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IMPLEMENTASI SISTEM BERBASIS ELEKTRONIK DALAM MENGURANGI MEDICATION ERROR: TINJAUAN PUSTAKA

THE IMPLEMENTATION OF ELECTRONIC-BASED SYSTEM IN REDUCTION OF MEDICATION ERROR: A LITERATURE REVIEW

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ABSTRAK

Kesalahan pengobatan telah menjadi masalah yang terus berlanjut dalam perawatan kesehatan, yang sering kali membayangi kemampuan perawat untuk fokus pada perawatan pasien. Secara tradisional, perawat telah mencurahkan banyak waktu untuk menghitung obat-dosis, rute, dan frekuensi-dengan mengorbankan tugas perawatan lainnya. Tinjauan literatur ini mengeksplorasi adopsi sistem berbasis elektronik untuk mengurangi kesalahan pengobatan dan risiko terkait dalam pengaturan perawatan kesehatan. Penelitian ini melibatkan pemeriksaan basis data seperti Clinical-key-nursing, Science Direct, ProQuest, Embase, dan artikel akademis, dengan menggunakan kata kunci seperti "kesalahan pengobatan" dan "sistem berbasis elektronik." Temuan menunjukkan bahwa sistem elektronik dapat mengurangi bahaya yang terkait dengan kesalahan pengobatan dengan memastikan kepatuhan terhadap "10 hak pemberian obat," yang meliputi pasien, obat, dosis, waktu, rute, dokumentasi, penilaian, pendekatan, interaksi obat, dan informasi yang tepat. Tinjauan ini menganalisis 19 artikel, tetapi hanya sepuluh artikel yang memenuhi kriteria inklusi. Hasilnya menunjukkan korelasi positif antara penggunaan sistem elektronik dan penurunan kesalahan pemberian obat, yang menyoroti potensi manfaat teknologi dalam meningkatkan keselamatan pasien dan efisiensi perawatan.

Kata Kunci: Sistem berbasis elektronik, kesalahan pengobatan, kesalahan resep.

ABSTRACT

Medication errors have been a persistent issue in healthcare, often overshadowing nurses' ability to focus on patient care. Traditionally, nurses have devoted considerable time to calculating medications—dosages, routes, and frequencies—at the expense of other caregiving duties. This literature review explores the adoption of electronic-based systems to reduce medication errors and associated risks in healthcare settings. The research involved examining databases such as Clinical-key-nursing, Science Direct, ProQuest, Embase, and academic articles, using keywords like "medication error" and "electronic-based system." The findings suggest that electronic systems can mitigate harms linked to medication errors by ensuring compliance with the "10 rights of medication administration," which include the right patient, drug, dose, time, route, documentation, assessment, approach, drug interaction, and information. The review analyzed 19 articles, but only ten met the inclusion criteria. The results indicate a positive correlation between the use of electronic systems and a decrease in medication errors, highlighting the potential benefits of technology in enhancing patient safety and care efficiency.

Keywords: Electronic-based system, medication error, prescription error.

INTRODUCTION

Nurses are health care professionals that deals directly with reconstitution, diluting and administration of medication. Medication errors are serious concerns and highly prevalent globally and often are due to multiple factors [1,2]. The world health organization estimates that the cost of medication errors is approximately $42 billion USD per annum[3]. Medication errors could lead to mortality, morbidity, complications, prolonged length of hospitalization or even serious drug adverse reaction or hypersensitivity. However, medication error is one of the most frequent global patient safety concerns that are preventable [4], the national coordinating council for medication errors reporting prevention defines medication error as any preventable event that may cause or lead to inappropriate medication use to patient which can cause harm. The strategic framework of global patient safety challenges includes four domains, patient/public, health care professionals, system practices and medications.[5]

