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## Electronic Medication to Minimize Medication Error: Systematic Review

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### Abstract

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*Introduction: Quality has been the main focus of attention in health services in decades. One of the factors that can lower the quality of health care and patient confidence is the fault of the medication. A medication error is an event that can lead to an error using the drug under the supervision of a health professional and this event should be avoided.*

*Methods: Approach on systematic This review uses the Cochrane approach and a journal sourced from several databases among lainScopus, Pubmed, BMJ, BMC, NCBI, ProQuest, Science direction in the last 5 years. Boolean operators in the search process use AND and OR.*

*Results: Overall, the review consists of 15 articles (table 1). In this review, the electronic system affects Medication Error and improve patient safety. The intervention can be used and applied to improve patient safety namely: 1) EMMS (Electronic Medication Management Systems), 2) EHR/EHRs (Electronic Health Reports), 3) E-Prescribing (Electronic Prescribing), 4) MediDocQ (Medication Administration Charts), 5) CPOE (Computerised Provider order entry).*

*Conclusions: Health information technology in the field of medication proved effective to reduce the fault of the medication in hospital patients.*

#### Keyword:

*Medication error, system electronic, electronic medication, patient safety*

## PENDAHULUAN

Quality has been the main focus of attention in health services in decades. One of the factors that can reduce the quality of health services and the patient's trust is the medication error. A medication error is an event that can lead to the error of the use of the drug under the supervision of health professionals and this event should be avoided [1]. Reports of recent studies have stated that the fault of the medication is very harmful to patients hospitalized and inflicting enormous losses [2].

A medication error is the most common mistake in the hospital. The incidence of medication errors recorded approximately 1.5 million people each year suffered a loss due to a medication error. The medication error not only lowers patient satisfaction and confidence but also causes a loss of 6-29 billion dollars annually [1]. The latest research shows that it can be held as one problem of medication in the hospital, so the hospital is spared losses of 7000 dollars [3].

The treatment process should be supported by clear information and documentation.

Mistakes in the process of medication (prescription making, compounding drugs) and documentation of treatment are factors contributing to improper clinical decision-making and adverse patients [4]. A medication error has great implications for the safety of patients [1]. A loss that can be caused due to the occurrence of missing including overdose, the effect of drug allergies to death [5]. The development of health information technology to reduce the occurrence of medication errors should continue to be increased, to improve the patient's safety.

Health information technology can improve patient safety by reducing treatment errors, reducing adverse drug reactions and improving compliance with code of practice. Health information technology is an important means to improve the quality and safety of health services [6]. The development of its main health information technology to increase patient health safety continues to increase so that the case of medication error has been reduced.

## METODE

### Design Research

The design of this research is a systematic review resulting from searches on the Internet focusing on recent research over the last 5 years. A systematic review of the literature related to ME (Medication Error).

## Search Strategy

The search strategy includes all ages, all languages, and all types of trials and studies. Researchers use electronic databases: Scopus, Pubmed, BMJ, BMC, NCBI, ProQuest, Science Direct. The literature review uses the keyword "medication error or system electronic or patient safety". In the article search, we use the Boolean operators "AND ". After several articles are obtained, researchers then re-select them according to the criteria of inclusion and exclusion specified.

The article search process is done from December 9 to December 14, 2019. Searches for articles use keywords that have been determined by researchers and they also provide limitations as well as inclusion and exclusion criteria. Data obtained from Scopus, Pubmed, BMJ, BMC, NCBI, ProQuest, Science Direct, are then selected one by one by researchers to determine the appropriate journaling they have chosen. After getting the articles in line with the researchers' expectations, the articles are analyzed one by one and grouped to get the result. The next step is to discuss what has been found based on the points gained from the results.

### Inclusion /exclusion

We include all types of studies i.e., pre-Test and post-test, longitudinal study, cohort or case-control studies, and descriptive studies that report the incidence of treatment errors or identify the cause of ME (Medication Error), either in adults or children.

