect of clinical proficiency should revolve around understanding the conceptualisation, construction, deployment and ongoing maintenance of EHRs. To alleviate clinical dissatisfaction and fatigue and to elevate the standards of patient care and safety, it is imperative to enhance EHR usability. Analysing EHR event data can assist healthcare organisations in assessing whether automated clinical processes align with the desired objectives in terms of quality and efficiency. Studies showed that increased exposure to information systems helps nurses become more comfortable and accepting of these tools. Furthermore, the involvement of management is crucial for effective implementation of computer-based documentation, in addition to the role of guidance and control functions.[10,18,24,30] While digital systems hold great potential, additional research is needed to ensure that nursing theory informs the design of digital health systems. This way, nursing documentation can be purposefully tailored and quality control can be effectively managed, possibly through the use of checklists.[19-21]

The integration of computerised nursing processes and information technology synergises effectively to enhance nursing care. This combination provides care units with accurate and comprehensive information, facilitates easy access to records, and enables nursing staff to maintain thorough documentation. Moreover, it empowers nurses to optimise their time management, consequently elevating both the safety and the quality of patient care.[17,22,25]

Nurses attested to the effectiveness of the new system, noting that it enhanced their ability to detect patient issues, reduced errors by encouraging real-time documentation, and resulted in clearer and more comprehensive nursing documentation. EHRs played a vital role in enhancing both the quality and cost-effectiveness of care. This was achieved by capturing, storing and delivering clinical information precisely when and where it was needed.[17-19] For instance, employing the Omaha System to care for coronavirus disease-2019 (COVID-19) patients had the potential to elevate the quality of care, establish a common language for nurses worldwide, and expedite patient recovery times. There existed a strong correlation between people's perceptions of the quality of electronic medical records and the overall quality of healthcare services provided.[26,29]

EHRs were highly valuable tools for nurses as they assisted in clinical decision-making and enabled swift actions in urgent and emergency care settings without replacing direct patient care. Digital systems significantly enhanced nurse documentation, particularly when it came to implementing nursing interventions based on risk assessments, thereby enabling nurses to provide improved care and enhance patient safety.[17,19,21,22,28] The digital systems also featured portable tools, such as barcode readers for medication administration and patient identification within the application, along with early warning score systems, which collectively bolstered patient safety. Moreover, the approach reduced time delays (since information is recorded as it is collected) and minimised transcription errors, resulting in more precise records. The quality of care was elevated, and the reliance on human memory was decreased, while the availability of precise real-time data further enhanced accuracy and patient safety.[25]

The use of EHRs significantly improved patient safety and the quality of care by offering tools, such as warnings and reminders, that aided in preventing adverse events, especially those related to medication errors, which can compromise the quality of care and patient safety.[10,27] Furthermore, digital systems contributed to the patient's wellbeing by facilitating the identification of actual and potential diagnoses, signs and symptoms. These systems provided a comprehensive overview of patients and motivated the nurses in carrying out necessary interventions.[26]

Discussion

The current review has provided a concise summary of 15 studies which investigated electronic nursing documentation and its effects on patient safety, quality of care, and documentation. The findings suggest that electronic nursing documentation brings about improvements in all the three aspects, but it also presents challenges for nurses in terms of implementation and usage.

The nurses in the studies encountered various challenges related to EHRs, which encompassed technical issues, time constraints, and considerations pertaining to patient

conditions. Additionally, from the perspective of head nurses and their staff, the primary concerns included inadequate supervision, competency issues in documentation, and a lack of confidence and enthusiasm when using digital documentation systems. The imbalance in patient care workloads and the demand for high-quality documentation may hinder nursing innovation. This highlights the need for nurses to receive support in becoming familiar with their diverse responsibilities and the overall workflow.[1,5,31] Interestingly, 1 study indicated that there was no apparent connection between the perceived workload and whether the nursing process was central in EHRs.[32] Despite the challenges, it is evident that the potential of electronic nursing documentation in enhancing patient outcomes remains somewhat unclear.

