International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 02 | Feb - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

Minimizing Medication Errors in High-Risk Medications: Effective Strategies for Busy Pharmacy Environments

Adinarayana Andy[1]*, Divya Andy[2]

1.Pharmacy Manager Weatherwax Family Pharmacies Inc Spring Arbor, Michigan, U.S.A.

2.Independent Research Consultant, Michigan, U.S.A.

***Corresponding Author:** Adinarayana Andy, Pharmacy Manager, Weatherwax Family Pharmacies Inc. Spring Arbor, Michigan, U.S.A.

Abstract

Medication errors, particularly in high-risk medications such as anticoagulants, insulin, and chemotherapy agents, pose a significant threat to patient safety in busy pharmacy environments. These errors often arise from miscommunication, complex dosing requirements, environmental distractions, and inadequate staff training. This article investigates effective strategies to minimize medication errors by standardizing processes, implementing technological solutions, enhancing communication, and providing continuous staff training. Standardizing protocols, such as checklists and patient education guides, reduces variability and increases reliability in handling high-risk medications. Technology, including Computerized Physician Order Entry (CPOE), Electronic Health Records (EHRs), and Barcode Medication Administration (BCMA), enhances accuracy, mitigates risks, and improves workflow efficiency.

Additionally, fostering clear communication and interdisciplinary collaboration among healthcare providers enhances medication safety. Regular training, including simulations and mentorship programs, empowers pharmacy staff to stay informed about best practices and emerging guidelines. By incorporating these multifaceted strategies, pharmacists play a pivotal role in minimizing medication errors, reinforcing a safety culture, and promoting optimal patient outcomes. This article underscores the essential contribution of pharmacists in managing high-risk medications and advancing patient-centered care in dynamic pharmacy settings.

Keywords

Medication errors, High-risk medications, Anticoagulants, insulin, Pharmacy safety, Technology in pharmacy, Patient education, Standardized protocols, Pharmacist role, Healthcare Collaboration

1 Introduction

Medication error prevention in pharmacies, especially for high-risk medications, is crucial for today's pharmacy practice to enhance patient safety and achieve the best therapeutic results. As for the high-risk medication, the authors explain that it is the medication associated with a higher risk of causing harm if misused. These include anticoagulant agents, insulin, and certain chemotherapy drugs, which are usually very sensitive in dosage and monitoring. This concern has become critical since medication errors are high, especially in technical pharmacy spaces crowded with

prescription filling, patients, and various operational challenges. Such factors can result in Emergent inattention, suboptimal communication, and medication errors that negatively affect the safety of patients. High-risk medications were estimated to be responsible for 46.1% of all adverse drug events, meaning that the application of effective interventions to prevent the adverse drug effects of high-risk medications is urgently needed [1].

The purpose of this article is to categorize high-risk medications, identify the most frequently occurring medication errors, and provide an overview of approaches that could be used to decrease the possibility of these errors in dynamic environments like a pharmacy. Pharmacists have the potential to introduce improvement in medication management by paying attention to standardization of procedures, technology integration, satisfying communication, and obligatory education for employees. By employing these preventive steps, the number of medication errors that pharmacy practitioners encounter can be significantly reduced, and the purpose of pharmacists in the cascade of care is reaffirmed.

Understanding High-Risk Medications

They are referring to medications that are susceptible to causing a lot of harm to the body if not used appropriately. These drugs are best taken and monitored closely because of their pharmacological actions, relatively low toxic-nonspecific margins, and possible complications. It forms the basis for pharmacists' and other care providers' knowledge and competence for improving the use of high-risk medicines and reducing associated medication safety risks. AIDS medications and anticoagulants are some of the high-risk medications that include such products as Warfarin and direct oral anticoagulants (DOACs). However, such drugs have a pretty restricted range of safety, and their use is followed by precise monitoring to prevent bleeding complications or thrombotic events. Likewise, insulin required for diabetic patients also requires proper measurement according to their blood glucose level, diet, or any disease they are suffering from. Inaccurate insulin dosing may cause a shallow or high blood sugar level, so patients require careful dosage [2].