### Data Collection

All research related to ME (Medication Error) is tabulated and spelled out in the PICOT table. (*table 1*).

## HASIL

In the journal search by using the specified keyword obtained results 276 articles based on the criteria of inclusion and exclusion and the appropriate screening is done, so there are 15 articles journaled to be reviewed. In this review talk about (ME) Medication Error with electronic system based intervention to improve patient safety.

The Systematic review is Hetrogen, as the attached study is Hetrogen, but according to the inclusion and exclusion criteria that the researcher has agreed to. A variety of different designs and methods have been attached to (*table 1*). Although this is Hetrogen systematic review aims to minimize ME (Medication Error) by using various interventions that aim to

improve patient safety.

The intervention can be used and applied to improve patient safety namely: 1) EMMS (Electronic Medication Management Systems), 2) EHR/EHRs (Electronic Health Reports), 3) E-Prescribing (Electronic Prescribing), 4) MediDocQ (Medication Administration Charts), 5) CPOE (Computerised Provider order entry). Medication errors can occur in some processes, such as when prescribing medicines, compounding drugs, delivery of drugs to patients. A loss that can be caused due to the occurrence of missing including overdose, the effect of drug allergies to death [5]. So that the intervention that has been validated by the researchers can be used as reference material to minimize the occurrence of medication error

## PEMBAHASAN

Health information technology in the era of the 4.0 industry continues to increase. The development of health information technology proved to be able to reduce the impact of medication errors in hospital patients. A medication fault harms the patient and extends the number of days of patient care in the hospital [15]. Research on the technology of information that can reduce the effects of medical errors, including an electronic medication management system, electronic medication Documentation (MediDocQ), Barcode assisted medication, electronic reconciliation Medication. Systematic This review will be dictated about the comparison of each of these technologies which effectively enhances the patient's intensity.

### 1. *Electronic Medication Management System*

Electronic Medication Management System is designed to digitize the process of Drug Administration, completing tasks related to treatment, providing other information that supports the treatment of patients and promoting regulations on Drug-granting compliance [15]. The results of this study were in line with the research conducted [18] stating that the utilization of technology for treatment planning of these patients had a positive impact with proven reduced risk Treatment errors. It is evidenced by 56% of respondents agree that the Electronic Medication Management System can reduce potential treatment errors. The application of Electronic Medication Management System in Australia does not go well, because not only involving nurses, but doctors also have to change the system of prescription medication that is commonly done into electronic prescription systems or Computerised [15]. Stated that

the Electronic Medication Management System can solve the problem by raising a new problem that is the safety of treatment in patients and human dependence on technology [18].

### 2. *Electronic medication Documentation (MediDocQ)*

Electronic medication Documentation (MediDocQ) is an evaluation of the documentation against non-standard prescriptions and drug-giving records of patients. The main component of this instrument is the completeness of documented information (prescription, Drug Administration and Pro re Nata (PRN) drugs), the quality of transcription and compliance of documentation structures, readability, and correction of the medication process. The results of this study 33 of 54 items resulted in value above 0.75. The results showed that MediDocQ instruments demonstrate the high quality of medical documentation. The quality of documentation improves with the existence of instruments MediDocQ [4].

### 3. *Barcode Assisted Medication Administration (BCMA)*

Technology development to reduce the occurrence of a medication error namely Barcode Assisted Medication Administration (BCMA). Patient barcode Scanning is done to identify the patient and the type of medication to be administered, with this system can prevent the patient's error, treatment, dose, timing and error of the route by ensuring that the drug is administered according to In the administration of the patient's treatment [5]. The results of the study [5] were found that the patient's fault was ensured not to occur with BCMA technology. Based on the observation results (Van Der Veen et al., 2018) with OR 3.06 and CI 95% showed results although BCMA had a positive impact on the decline in medication errors, but the application of this technology also raises new problems including BCMA not Scans at all (36%), do not scan because the patient does not wear a BCMA bracelet (28%), incorrect drug scanning, scanning of some medications, and ignoring the warning signal of scanning fixes version (11%).

