Open Minds

Internacional Journal

ISSN 2675-5157 vol. 2, n. 1, 2026

ARTICLE 9

Acceptance date: 21/01/2026

DETERMINATION OF POTENTIAL RISKS DUE TO CONFUSING MESSAGES DERIVED FROM SOFTWARE-GENERATED MEDICAL PRESCRIPTIONS

María Camila Ortega Paternina
Universidad de Cartagena, Facultad de Ciencias Farmacéuticas, Grupo de Farmacología y Terapéutica, Maestría en Farmacia Asistencial, Cartagena, Colombia

Nathaly Karina Arias Iglesias
Universidad de Cartagena, Facultad de Ciencias Farmacéuticas, Grupo de Farmacología y Terapéutica, Programa de Química Farmacéutica, Cartagena, Colombia

Julian Martinez Zambrano
Universidad de Cartagena, Facultad de Ciencias Farmacéuticas, Grupo de Farmacología y terapéutica, Maestría en Farmacia Asistencial, Programa de Química Farmacéutica, Cartagena, Colombia

Antistio Alviz Amador
Universidad de Cartagena, Facultad de Ciencias Farmacéuticas, Grupo de Farmacología y terapéutica, Maestría en Farmacia Asistencial, Programa de Química Farmacéutica, Cartagena, Colombia

Abstract: Introduction: Software-generated medical prescriptions have been widely incorporated into healthcare systems to optimize therapeutic safety and efficiency. However, these tools can lead to clinically significant errors when alert messages are confusing or information is poorly organized, compromising the quality of care and patient safety. **Objective:** To examine the risks associated with electronic prescribing and propose strategies to reduce errors, improve system usability, and strengthen safety in clinical practice. **Method:** A systematic review of the literature published over the past ten years was conducted to identify studies documenting the frequency, types of errors, and consequences of software-assisted medical prescriptions across different healthcare settings. **Results:** The evidence reveals frequent issues such as dosing errors, duplicate drug prescriptions, undetected drug interactions, and adherence difficulties, with a higher incidence among polymedicated patients, children, and older adults. These failures are linked to adverse reactions, intoxications, prolonged hospitalizations, and even fatal outcomes, in addition to ethical and legal repercussions for healthcare professionals. Critical factors identified include software Usability and clarity of communication, where non-intuitive interfaces and deficient designs contribute to mistakes. **Conclusion:** Electronic prescribing represents a highly promising tool to improve healthcare quality but requires substantial improvements in design, validation, and professional training to ensure safe use and minimize clinical, ethical, and legal risks.

Keywords: Electronic prescribing, Medication errors, Patient safety, Drug interactions, Usability of medical software, Adverse drug reactions

INTRODUCTION

Prescribing medication is a complex process that seeks to select the most appropriate treatment for each patient, taking into account their clinical condition, the availability of medications, and the appropriate dosaje [1]. However, this process is not immune to errors, especially in settings where electronic prescribing systems are used. Several studies have documented that the introduction of these tools, while improving the standardization and traceability of medical orders, can also lead to errors related to transcription, dosage, inappropriate combinations, or interoperability issues between platforms [1].

Errors arising from electronic prescriptions can have significant clinical consequences, including adverse reactions, poisoning, and reduced treatment adherence, as well as generating economic and legal burdens for healthcare systems. Given this situation, it is essential to systematically examine the scientific evidence on the risks and benefits of electronic prescribing, as well as the most common causes of associated medication errors.

The objective of this systematic review is to synthesize the available scientific literature on the risks induced by clinical prescriptions generated by software, analyze the impact of confusing messages on clinical decision-making, and evaluate their implications for patient safety. It also seeks to identify common causes of error reported in studies and propose guidelines that contribute to improving the validation and reliability of electronic prescribing systems in the healthcare setting.

METHODOLOGY

This study was based on a systematic review of descriptive literature on the risks arising from software-generated prescriptions, for which two approaches were used: The collection of data from previous studies related to prescription errors generated by computer systems, and an analysis of cases in real clinical settings, where articles were taken into account and errors in electronic prescribing, patient safety, and the risks associated with the use of software in prescribing were analyzed over the last ten years (2013-2025).

Case studies in hospitals and clinics that have documented incidents related to electronic prescribing errors, research on the impact of prescribing systems on patient safety and medication administration were also investigated.

Likewise, a review of articles and studies published in the PubMed and Scopus databases for the last ten years (2013-2025) was conducted. These databases were selected for their wide selection of articles and scientific rigor.