High-risk chemotherapy agents, the second class, are widely used in cancer treatment, and their dosage must be adjusted depending on a patient's surface and weight. When administered in suboptimal doses, these agents will cause either an adequate treatment or toxicity. Also, opioids pose some preeminent dangers, much more so in the middle of the opioid period. Abuse or prescribing these medications in the wrong doses can result in overdose, dependency, and several other adverse effects. They are a team of healthcare professionals who can track high-risk medications, check that prescriptions are correct, and educate the patient about the risks of their medication. These medications can be complicated because of additional precautionary steps, including warning patients of possible side effects and ensuring they follow their prescribed doses. With this knowledge, pharmacists can effect powerful interventions and prevent factors and medication-related errors, ultimately fostering the most desirable health outcomes. These foundational concepts are essential because they will help promote patient safety and positive health outcomes [3], [4].

3 Common Causes of Medication Errors

Medication errors may be defined as any mistake that fails to use a drug safely or effectively across the entire medication-use process. Only when one understands the common causes of these errors can pharmacists and other health care providers work towards mustering prevention programs. As will be revealed by the subsequent observations, various factors play a role in causing medication errors, particularly with high-risk medications. Lack of effective communication is a significant cause, mainly due to the failure to exchange information between caregivers, pharmacists, and consumers. Scattered prescriptions, untidy prescriptions, incorrect avowals, or neglect

to offer adequate details might lead to clarity concerning medicines. For instance, if a physician is silent on the dosage, they may be prone to under- or overloading the patient with an anticoagulating agent, each being dangerous. Usually, high-risk medications are associated with intricate dosing schedules, which present problems to the patient and the personnel from the pharmacy. For example, Warfarin is an anticoagulant that requires the measurement of the INR to determine safe dosing, yet the patient may find it hard to meet these demands. An enhanced degree of risk for adverse events may stem from slight miscalculations of doses caused by data inadequacy [5].

Externality conditions include factors like working environment congestions; this regularly observed invades and time pressures, hence escalating chances of mistakes in many premises pharmacies. Medication dispensing may be done in a disrupted environment mainly due to interruptions like receipt of phone calls, client inquiries, or operational requirements, which would imply inadequate attention. This rapid environment makes it challenging for pharmacists to adhere to safety measures, making the reverting process challenging. The third is a need for sufficient staff training because they may need to correct their dispensing or explain how to use the drugs to the patient. That is why pharmacy staff who do not have training in high-risk medications may unconsciously make mistakes in their judgment. Continuing education and training are essential in ensuring that pharmacy staff is up-to-date on the current rules and nonpharmacologic safety measures. High-risk medications are also managed in a highly inconsistent manner owing to no set standard protocols in place. Without a standard procedure manual, the pharmacy staff may adopt different approaches when cross-checking prescriptions, counseling patients, or observing therapy progress, resulting in high chances of making mistakes. This practice reduces the possibility of medical errors due to uniformity in the staff's actions. As a result, pharmacy professionals can identify the causes of risks, which can lead to effective measures to reduce them. By enhancing communication, navigation, and coaching, the organizations of the pharmacies can create a sustainable safety culture, which will benefit significantly when handling high-risk medicines [6].