Nurses recognise the importance of comprehensive documentation in enhancing the level of patient care they provide. Thorough documentation helps establish a connection between healthcare providers, ensuring care continuity.[1] The implementation of EHRs at the point of care has the added benefit of reducing the time nurses spend on administrative tasks, as they can input data directly, minimising the need to enter information at multiple locations. This streamlines processes, and eliminates unnecessary and unproductive work, ultimately enhancing the quality of patient care.[26,34] Electronic nursing documentation is gaining increasing importance, particularly when documenting complex processes and facilitating care coordination across various healthcare professions.[34] Standardised nursing documentation provides nursing organisations and healthcare professionals with crucial information to plan safe, high-quality care, ultimately contributing to positive patient outcomes. The utilisation of electronic nursing documentation further offers opportunities to improve the quality of nursing documentation.[35] Electronic nursing documentation can assist staff members in meeting documentation standards, improving documentation quality, facilitating decision-making, providing information that is simple to access, minimising the risk of loss or damage to data, enhancing the information exchange and teamwork between the nurses and other healthcare professionals, easily auditing documentation, and providing access to the development of client health.[36]

The adoption of EHRs was initially expected to enhance patient safety by increasing the availability of information and reducing medical errors. EHRs achieve this by making healthcare data easily accessible and available at the point of care, thereby improving the quality of the nursing process. However, the successful implementation and management of EHRs can be hindered by various obstacles.[28] On the positive side, some nurses found that using EHRs enabled them to involve patients more frequently in the documentation process. They also believed that the use of electronic patient portals further supported their patients in this regard. Additionally, the degree of organisational and leadership support played a pivotal role in influencing how effectively the technology was implemented.[5,33,37]

The effectiveness of planned intervention programmes aimed at quality improvement has been established, with standardised nursing care plans proving to have a significant impact on the quality of electronic documentation by nurses.[38] Moreover, nurses should play an active role in improving electronic nursing documentation by evaluating, researching and bridging the gap between nursing practice standards, thus acting as decision-makers and potentially contributing to revenue generation.[39] The current review indicates that electronic nursing documentation significantly influences the productivity and utilisation of workflows. However, to ensure maximum effectiveness, it is essential for the nursing documentation framework to be standardised and logically structured.[3,24,40]

The current systematic review has limitations. It exclusively included quantitative studies, potentially excluding valuable insights from qualitative research. The eligibility criteria, which focussed on published and open-access articles, may have led to the exclusion of relevant studies that were not publicly accessible. Finally, the review protocol was not registered with the International Prospective Register of Systematic Reviews, which is a recognised platform for registering systematic review protocols. These limitations should be considered while interpreting the results and conclusions of the current review.

Despite the limitations, however, certain recommendations are in place in the light of the findings. The transition to electronic nursing documentation in healthcare settings requires a strategic and comprehensive approach. Healthcare organisations should provide adequate training and support to nurses, addressing challenges related to knowledge gaps and technical issues. Addressing time constraints through streamlined documentation processes, templates and mobile devices can facilitate seamless integration of electronic documentation into nursing workflows. Ensuring system integration and interoperability with other healthcare information systems, such as EHRs and clinical decision support systems, is crucial for efficient data sharing and care coordination. To enhance the effectiveness of electronic nursing documentation, healthcare organisations should adopt

standardised documentation formats and templates that are logically structured and aligned with the nursing process. Continuous quality improvement mechanisms, including regular evaluations, feedback from nurses and data analysis can help identify areas for improvement, and guide necessary adjustments or updates to the systems. Healthcare organisations should actively promote and leverage the advantages of electronic nursing documentation, such as improved data accuracy, ease of auditing, efficient access to patient health records, and reduced maintenance costs.

Conclusion

The utilisation of electronic nursing documentation demonstrated significant improvements in terms of patient safety, quality of care, and documentation. However, it is clear that the implementation of electronic nursing documentation requires a strategic and comprehensive approach. Furthermore, electronic documentation contributed to improved care coordination due to rapid access to the records, comprehensive documentation for nursing staff, efficient time management for nurses, and a positive impact on patient safety, quality of care, and documentation.

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Author Contribution:

EDW: Concept, design, data acquisition, analysis, interpretation, drafting, revision, final approval and agreement to be accountable for all aspects of the work.

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HA: Drafting, revision, final approval and agreement to be accountable for all aspects of the work.

LSB: Final approval and agreement to be accountable for all aspects of the work.