For the systematic search of articles, specific search equations were used for each database, with the following for Scopus:

> "(TITLE-ABS-KEY("electronic prescribing" OR "e-prescription" OR "computerized physician order entry" OR CPOE OR "clinical decision support system") AND TITLE-ABS-KEY("medication error*" OR "prescribing error*" OR "adverse drug event*" OR "risk*" OR "patient safety" OR "harm") AND TITLE-ABS-KEY("software" OR "health information technology" OR "usability" OR "automation bias" OR "system failure") AND TITLE-ABS-KEY("case study" OR "case report" OR "observational study" OR "qualitative study" OR "retrospective study")) AND PUBYEAR > 2013 AND PUBYEAR < 2025"

And for PubMed:

> "(("electronic prescribing"[MeSH Terms] OR "computerized physician order entry"[MeSH Terms] OR "e-prescription" OR "CPOE" OR "clinical decision support systems"[MeSH Terms]) AND ("medication errors"[MeSH Terms] OR "prescribing errors" OR "adverse drug event" OR "patient safety" OR "risk" OR "harm") AND ("software" OR "health information technology" OR "system failure" OR "automation bias" OR "usability") AND ("case reports"[Publication Type] OR "case study" OR "observational study" OR "qualitative study" OR "retrospective study"))Filters: from 2014 - 2024"

On the other hand, guidelines from health and patient safety institutions at the World Health Organization (WHO), the Institute of Medicine (IOM), and the Na-

tional Patient Safety Agency (NPSA) were reviewed.

Figure 1 shows the flowchart used for the selection of studies in the systematic review on electronic prescribing, medication errors, and clinical decision support systems. In the identification phase, 166 records were initially retrieved from the Scopus database and 19 from PubMed. After applying inclusion and exclusion criteria and removing duplicates, the sample was reduced to 83 articles in Scopus and 14 in PubMed. Subsequently, in the screening stage, those studies that did not meet the objectives of the review were discarded, leaving 40 articles from Scopus and 13 from PubMed.

In the eligibility phase, 19 articles from Scopus and 10 from PubMed were reviewed in full text. Finally, after critical evaluation of methodological quality and thematic relevance, 27 studies were selected to form the evidence base for the analysis of this review. This process ensures a rigorous and transparent approach to the selection of scientific literature, in accordance with PRISMA recommendations.

RESULTS

In the literature review of the articles presented above, different risks associated with software-generated drug prescriptions were found. The main findings are presented below:

- **Electronic prescribing system:** Electronic prescribing (ePrescribing) systems show great promise in making healthcare safer, more efficient, and more cost-effective. They have been shown to reduce prescribing errors and costs. [2]

- **Medication reconciliation:** Medication reconciliation is the process of comparing a patient's prescriptions with all the medications they have been taking. This reconciliation is performed to avoid medication errors, such as omissions, duplications, dosing errors, or drug interactions. It should be performed at every transition of care where new medications are prescribed or existing prescriptions are rewritten. [3]

- **Shared medication record:** According to the FDA, a shared medication record is a list of medications a patient uses, maintained so it can be easily shared with healthcare professionals or caregivers, and can be created using paper, mobile apps, or online forms, helping to manage treatment safely and effectively. [4]

- **Prescription safety:** According to the Colombian Ministry of Health, prescription safety consists of ensuring that medications are prescribed accurately, appropriately, and in a timely manner, minimizing errors such as incorrect dosages, dangerous interactions, or duplications, especially in patients undergoing multiple treatments. To this end, strategies such as medication reconciliation upon hospital admission and discharge, the use of electronic prescribing systems, ongoing training of healthcare personnel, and the implementation of clinical guidelines that promote good practices are applied, all with the aim of protecting patients, improving therapeutic adherence, and reducing preventable adverse events. [5]