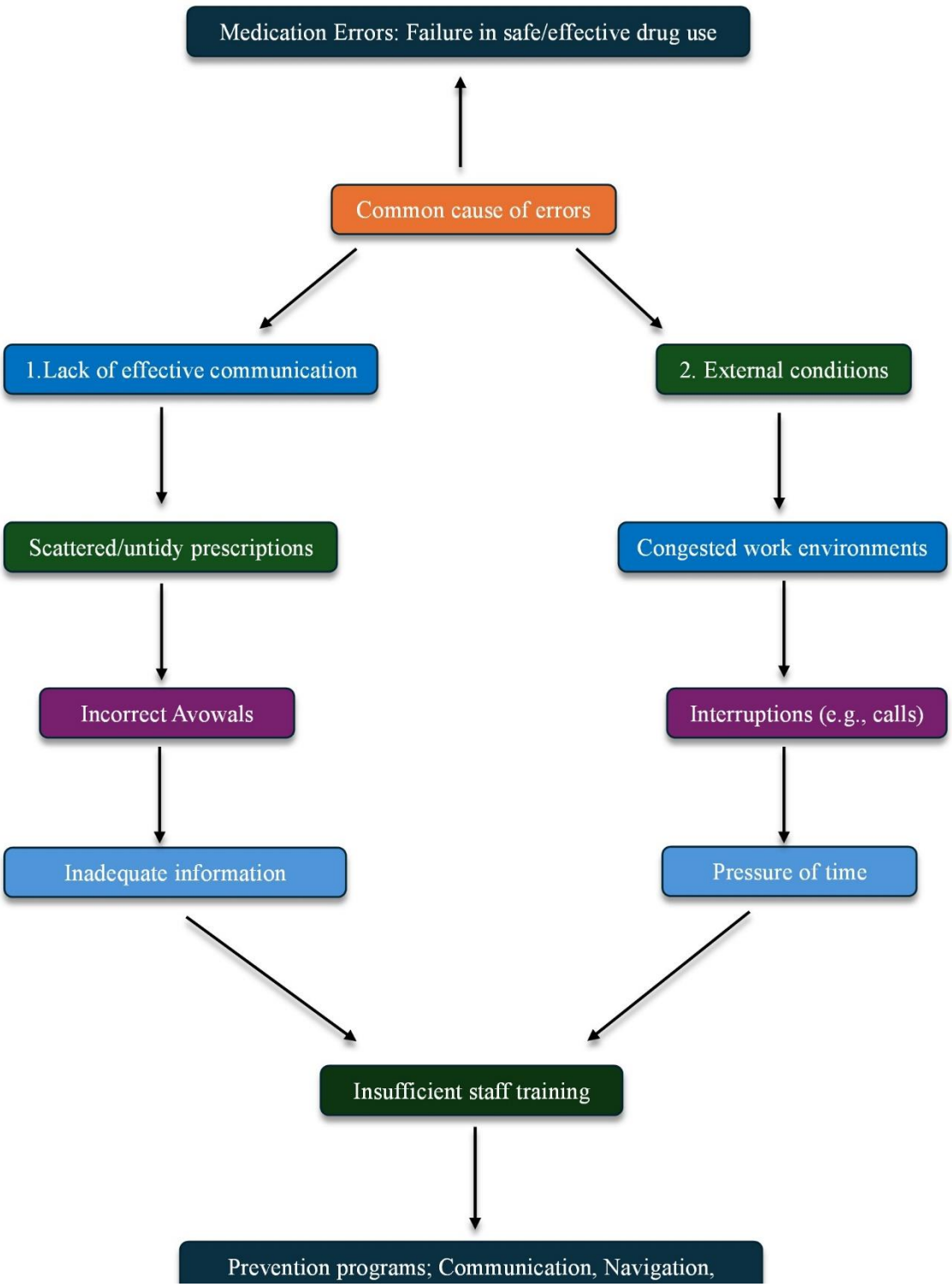

Fig. 1: Causes of medication errors and prevention measures

Effective Strategies for Minimizing Errors

Scattered prescriptions, untidy prescriptions, incorrect avowals, or the need to offer adequate information might lead to clarity concerning medicines. For instance, if a physician is silent on the dosage, they may be prone to under or overloading the patient with an anticoagulating agent, each being dangerous. Usually, high-risk medications are associated with intricate dosing schedules, which present problems to the patient and the personnel from the pharmacy. For example, Warfarin is an anticoagulant that requires the measurement of the INtohdetermine of safe dosing, yet the patient may find it hard to meet these demands. An enhanced degree of risk for adverse events may stem from slight miscalculations of doses caused by data inadequacy [7].