### 4. *Electronic Medication Reconciliation*

Drug reconciliation is a process of reviewing the patient's treatment history, identifying the list of medicines that are appropriate for patients. Reconciliation errors can also cause harm to the patient. One of the developments done in the development of a repeated drug checking system conducted with information technology that has been conducted by research [14]. The ethoxylation of the

drug is included in the documentation of the treatment process, so it is necessary documenting the clear process of reconciliation to avoid a pronounced fault in patients [4].

Electronic Medication Reconciliation application process includes the monitoring of the patient's drug list through EHR (Electronic Health Record) as well as through the patient and family, pharmacist conducting a patient reconciliation medication based on the prescription that has been given, Rekonsilias performed until the drug is prepared to be administered to patients. Some studies have shown that the implementation of drug reconciliation can be successfully applied, but does not cover the possibility of errors occurring during the reconciliation process, resulting in the impact of treatment errors in patients [14].

Based on some research, there have been many technologies developed to reduce the occurrence of medication errors with the ultimate goal of increased patient's intensity. Some of the technology developed proved to be able to reduce the occurrence of the case of medication errors in patients, so as to reduce losses in patients or hospitals. However, the developed technology still requires a lot of evaluation, because some studies have mentioned the impact caused by the application of technology raises new problems in the fault of the medication.

## KESIMPULAN

Mismedication is an error in the use of drugs that cause harm to patients in the hospital. A medication error has great implications for the safety of patients. The consequences of misconduct include material losses for hospitals and injuries to death for patients. In order to reduce the impact caused by medication errors, the health information System technology is developed related to the patient's dictating the process. Health information technology in the field of medication proved effective to reduce the fault of the medication in the hospital. The research results of health information technology development in the field of medication proved to reduce the occurrence of medication errors in hospital patients. The results of this research can be considered for health practitioners, especially nursing-related patients and handling the patient's treatment process for 24 hours to reduce the occurrence of medication errors in patients.

## DAFTAR PUSTAKA

- [1] N. M. K. Elden and A. Ismail, "The Importance of Medication Errors Reporting in Improving the Quality of Clinical Care Services," *Glob. J. Health Sci.*, vol. 8, no. 8, p. 243, 2015, doi: 10.5539/gjhs.v8n8p243.
- [2] H. Singh and D. F. Sittig, "Measuring and improving patient safety through health information technology: The health IT safety framework," *BMJ Qual. Saf.*, vol. 25, no. 4, pp. 226–232, 2016, doi: 10.1136/bmjqs-2015-004486.
- [3] K. Bravo, G. Cochran, and R. Barrett, "Nursing strategies to increase medication safety in inpatient settings," *J. Nurs. Care Qual.*, vol. 31, no. 4, pp. 335–341, 2016, doi: 10.1097/NCQ.000000000000181.
- [4] A. Hammer, A. Wagner, M. A. Rieger, and T. Manser, "Assessing the quality of medication documentation: Development and feasibility of the MediDocQ instrument for retrospective chart review in the hospital setting," *BMJ Open*, vol. 9, no. 11, pp. 1–12, 2019, doi: 10.1136/bmjopen-2019-034609.
- [5] G. Strudwick *et al.*, "Factors Associated with Barcode Medication Administration Technology That Contribute to Patient Safety: An Integrative Review," *J. Nurs. Care Qual.*, vol. 33, no. 1, pp. 79–85, 2018, doi: 10.1097/NCQ.0000000000000270.
- [6] Y. K. Alotaibi and F. Federico, "The impact of health information technology on patient safety," *Saudi Med. J.*, vol. 38, no. 12, pp. 1173–1180, 2017, doi: 10.15537/smj.2017.12.20631.
- [7] M. Van De Vreede, M. Hsm, and G. I. V Pharmacist, "Review of medication errors that are new or likely to occur more frequently with electronic medication management systems," pp. 276–283, 2019.
- [8] R. M. Ratwani *et al.*, "A usability and safety analysis of electronic health records: A multi-center study," *J. Am. Med. Informatics Assoc.*, vol. 25, no. 9, pp. 1197–1201, 2018, doi: 10.1093/jamia/ocy088.
- [9] K. Whalen, E. Lynch, I. Moawad, T. John, D. Lozowski, and B. M. Cummings, "Transition to a new electronic health record and pediatric medication safety: Lessons learned in pediatrics within a large academic health system," *J. Am. Med. Informatics Assoc.*, vol. 25, no. 7, pp. 848–