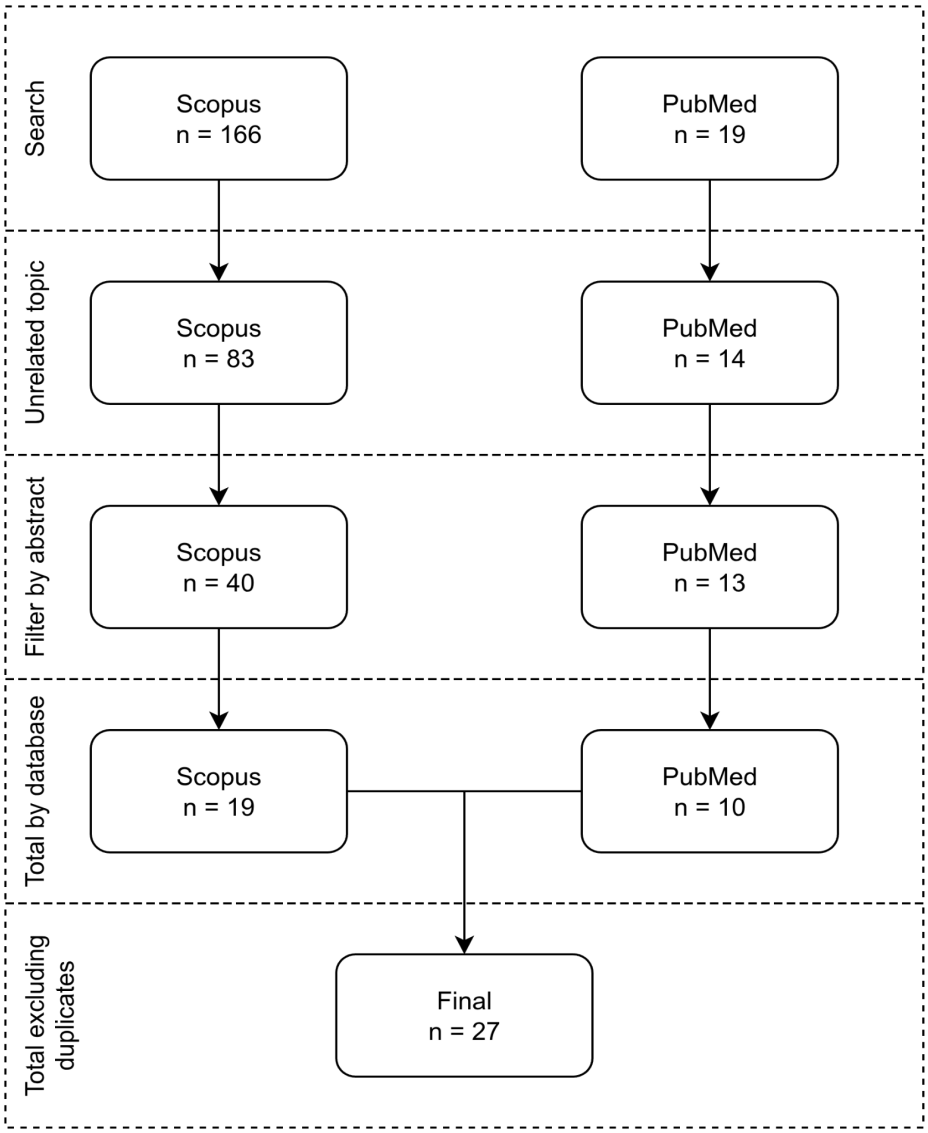

Fig 1. Flow diagram of article inclusion and exclusion for the revie

- **Usability testing:** Usability refers to how easily people can use an interface or product to accomplish a specific task. This is achieved when the design is intuitive, efficient, satisfying, and accessible to all types of users. It encompasses both the user experience and the simplicity of achieving a goal through a system or device, making it applicable to both software and hardware. [6]

- **Effectiveness of patient care:** Quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes. It is based on evidence-based professional knowledge and is fundamental to achieving universal health coverage. [1]

- **Adverse drug reaction:** An adverse drug reaction (ADR) is any harmful and unexpected effect that occurs after the administration of a drug in normal doses used to prevent, diagnose, or treat diseases. These reactions can range from mild symptoms such as itching, redness, or hives to severe manifestations such as anaphylaxis or toxic epidermal necrolysis, which require urgent medical attention. [7]

- **Personalized medicine:** Personalized medicine is an emerging practice in medicine that uses an individual's genetic profile to guide decisions made regarding disease prevention, diagnosis, and treatment. Knowledge of a patient's genetic profile can help physicians select the appropriate medicine or therapy, as well as administer the appropriate dose or regimen. [8]

Several cases documented in the reviewed articles were examined where risks associated with software-generated prescriptions in hospitals and clinics were presented. The following themes emerged as recurring:

- Dosage error: An analysis of reviewed articles, such as that by Gandhi and Lee (2010), pointed out that a lack of clarity in the dosage and frequency of administration of medications can lead to misunderstandings for both healthcare professionals and patients, resulting in serious dosage errors**.** [9] General Surgery, and Vascular Surgery of a tertiary hospital. Method Prospective observational 6-month study. Technology-induced errors were classified according to various taxonomies. Interrater reliability was measured. Consequences were assessed by interviewing patients and healthcare providers and classified according to their severity. Main outcome measure Prevalence of technology-induced errors. Results A total of 117 patients were included and 107 technology-induced errors were recorded. The prevalence of these errors was 3.65%. Half of the errors were clinical errors (n = 54

- Increase in prescribed medications in polymedicated patients: The increase in prescribed medications in polymedicated patients may be due to the presence of multiple diseases (multimorbidity), the lack of regular medication reviews, the lack of coordination between healthcare professionals, and the inappropriate use of drugs, as evidenced by the increase in medication-related problems (MRPs) and inappropriate polypharmacy, which increases risks to patient health**.** [10]

- **Duration of prescription use:** One of the most common errors related to the duration of prescription use is not clearly specifying the treatment period, which can lead patients to prolong or interrupt the use of the medication incorrectly. It is also common for the date of issue to be omitted or for chronic treatments to be prescribed without indicating periodic check--ups, which encourages indefinite use without medical supervision**.** [11]

- **Medication errors:** According to studies by Bates et al. (2000) and the World Health Organization, medication errors resulting from electronic prescribing systems are a major cause of adverse events in patients. Errors can include incorrect prescription of medications, erroneous dosages, or undetected drug interactions. These errors can result from confusing messages due to unclear instructions or failures in system interoperability. [12] however, they may also introduce new areas of risk. Despite recent advances in identifying these risks, the development and use of ePrescribing systems is still leading to numerous unintended consequences, which may undermine improvement and threaten patient safety. These negative consequences need to be analysed in the design, implementation and use of these systems. We therefore aimed to understand the roots of these reported threats and identify candidate avoidance/ mitigation strategies.\nMETHODS: We analysed a longitudinal, qualitative study of the implementation and adoption of ePrescribing systems in six English hospitals, each being conceptualised as a case study. Data included semistructured interviews, observations of implementation meetings and system use, and a collection of relevant documents. We analysed data first within and then across the case studies.\ nRESULTS: Our dataset included 214 interviews, 24 observations and 18 documents. We developed a taxonomy of factors underlying unintended safety threats in: (1

- **Software-induced errors:** Software-induced errors in medical prescribing, known as technological errors, arise when computer systems designed to improve safety end up generating errors due to poor design, confusing interfaces, or poorly configured automation. Among the most common are: incorrect selection of medications from poorly organized drop-down lists, erroneous dosages due to predetermined units, omission of warnings about interactions or duplications, and administrative errors such as incorrect routes of administration or pharmaceutical forms. [13].