The WHO implemented the global patient safety action plan 2021-2030 to help eliminate or reduce harm caused in health care settings[6]. Medication errors only happen when health care providers who administer the medication do not follow the 10 rights involved in administering medications these are right patient, right route, right dose, right time/frequency, right documentation/signature, right medication, right assessment/history, right approach, right to refuse, right drug to drug interactions, right evaluation, and right information/education.7 Medication errors occur when medication system are insufficient or due to human factors, unconducive environment or ineffective staffing during prescribing, transcribing, dispensing, and administration which can cause deaths, disability, or severe harm to clients or patients.[8]

The world health organization conducts a global submit on medications without harm, with goal of reducing medication adverse harm or effects by 50%. The largest workforce in health care settings are nurses [9,10]. Medication management is an important nursing role with potential dangerous consequences if an error occurs[11]. Nurses play a vital role in medication management especially in medication administration [12].

OBJECTIVE

This literature aims to describe the implementation of electronic-based system in reduction of medication error in health care settings by following the 10 rights.
Right patient, right route, right dose, right time/frequency, right documentation /signature, right assessment/history, right approach, right to refuse, right drug to drug interactions, right evaluation, and right information/education.[13]

METHODS

This literature review chooses PRISMA to describe the implementation electronic-based system in reducing medication error.

Eligibility Criteria

The author used various types of search methods including qualitative and quantitative methods to describe the implementation of electronic-based system in reduction of medication error by following the 10 rights Right patient, right route, right dose, right time/frequency, right documentation/signature, right assessment/history, right approach, right to refuse, right drug to drug interactions, right

evaluation, and right information/education [14].

Search Strategy

The author employed a search strategy to gain relevant information from articles about the implementation of electronic-based system in reduction of medication error. During this period the author uses some keywords, such as electronic-based system, medication error.

Study Design

Five databases were visited which consist of Clinical-key-nursing, Science Direct, ProQuest, Embase, and scholar articles are included in the investigation. The author selected some important article and included them in his study.

Synthesis of Results

The result or findings of this study explains or describe the importance of electronic-based system in reducing medication error in health settings.

Literature Search Results

The following are selected journals that the researcher analysed in this literature review study.

Table 1.
Details of the results of the main selected journals for the literature review.

NO	AUTHOR/ YEAR	country	RESEARCH PURPOSES	RESEARCH METHODS	RESEARCH RESULTS
1	Artawan P. Martini O.A.I	Indonesia	To describe and analyse hospital E-prescribing implementation in reducing medication errors	A descriptive study	According to the research findings e- prescribing increases prescription accuracy and thus reduces prescription errors.
2	Pandya et al.	USA(New York)	To develop and implement standardised handoff process using an electronic medical record-based tool to ensure optimal communication of treatment-related information for patients receiving cancer treatment between oncology nurses	An integrative review	Medication errors were reduced from 86% to 32% post intervention or post handoff which shows a massive medication administration reduction in the application of electronic-based medication system.
3	Sherri mills	USA(new Orleans)	To investigate whether electronic medical system reduces medication administration error.	A systematic review	Findings in this study states that the used of electronic-based system helps greatly in reducing medication administration errors especially when using computerized

					physician order entry (CPOE)
4	Marina Vaidotas	Brazil	To determine the efficacy of electronic prescription technology on errors caused by prescription	Systematic review	Electronic prescription errors were greatly reduce base on the outcome of this study.
5	Mohanna Naidu, Yeo Lee YEAN Alicia	Australia	To determine the advantages and disadvantages of BCMA AND e-MAR SYSTEM	A descriptive analytical study	Findings shows that BCMA and e-MAR reduces medication error when pre-and post implementation were made in an emergency department
6	Teyl et al	Australia	To evaluate the impact of moving from paper-based system to digital system	An interrupted time-series design	Findings from this study states that the shift from paper-based medication system to a fully digital system result in reduction of medication incidents and prescribing errors
7	Laura et al	USA	To evaluate the feasibility of a simulation-based learning study to improved student nurse competence to safely administer-alert medications	Feasibility study	Students were exposed to real clinical situation and they were able to understand and avoid medication errors in the future
8	Thu-Trang T Hickman et al	USA	To elucidate error types, help by prescribers	Retrospective data collection method	The study states that out of 2522 medication errors there were 86.9% of electronic-based prescribing prevented medication error
9	Virginie Korb-Savoldelli et al.	France(Paris	To evaluate the impact of (CPOE) system on prescription safety	A systematic review	Positive outcome was seen after the implementation of the technology
10	Madaline Kinlay et al.	Australia	To identify system related medication errors or workflow	Retrospective qualitative study	The study also state few improvements when electronic medication system was applied