4.1 Standardizing Processes and Protocols

One of the best approaches to minimizing medication mistakes is decreasing variations within organizational procedures. This is important because clear prescribing, dispensing, and monitoring rules for high-risk medications enhance consistency and thus lessen the possibility of errors. A starting point is to create Standard Operating Procedures (SOPs). The pharmacies should develop SOPs to lay down each step that is taken in handling risky drugs, from checking the script to preparation for dispensing and counseling the clients. This ensures that pharmacy staff only have to learn a few procedures followed by the rest of the health care_order_filling pharmacy staff, reducing variability and pressing potential mishaps. The utilization of checklists is of equal use. Practical checklists for severe activities help to enhance the quality and the speed of performances since staff use checklists to read essential information. For example, a checklist for dispensing high-risk medication could prompt the pharmacist to double-check the dosage calculations, check the medication allergy of the patient, and do label checking. These checklists serve as knowledge prompts to remind staff of critical measures while minimizing the risk of failures [8].

The following frameworks shall also be implemented: for written material, group patient education, and individual patient education. The educational points for a patient are made by protocols so that all patients receive similar instructions about their high-risk medication and its utilization, effects, and significance of compliance with the prescribed medicines. Effective and comprehensible information transfer allows the patients to participate in the safe use of medications. Theoretically, updating and reviewing SOPs and protocols is more accessible to ensure they fit current and improved standards. To quote continuous improvement, pharmacies can identify improvement opportunities to ensure procedures align with the present standard or compliance requirement regulations. Through these processes, affiliations ensure that patient care steps for medication administration are formulated to reduce risks with sensitive medicines [9].

4.2 Implementing Technology Solutions

The use of technology in pharmacy practice helps prevent all the various types of medication errors. New technology can play a vital role in increasing the reliability of medication dispensing, optimizing processes, and facilitating cooperation among personnel. Among them, the most essential is Computerized Provider Order Entry (CPOE) systems, which capture prescriptions made by physicians in electronic format. This minimizes the possibility of developing errors often related to handwritten orders. Some of the CPOE systems provide clinical decision support, which provides messages to the prescriber about drug-drug interactions, allergens, or contraindications, allowing potential medication errors before they are taken to the pharmacy. Another vital technology is electronic health records, often digital well-being data. They enhance the communication between the pharmacist and other healthcare practitioners by giving the pharmacist a real-time view of the patient's medical record. EHRs help pharmacists increase their chances of seeing medication lists, detecting discrepancies, and observing patients' therapies. It is essential to gain comprehensive patient information to make the right decisions regarding high-risk medications [10].

Another technique called Barcode Medication Administration (BCMA) drastically minimizes the chances of errors during the dispensing and administration of prescribed medication. Here, for instance, barcodes placed on the packets

of the medicines and the tags worn by the patients will help the pharmacy staff deliver the right medicine to the right patient in the correct dosage. It is essential for the safety of medication that BCMA is used as supplementary confirmation. Automated Dispensing Systems help to reduce or eliminate human error chances when it comes to dispensing medication. These systems store medication safely, dispense it, and record its usage. Pharmacists should then focus on handling patients and their medicines by freeing up their time through automation. Through the above-listed technological systems, pharmacies can help increase the efficiency of medication delivery, exchange information between healthcare professionals, and reduce the chances of medication errors, especially with the ABBT categories of medicines [11].

4.3 Enhancing Communication and Collaboration

Reducing medication misadventures requires interdisciplinary coordination between medical caregivers, pharmacists, and end users. Enhancing these communication lines helps arrive at improved decisions that would make all the stakeholders agree on medication administration. This means that there has to be massive cooperation between different fields. Advising collaboration with pharmacists, physicians, nurses, and other employees is one of the powerful ways to increase the level of patient safety. Interprofessional collaboration meetings are daily and allow for the combination of ideas, focusing on scrutinizing different patient cases as well as discussing such issues as high-risk drugs and related concerns. This makes everyone work within a healthcare team to create a safe and accountable environment shared amongst them. The other component also entails the creation of free communication lines among the staff in a pharmacy. This approach may involve inviting the members of such teams to express any probable concerns or mistakes they foresee may occur. If the staff are free to share their experiences, especially the difficult ones, they are likely to help build a positive organizational culture and help with organizational learning. The respect of the patient's pronouncements is a critical factor in reducing mistakes [12].