- **Consequences of medication errors:** The consequences of medication errors can be serious and multifactorial, affecting both patient health and the efficiency of the healthcare system. Clinically, these errors can cause adverse reactions, poisoning, worsening of the disease, prolonged hospitalizations, and even death. [14] .

After applying the search and selection criteria, a body of evidence consisting of 27 scientific articles published between 2004 and 2021 was consolidated. This selection provides an overview of the evolution of knowledge on the safety of electronic pres-

cribing. Table 1 details the bibliographic characteristics of each study included.

For example, early studies, such as the seminal work by Ash et al. (2004), were a wake-up call. We believed that digitization was a panacea for human error, but we soon discovered that technology could generate new types of errors. The work of Koppel et al. (2008) was crucial in exposing systemic vulnerabilities, demonstrating that poor design could facilitate errors rather than prevent them. We had underestimated the complexity of the clinical environment (15-16).

Studies such as that by Slight et al. (2013) began to quantify the discrepancies between the physician's intention and the final pharmacy label. We began to see more specific analyses, such as the risks in vulnerable populations such as pediatrics (Cresswell & Sheikh, 2012) and the lack of integration between systems (Mozaffar et al., 2016), a problem that persists to this day. (20,21, and 27)

Current references no longer mention whether technology is good or bad, but rather how to design it to adapt to human workflow. Research now focuses on the usability, communication, and intelligence of systems.

DISCUSSION

In the analysis of the previously reviewed articles, an assessment was made to identify the issues that contribute to the risks posed by software in medical prescriptions and thus provide possible solutions. Firstly, one of the most relevant findings in the reviews was the confusion caused by the messages generated by the software, i.e., the patient does not understand the procedure to be followed with the medication and may therefore experience problems related to the medication, such as whether or not the patient requires the medication, whether or not they need it, whether it is effective for their condition, etc. Secondly, there are medication errors, which are therefore an important factor requiring greater care, both for pediatric patients and older adult patients, who are the most vulnerable and most frequently affected in hospitals. Consequently, this error leads to a lack of credibility in electronic prescription systems, where errors occur in the assignment of medication, routes of administration, or dosage. This is consistent with previous studies by the World Health Organization (2024), Whereas previous studies had already warned about the impact of electronic prescribing systems on patient safety, this study indicated that despite the implementation of advanced systems, lack of clarity and confusion in messages continue to be common causes of errors. Similarly, incorrect dosages and undetected drug interactions are the main consequences of this type of situation, which can have a direct impact on patient health.

Thirdly, we have the increase in medication in polymedicated patients, This is one of the main problems where patients suffer from one or more underlying conditions, such as type 2 diabetes mellitus and high blood pressure with kidney failure or heart failure, where a significant number of tablets are prescribed, which can cause medication-related problems, such as interactions between them and minimized bioavailability. Similarly, some patients may be confused about the prescription and the correct dosage and storage of each drug.

Authors	Title	year	DOI	Citations
Ash, J. S., Berg, M., & Coiera, E.	Some Unintended Consequences of CPOE	2004	10.1197/jamia.M2042	[15]
Koppel, R., Metlay, J. P., Cohen, A., et al.	The Vulnerabilities of Computerized Physician Order Entry Systems: A Qualitative Study	2008	10.1093/jamia/ocv135	[16]
Walsh, K. E., Businger, A. C., & Gandhi, T. K.	Technology-induced Errors Associated with Computerized Provider Order Entry Software for Older Patients	2009	10.1007/s11096-017-0474-y	[17]
Barber, N., Cornford, T., & Klecun, E.	The Hidden Role of Community Pharmacy Technicians in Ensuring Patient Safety with the Use of E-Prescribing	2011	10.3390/pharmacy3040330	[18]
Franklin, B. D., O'Grady, K., Donyai, P., et al.	The Conduct and Optimisation of A Qualitative Study Exploring the Acceptability and Usability of the e-Prescribing Risk and Safety Evaluation (ePRaSE)	2011	10.1097/PTS.0000000000001322	[19]
Cresswell, K. M., & Sheikh, A.	Electronic Ordering and the Management of Treatment Interdependencies: A Qualitative Study of Paediatric Chemotherapy	2012	10.1186/s12911-020-01212-z	[20]
Slight, S. P., Seger, D. L., Nanji, K. C., et al.	From Physician Intent to the Pharmacy Label: Prevalence and Description of Discrepancies from a Cross-sectional Evaluation of Electronic Prescriptions	2013	10.1136/bmjqs-2013-002089	[21]
Chen, Y. F., Avery, A. J., Neil, K. E., et al.	Suboptimal Prescribing Behaviour Associated with Clinical Software Design Features: A Retrospective Cohort Study in English NHS Primary Care	2013	10.3399/bjgp20X712313	[22]
Baysari, M. T., Westbrook, J. I., & Richardson, K.	Improving Medication Safety in a Paediatric Hospital: A Mixed-methods Evaluation of a New CPOE Implementation	2014	10.1136/bmjhci-2022-100622	[23]
Licciardello, L., Fava, M., Di Marco, P., et al.	Look-alike, Sound-alike Medication Errors: A Novel Case Concerning a Slow-Na, Slow-K Prescribing Error	2014	10.2147/IMCRJ.S78637	[24]
Le-Quelleca, S., Arnoulda, M., Franca, S., et al.	Impact of Electronic Prescription Alerts on Medication Errors Related to Vitamin K Antagonists in Hospitalised Patients	2015	https://doi.org/10.1136/ejhpharm-2013-000308	[25]
Abramson, E. L., Pfoh, E. R., Kaushal, R., et al.	Communication Failure: Analysis of Prescribers' Use of an Internal Free-text Field on Electronic Prescriptions	2015	10.1093/jamia/ocy003	[26]