854, 2018, doi: 10.1093/jamia/ocy034.

- [10] G. Lau, J. Ho, S. Lin, K. Yeoh, T. Wan, and M. Hodgkinson, "Patient and clinician perspectives of an integrated electronic medication prescribing and dispensing system: A qualitative study at a multisite Australian hospital network," *Heal. Inf. Manag. J.*, 2017, doi: 10.1177/1833358317720601.
- [11] D. Classen, M. Li, S. Miller, and D. Ladner, "An electronic health record-based real-time analytics program for patient safety surveillance and improvement," *Health Aff.*, vol. 37, no. 11, pp. 1805–1812, 2018, doi: 10.1377/hlthaff.2018.0728.
- [12] J. A. Austin, I. R. Smith, and A. Tariq, "The impact of closed-loop electronic medication management on time to first dose: a comparative study between paper and digital hospital environments," *Int. J. Pharm. Pract.*, vol. 26, no. 6, pp. 526–533, 2018, doi: 10.1111/ijpp.12432.
- [13] G. Schiff *et al.*, "Computerised physician order entry-related medication errors: Analysis of reported errors and vulnerability testing of current systems," *BMJ Qual. Saf.*, vol. 24, no. 4, pp. 264–271, 2015, doi: 10.1136/bmjqs-2014-003555.
- [14] J. D. Hron *et al.*, "Electronic medication reconciliation and medication errors," *Int. J. Qual. Heal. Care*, vol. 27, no. 4, pp. 314–319, 2015, doi: 10.1093/intqhc/mzv046.
- [15] D. Debono *et al.*, "Applying the Theoretical Domains Framework to identify barriers and targeted interventions to enhance nurses' use of electronic medication management systems in two Australian hospitals," *Implement. Sci.*, vol. 12, no. 1, pp. 1–13, 2017, doi: 10.1186/s13012-017-0572-1.
- [16] M. G. Amato *et al.*, "Computerized prescriber order entry-related patient safety reports: Analysis of 2522 medication errors," *J. Am. Med. Informatics Assoc.*, vol. 24, no. 2, pp. 316–322, 2017, doi: 10.1093/jamia/ocw125.
- [17] H. F. Wang *et al.*, "Quality improvements in decreasing medication administration errors made by nursing staff in an academic medical center hospital: A trend analysis during the journey to Joint Commission International accreditation and in the post-accreditation era," *Ther. Clin. Risk Manag.*, vol. 11, pp. 393–406, 2015, doi: 10.2147/TCRM.S79238.
- [18] M. Van de Vreede, J. de Clifford, and A. McGrath, "Staff experience and perceptions of the safety and risks of electronic medication management systems in Victorian public hospitals," *J. Pharm. Pract. Res.*, vol. 48, no. 1, pp. 18–25, 2018, doi: 10.1002/jppr.1327.
- [19] A. Tubaishat, "The effect of electronic health records on patient safety: A qualitative exploratory study," *Informatics Heal. Soc. Care*, vol. 44, no. 1, pp. 79–91, 2019, doi: 10.1080/17538157.2017.1398753.