Pharmacists should involve patients in a conversation about medications and recall that the patient is allowed to ask questions and even voice concerns. Sharing information with the patient provided in simple and easily followed terms leads to improved patient understanding and application of medication use, thus a reduced chance of medication-related mistakes due to the patient's failure to understand directions given. Communication of medical details during transitional care, like discharge from the hospital or transfer to another healthcare provider, is crucial. The passing of medication information is vital. Along this aspect, or rather the transitions in medication therapy, pharmacists can be more proactive in managing these processes, explaining the correct medicines and their use to the patients. With improvements in relations between the pharmacy and other members of a multisector healthcare team, pharmacies can establish a smoother system of patient care medication, which can minimize the potential mistakes in medication related to the use of high-risk drugs (see **Table 1)** [13].

Component	Description	Purpose	Outcome
Interdisciplinary Coordination	Collaboration between medical caregivers, pharmacists, nurses, and end users.	Promotes a unified approach to medication safety.	We have improved patient safety and medication management.
Interprofessional Meetings	Daily meetings to discuss high-risk drugs, patient cases, and related concerns.	Facilitates shared accountability and decision-making.	Safer healthcare team environment.
Open Communication Lines	Encouraging staff to express concerns and share experiences freely.	Builds positive organizational culture and learning.	We have enhanced safety and proactive problem-solving.
Patient Involvement	They engage patients in discussions about their	Ensures patients understand medication instructions.	Reduced risk of patient misunderstanding and errors.

	medications and address questions and concerns.		
Respecting Patient Decisions	It is valuing patient input and making decisions that align with their preferences.	Promotes patient-centered care.	It increased patient trust and cooperation.
Transitional Care Communication	Effective communication during hospital discharge or transfer to another healthcare provider.	Ensures continuity of care and medication management.	We minimized errors during transitions of care.
Proactive Pharmacist Role	Pharmacists actively manage medication therapy and educate patients on proper use.	Reinforces accurate medication knowledge and usage.	Fewer medication errors and enhanced patient safety.
Multisector Healthcare Team	We are establishing strong relations between pharmacy and other healthcare members.	Smoothens the system of patient care medication.	Minimizes errors related to high-risk drugs.

Table 1: The critical components of reducing medication misadventures through interdisciplinary coordination, communication, and patient involvement

4.4 Regular Staff Training and Education

Staff at various pharmacies focused on process improvement and reducing medication errors, including the quest for education and training to avert partakers of wrong medications, particularly in those days. The results clarify that sufficient staff knowledge and up-to-date practices can improve medication safety and that maintaining regular continuing education programs is required. These programs should include high-risk medications, measures to avoid errors, and references to new guidelines and laws. Training opportunities will inform the staff about new risks and medication handling methods. Introducing simulation training into a staff education pattern may help ensure staff has practical experience in handling HM. Decision-making communication skills and problem-solving problem-solving can be effectively practiced through simulation. Some real-life events that the staff might face can also be dealt with through simulations [14].

Setting up of the mentorship programs is also recommended. Some of these programs involve youths with more experienced staff who could take them through the ropes. Tutelage creates desire and approach among members, and the subsequent impartation of knowledge and practice of best practices concerning medication creates high levels of competency among the employees involved. Also, performance evaluations and feedback are essential in review procedures to self-assess, report any deficiencies in knowledge or safety practices to the company, and be reminded again. Positive feedback allows staff to think about their behaviors and modify them to avoid sending incorrect medication information into the community. Thus, competent and proper training and education of the pharmacy staff should be the main concerns of the pharmacies because, when understood well, the staff would be able to make the right decisions, avoiding medication errors, especially with high-risk medications [15].

5: The Role of Pharmacists in Medication Safety

This work identifies pharmacists as key players in preventing and managing medication risks, especially high-risk medicines. Since they specialize in medication within health systems, pharmacy professionals are on the frontlines in recognizing, forestalling, and mitigating medication errors. Pharmacists' steps to promote safe medication use include assessing the order according to the accuracy of the written prescription, the specific medication, dose, and route, and the prescription's suitability to the patient. Open-box medications trigger special attention from pharmacists due to their potential to pose a high risk to patients. They need to consider the patient history, current medication profiles, and risks associated with the interacting medications. Such a review is critical to discover contraindications or risks that may not be observable in doctors who prescribe drugs. Apart from the dispensing role, patient-centered education is another essential pharmacist role play. All authors provide clear directions for the safe administration of a high-risk medication, including potential adverse effects and how to assess patients for these effects, emphasizing the necessity for compliance. They also educate the patient on signs or symptoms they should report to a doctor for early treatment, empowering them in their treatment process and ensuring safe medication usage [16].