Authors	Title	year	DOI	Citations
Mozaffar, H., Williams, R., Cresswell, K., et al.	Safety Risks Associated with the Lack of Integration and Interfacing of Hospital Health Information Technologies	2016	10.1136/bmjqs-2015-004925	[27]
Harvey, H. B., Alkasab, T. K., & Rosenthal, D. I.	Unintended Adverse Consequences of a Clinical Decision Support System: Two Cases	2016	10.1093/jamia/ocx096	[28]
Tariq, A., Cresswell, K., Williams, R., et al.	Exploring the Roots of Unintended Safety Threats Associated with the Introduction of Hospital ePrescribing Systems and Candidate Avoidance and/or Mitigation Strategies: A Qualitative Study	2016	10.1136/bmjqs-2016-005879	[12]
Rupp, M. T., & Ducker, M.	Quality and Variability of Patient Directions in Electronic Prescriptions in the Ambulatory Care Setting	2017	10.18553/jmcp.2018.17404	[29]
Cornu, P., Steichen, O., Beaune, S., et al.	Discrepancies in Electronic Medical Prescriptions Found in a Hospital Emergency Department: A Prospective Observational Study	2017	10.3390/ph17040460	[30]
Blijlevens, M. A., Wensing, M., Knippenberg-Gordebeke, G., et al.	Implementation of E-prescription for Multidose Dispensed Drugs: Qualitative Study of General Practitioners' Experiences	2018	10.2196/27431	[31]
McLeod, M., Ahmed, Z., Barber, N., & Franklin, B. D.	Workarounds to Hospital Electronic Prescribing Systems: A Qualitative Study in English Hospitals	2018	10.1136/bmjqs-2015-005149	[32]
Seger, A. C., & Schiff, G. D.	Automatic Errors: A Case Series on the Errors Inherent in Electronic Prescribing	2019	10.1007/s11606-016-3606-5	[33]
Dhavle, A. A., Rupp, M. T., & Warholak, T. L.	Analysis of Prescribers' Notes in Electronic Prescriptions in Ambulatory Practice	2019	10.1001/jamainternmed.2015.7786	[34]
Chheng, V., Le, M. M., & Poon, S. K.	Evaluating the Appropriateness of Clinical Decision Support Alerts: A Case Study	2020	10.1111/jep.13488	[35]
Ben Abacha, A., Shivade, C., & Demner-Fushman, D.	Ability of Machine-learning Based Clinical Decision Support System to Reduce Alert Fatigue, Wrong-drug Errors, and Alert Users About Look Alike, Sound Alike Medication	2020	10.1016/j.cmpb.2023.107869	[36]
Bounthavong, M., Gish, P. L., & Jackson, G. L.	Prescription Errors Related to the Use of Computerized Provider Order-entry System for Pediatric Patients	2020	https://doi.org/10.1016/j.ijmedinf.2017.04.005	[37]

Authors	Title	year	DOI	Citations
Lopez-Leon, S., Suarez, C. E., & Pelaez, S.	Evaluation of Satisfaction and Usability of a Clinical Decision Support System (CDSS) Targeted for Early Obstetric Risk Assessment and Patient Follow-up	2021	10.1186/s12911-021-01533-3	[38]
Sagesse, V., Le Louët, H., & Miremont-Salamé, G.	Computerized Pediatric Oncology Prescriptions Review by Pharmacist: A Descriptive Analysis and Associated Risk Factors	2021	doi.org/10.1002/pbc.26897	[39]
Saleh H, Abdullah A. Muneerah F. Omar M. Mai T. Mohammed H. Ghalia G. Qassem T.Omar A. Abdulaziz M. Fahad S. Alrasheedi &Yosef A.	Effect of Electronic Prescription System Modifications on Reducing Prescribing Errors in a Military Hospital	2024	https://doi.org/10.1080/20523211.2024.2431177	[40]

Table 1. Summary of Articles Included in the Systematic Review on Electronic Prescribing and Patient Safety (Vancouver Style).