DISCUSSION

According to Mohanna et al medication errors can cause several life challenging issues such as mortality, morbidity, health complication, prolonged length of hospitalization or even severe adverse drug reactions. Therefore, implementation of electronic-based system is very important to help and bridged the gap or reduce the tendencies of medication error.[14] According to Bronowski et al the implementation of BCMA and e-MAR were found to greatly reduce the medication errors. This is in line with another study conducted by McCommas et al.

Another study conducted by De Yang et al made mention of similar outcome after the implementation of BCMA, there were great reduction of medication administration errors when this technology was introduced.

Another study conducted by Hassink et al found out a great reduction of medication errors after post implementation of an electronic-based system in his study. A peer-reviewed literature supports the use of electronic medication administration records compared to paper-based medication records, as it is more efficient, reduces adverse medication events, promote patient safety, and improves communication [15].

A study conducted by Nuckols, and colleagues concluded that computerized physician order entry reduces adverse drug events and medication errors, this is in line with another study conducted by Brigham and Women's which states that computerized physician order entry helps greatly in reducing medication errors and adverse drug reactions. Medication errors are so serious and so delicate in clinical practice, especially in intensive care units where critically ill patients are hospitalized and therefore, can encounter challenges due to their illnesses and medical activities implemented on them[16].

A study conducted by Putu Artawan states that e-prescribing increase the accuracy of prescription and hence reduces potential adverse drug reactions and also improves service efficiency. This is in line with another study conducted by Pandya et al in 2019 which also states similar outcome after conducting his/her research. According to Pandya et al pre-intervention medication was (60%) and post-intervention outcome was found to be (32%) which was a great achievement. Furthermore, in the same study there was an average reduction of 2 minutes waiting time/patient/month. Another research conducted by Sherri Mills in 2019 also states almost similar findings when electronic-based system was implemented especially with the computerized physician order entry (CPOE)[17,18].

A study conducted by Mohanna et al also made mentioned of similar outcome from his study stating the efficacy of using BCMA and E-MAR in reducing prescription errors and hence improves patient safety. Similar study was also conducted by Thu-Trang T Hickman et al in 2018 where massive reduction of medication error was seen in his study results. Another study conducted by Maaline Kinlay et al in 2021 also states similar effects of electronic-based system when it was implemented to reduce patient harm or dangers associated with both medication and prescription errors. Some of the researchers do face resistance from staff not accepting the new technology and their reasons were, more training needed for all health professional to be familiar with technology, IT equipment are also expensive to purchase and maintain, hiring IT experts also was a challenge for some of the studies included in my review[20,21].

CONCLUSION

According to the 10-journal reviewed (8) of them proved a positive outcome or impact on the importance of electronic-based system in reducing medication administration errors. Some of the studies not all made mention of electronic-base system being more efficient, convenient, and cost effective and safe time. It is also notice that some of studies reviewed stated that with the implementation of electronic-based medication system nurses will have ample time to prepare their nursing care plans and take great care of their patient. Finally, implementation of this technology would greatly help to reduced medication administration errors in our health settings. Electronic base-medication system would be very helpful if hospitals go in for it, because it greatly helps in reducing patients' morbidity, mortality, length of hospital stay and even serious drug adverse events. When applied it can serve as a form of education and upgrading for nurses hence each of the health care providers would be train on the technology.

REFFERENCES

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