These results highlight the urgent need for electronic prescription systems to be designed with intuitive interfaces that minimize ambiguity and provide clear instructions. and finally, there is the problem of shared medication records, where healthcare professionals are provided with easy access to information about the medications prescribed to patients. This can lead to the imprudent prescription of a drug that the patient previously took for a condition that they no longer need, as it is easier for the professional to simply re-prescribe these medications to save time. Although automated systems have the potential to reduce errors, a lack of confidence in their accuracy may lead professionals to perform additional manual checks, which could negate the benefits of these systems. This aspect is also supported by previous studies, such as that by (11), who reports that mistrust of electronic systems can increase workload and generate widespread skepticism among users. In addition, the need to manually confirm prescription orders creates a double workload for healthcare professionals, which could compromise efficiency in high-demand care settings.

Given the problems outlined above, it is necessary to seek measures to address these circumstances with regard to medical prescriptions, where a possible solution to this problem would be the implementation of continuous training programs for healthcare professionals, ensuring that they are well prepared to use technologies efficiently and understand the messages generated by the systems. Likewise, encouraging them to provide feedback on their knowledge as professionals, using different tools such as artificial intelligence to provide good patient care. On the other hand, an important aspect to improve is the presentation of information related to drug dosages and interactions. Interfaces must be understandable and consistent for physicians, pharmacists, and other healthcare professionals. Finally, to improve this situation, it is crucial to increase the reliability and transparency of

systems by using technologies that provide clear and understandable feedback on potential errors, interaction alerts, and prescription recommendations. Improving confidence in these systems and the knowledge of professionals will be key to ensuring that the benefits of electronic systems are reliable and safe.

CONCLUSIÓN

The research presented shows that, although electronic prescription systems represent a significant advance in the modernization of healthcare, their implementation is not without risks that directly compromise patient safety. Errors resulting from confusing messages, design flaws, unclear and unrepresentative interfaces, or lack of interoperability between platforms lead to critical consequences such as dosing errors, treatment duplication, undetected interactions, and adherence problems, which mainly affect vulnerable patients such as children and older adults. These events not only have clinical repercussions such as adverse reactions, poisoning, prolonged hospitalizations, or even death, but also ethical, legal, and economic repercussions for healthcare professionals and institutions.

The analysis shows that human and technological factors are related, as a lack of trust in systems forces professionals to perform manual checks that increase workload and reduce process efficiency. It is therefore essential to move towards more reliable, clear, and transparent systems that integrate safety alerts, shared medication records, and automated feedback on potential errors or interactions.

Finally, continuous training for healthcare professionals, together with improvements in platform design and the integration of advanced tools such as artificial intelligence, are key strategies for ensuring that electronic prescribing fulfills its purpose: to guarantee safe, effective, and patient-centered treatments, minimizing associated risks and strengthening confidence in technology applied to medicine.

REFERENCES

[1] «Calidad de la atención». Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.who.int/es/health-topics/quality-of-care

[2] A. Sheikh *et al.*, «Electronic prescribing systems in hospitals to improve medication safety: a multimethods research programme», en *Electronic prescribing systems in hospitals to improve medication safety: a multimethods research programme*, National Institute for Health and Care Research, 2022. Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.ncbi.nlm.nih.gov/books/NBK584762/

[3] «Conciliación de medicamentos: seguridad y calidad del paciente - Biblioteca del NCBI». Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.ncbi.nlm.nih.gov/books/NBK2648/

[4] O. of the Commissioner, «Haga y mantenga una lista de los medicamentos que toma para cuidar su salud», *FDA*, feb. 2025, Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.fda.gov/consumers/articulos-para-el-consumidor-en-espanol/haga-y-mantenga-una-lista-de-los-medicamentos-que-toma-para-cuidar-su-salud

[5] «seguridad-en-la-utilizacion-de-medicamentos.pdf». Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/DE/CA/seguridad-en-la-utilizacion-de-medicamentos.pdf

[6] «Pruebas de usabilidad: definición, tipos y ejemplos». Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://blog.hubspot.es/website/pruebas-usabilidad

[7] E. Montané y J. Santesmases, «Reacciones adversas a medicamentos», *Med. Clínica*, vol. 154, n.º 5, pp. 178-184, mar. 2020, doi: 10.1016/j.medcli.2019.08.007.

[8] «Medicina personalizada | NHGRI». Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.genome.gov/es/genetics-glossary/Medicina-personalizada

[9] M. Vélez-Díaz-Pallarés *et al.*, «Technology-induced errors associated with computerized provider order entry software for older patients», *Int. J. Clin. Pharm.*, vol. 39, n.º 4, pp. 729-742, ago. 2017, doi: 10.1007/s11096-017-0474-y.

[10] J. Martínez-Sotelo, M. Pinteño-Blanco, R. García-Ramos, y M. I. Cadavid-Torres, «Adecuación de la prescripción en pacientes mayores polimedicados en atención primaria. Ensayo clínico controlado aleatorizado por grupos PHARM-PC», *Aten. Primaria*, vol. 53, n.º 10, p. 102124, dic. 2021, doi: 10.1016/j.aprim.2021.102124.

[11] R. Rojas, «8 errores comunes al redactar una receta médica que debes evitar», Saludiario. Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.saludiario.com/errores-comunes-redactar-receta-medica/

[12] H. Mozaffar, K. M. Cresswell, R. Williams, D. W. Bates, y A. Sheikh, «Exploring the roots of unintended safety threats associated with the introduction of hospital ePrescribing systems and candidate avoidance and/or mitigation strategies: a qualitative study», *BMJ Qual. Saf.*, vol. 26, n.º 9, pp. 722-733, sep. 2017, doi: 10.1136/bmjqs-2016-005879.

[13] S. E. García-Ramos, G. Baldominos Utrilla, M. Herrero Fernandez, y A. Lebrero García, «Detección de errores de prescripción asociados a un sistema de prescripción electrónica», *Farm. Hosp.*, vol. 36, n.º 5, pp. 439-440, sep. 2012, doi: 10.1016/j.farma.2011.09.004.

[14] G. P. Velo y P. Minuz, «Medication errors: prescribing faults and prescription errors», *Br. J. Clin. Pharmacol.*, vol. 67, n.º 6, pp. 624-628, jun. 2009, doi: 10.1111/j.1365-2125.2009.03425.x.

[15] E. M. Campbell, D. F. Sittig, J. S. Ash, K. P. Guappone, y R. H. Dykstra, «Types of Unintended Consequences Related to Computerized Provider Order Entry», *J. Am. Med. Inform. Assoc. JAMIA*, vol. 13, n.º 5, pp. 547-556, 2006, doi: 10.1197/jamia.M2042.

[16] S. P. Slight *et al.*, «The vulnerabilities of computerized physician order entry systems: a qualitative study», *J. Am. Med. Inform. Assoc. JAMIA*, vol. 23, n.º 2, pp. 311-316, mar. 2016, doi: 10.1093/jamia/ocv135.

[17] M. Vélez-Díaz-Pallarés *et al.*, «Technology-induced errors associated with computerized provider order entry software for older patients», *Int. J. Clin. Pharm.*, vol. 39, n.º 4, pp. 729-742, ago. 2017, doi: 10.1007/s11096-017-0474-y.

[18] O. K. Odukoya, L. J. Schleiden, y M. A. Chui, «The Hidden Role of Community Pharmacy Technicians in Ensuring Patient Safety with the Use of E-Prescribing», *Pharm. Basel Switz.*, vol. 3, n.º 4, pp. 330-343, dic. 2015, doi: 10.3390/pharmacy3040330.

[19] J. Heed *et al.*, «A Qualitative Study Exploring the Acceptability and Usability of the e-Prescribing Risk and Safety Evaluation (ePRaSE) Assessment Within English Hospitals», *J. Patient Saf.*, vol. 21, n.º 5, pp. 309-316, ago. 2025, doi: 10.1097/PTS.0000000000001322.

[20] V. Lichtner, B. D. Franklin, L. Dalla-Pozza, y J. I. Westbrook, «Electronic ordering and the management of treatment interdependencies: a qualitative study of paediatric chemotherapy», *BMC Med. Inform. Decis. Mak.*, vol. 20, n.º 1, p. 193, ago. 2020, doi: 10.1186/s12911-020-01212-z.

[21] G. L. Cochran, D. G. Klepser, M. Morien, D. Lomelin, R. Schainost, y L. Lander, «From physician intent to the pharmacy label: prevalence and description of discrepancies from a cross-sectional evaluation of electronic prescriptions», *BMJ Qual. Saf.*, vol. 23, n.º 3, pp. 223-230, mar. 2014, doi: 10.1136/bmjqs-2013-002089.

[22] B. MacKenna, H. J. Curtis, A. J. Walker, S. Bacon, R. Croker, y B. Goldacre, «Suboptimal prescribing behaviour associated with clinical software design features: a retrospective cohort study in English NHS primary care», *Br. J. Gen. Pract. J. R. Coll. Gen. Pract.*, vol. 70, n.º 698, pp. e636-e643, sep. 2020, doi: 10.3399/bjgp20X712313.

[23] M. Q. Liang *et al.*, «Improving medication safety in a paediatric hospital: a mixed-methods evaluation of a newly implemented computerised provider order entry system», *BMJ Health Care Inform.*, vol. 30, n.º 1, p. e100622, feb. 2023, doi: 10.1136/bmjhci-2022-100622.

[24] M. Naunton, H. R. Gardiner, y G. Kyle, «Look-alike, sound-alike medication errors: a novel case concerning a Slow-Na, Slow-K prescribing error», *Int. Med. Case Rep. J.*, vol. 8, pp. 51-53, 2015, doi: 10.2147/IMCRJ.S78637.

[25] M. Vélez-Díaz-Pallarés, M. Ruano, E. Villamañán, Y. Larrubia, E. Wagner, y A. Herrero, «Impact of electronic prescription alerts on medication errors related to vitamin K antagonists in hospitalised patients», *Eur. J. Hosp. Pharm.*, vol. 21, n.º 1, pp. 29-33, feb. 2014, doi: 10.1136/ejhpharm-2013-000308.

[26] A. Ai, A. Wong, M. Amato, y A. Wright, «Communication failure: analysis of prescribers' use of an internal free-text field on electronic prescriptions», *J. Am. Med. Inform. Assoc. JAMIA*, vol. 25, n.º 6, pp. 709-714, jun. 2018, doi: 10.1093/jamia/ocy003.

[27] K. M. Cresswell, H. Mozaffar, L. Lee, R. Williams, y A. Sheikh, «Safety risks associated with the lack of integration and interfacing of hospital health information technologies: a qualitative study of hospital electronic prescribing systems in England», *BMJ Qual. Saf.*, vol. 26, n.º 7, pp. 530-541, jul. 2017, doi: 10.1136/bmjqs-2015-004925.

[28] E. G. Stone, «Unintended adverse consequences of a clinical decision support system: two cases», *J. Am. Med. Inform. Assoc. JAMIA*, vol. 25, n.º 5, pp. 564-567, may 2018, doi: 10.1093/jamia/ocx096.

[29] Y. Yang, S. Ward-Charlerie, A. A. Dhavle, M. T. Rupp, y J. Green, «Quality and Variability of Patient Directions in Electronic Prescriptions in the Ambulatory Care Setting», *J. Manag. Care Spec. Pharm.*, vol. 24, n.º 7, pp. 691-699, jul. 2018, doi: 10.18553/jmcp.2018.17404.

[30] D. García González, P. Teixeira-da-Silva, J. J. Salvador Sánchez, J. Á. Sánchez Serrano, M. V. Calvo, y A. Martín-Suárez, «Discrepancies in Electronic Medical Prescriptions Found in a Hospital Emergency Department: A Prospective Observational Study», *Pharm. Basel Switz.*, vol. 17, n.º 4, p. 460, abr. 2024, doi: 10.3390/ph17040460.

[31] M. K. Gullslett y T. Strand Bergmo, «Implementation of E-prescription for Multidose Dispensed Drugs: Qualitative Study of General Practitioners' Experiences», *JMIR Hum. Factors*, vol. 9, n.º 1, p. e27431, ene. 2022, doi: 10.2196/27431.

[32] K. M. Cresswell, H. Mozaffar, L. Lee, R. Williams, y A. Sheikh, «Workarounds to hospital electronic prescribing systems: a qualitative study in English hospitals», *BMJ Qual. Saf.*, vol. 26, n.º 7, pp. 542-551, jul. 2017, doi: 10.1136/bmjqs-2015-005149.

[33] L. M. Lourenco, A. Bursua, y V. L. Groo, «Automatic Errors: A Case Series on the Errors Inherent in Electronic Prescribing», *J. Gen. Intern. Med.*, vol. 31, n.º 7, pp. 808-811, jul. 2016, doi: 10.1007/s11606-016-3606-5.

[34] A. A. Dhavle, Y. Yang, M. T. Rupp, H. Singh, S. Ward-Charlerie, y J. Ruiz, «Analysis of Prescribers' Notes in Electronic Prescriptions in Ambulatory Practice», *JAMA Intern. Med.*, vol. 176, n.º 4, pp. 463-470, abr. 2016, doi: 10.1001/jamainternmed.2015.7786.

[35] O. O. Olakotan y M. M. Yusof, «Evaluating the appropriateness of clinical decision support alerts: A case study», *J. Eval. Clin. Pract.*, vol. 27, n.º 4, pp. 868-876, ago. 2021, doi: 10.1111/jep.13488.

[36] C.-Y. Chen, Y.-L. Chen, J. Scholl, H.-C. Yang, y Y.-C. J. Li, «Ability of machine-learning based clinical decision support system to reduce alert fatigue, wrong-drug errors, and alert users about look alike, sound alike medication», *Comput. Methods Programs Biomed.*, vol. 243, p. 107869, ene. 2024, doi: 10.1016/j.cmpb.2023.107869.

[37] K. Alhanout, S.-S. Bun, K. Retornaz, L. Chiche, y N. Colombini, «Prescription errors related to the use of computerized provider order-entry system for pediatric patients», *Int. J. Med. Inf.*, vol. 103, pp. 15-19, jul. 2017, doi: 10.1016/j.ijmedinf.2017.04.005.

[38] «(PDF) Evaluation of satisfaction and usability of a clinical decision support system (CDSS) targeted for early obstetric risk assessment and patient follow-up», en *ResearchGate*, Accedido: 3 de octubre de 2025. [En línea]. Disponible en: https://www.researchgate.net/publication/329451516_Evaluation_of_satisfaction_and_usability_of_a_clinical_decision_support_system_CDSS_targeted_for_early_obstetric_risk_assessment_and_patient_follow-up

[39] C. Hamel *et al.*, «Computerized pediatric oncology prescriptions review by pharmacist: A descriptive analysis and associated risk factors», *Pediatr. Blood Cancer*, vol. 65, n.º 4, p. e26897, 2018, doi: 10.1002/pbc.26897.

[40] W. K. Alanazi *et al.*, «Effect of electronic prescription system modifications on reducing prescribing errors in a military hospital», *J. Pharm. Policy Pract.*, vol. 17, n.º 1, p. 2431177, dic. 2024, doi: 10.1080/20523211.2024.2431177.