Another significant contribution pharmacists make is the evaluation of the effects of medication. They often revisit high-risk medicated patients, sometimes to alter drug dosages and, in many cases, to consult other healthcare officials. In retail pharmacist-administered immunizations, pharmacists rely on professional competence to make necessary adjustments and perform the role of a significant reference point for patients about therapy and medication interactions. Pharmacists are also frontline champions for safe medication practices in their work communities. This includes supporting management's safety culture, engaging in interdisciplinary cooperation, and being active in driving changes to clinical practice standardization of managing high-risk medications. They know how to prevent medication errors since they represent the primary solution to patients' health and embrace their safety proactively [17].

6 Conclusion

Reducing medication errors in high-risk medications remains crucial in the current complex pharmacy practice settings, where pharmacists are responsible for protecting patients. This article has explored various measures—temptation control, process improvement, technological implementation, communication, and staff training—that help enhance pharmacists' ability to reduce errors, especially regarding risky drugs. This paper presents that pharmacists are well situated to assess safety risks owing to their medication knowledge and direct patient contact. By engaging in active patient surveillance and developing patient awareness together with patient counseling, pharmacists can further influence safe medication use of high-risk medications ranging from opioids to anticoagulation and insulin. More than just supplying drug mandates, it encompasses patient-centered advising, cooperation with the healthcare teams, and the propagation of safety culture within the pharmacy.

However, challenges persist. Constraints include minimal information entropy knowledge in retail configures, increased self-care behaviors, and regulations that can pose a challenge. None of these challenges can be resolved without the administration of staff education and technology to ensure better pharmacological care procedures. Other ethical dilemmas arise when a pharmacist recommends medication to patients such that the patient gets to decide whether to take the prescription or not, as opposed to the pharmacist having the mandate to decide on the proper medication to give a patient while bearing in mind the side effects of that medication. However, there is great potential to improve the safety of drugs even more in the future by enhancing cooperation between different professions and patients and introducing new technologies. Therefore, pharmacists will likely extend their contribution to patient safety out of the increasing practice arena by improving strategies for safer medication administration. Through

pursuing professional standards and eminently maintaining patient safety as advocacy, the pharmacists will retain the position of the influential members of the healthcare team that would advance the course of adequate reductions of medication errors and enhancements of patient care in the active pharmacy environment.

References

[1] L. L. Leape, D. D. Woods, M. J. Hatlie, K. W. Kizer, S. A. Schroeder, and G. D. Lundberg, "Promoting patient safety by preventing medical error," *Jama*, vol. 280, no. 16, pp. 1444–1447, 1998.

[2] D. S. Chakraborty, B. Kar, S. Choudhury, A. Ghosh, K. Samanta, and A. Hazra, "Knowledge, Attitude and Practice Survey Regarding High Alert Medication Among Resident Doctors in a Tertiary Care Teaching Hospital in Eastern India.," *Curr. Drug Saf.*, vol. 17, no. 4, pp. 375–381, 2022, doi: 10.2174/1574886317666220207123704.

[3] B. Goldspiel *et al.*, "ASHP guidelines on preventing medication errors with chemotherapy and biotherapy," *Am. J. Heal. Pharm.*, vol. 72, no. 8, pp. e6–e35, 2015.

[4] N. Heneka, T. Shaw, D. Rowett, and J. L. Phillips, "Quantifying the burden of opioid medication errors in adult oncology and palliative care settings: a systematic review," *Palliat. Med.*, vol. 30, no. 6, pp. 520–532, 2016.

[5] R. A. Tariq, R. Vashisht, A. Sinha, and Y. Scherbak, "Medication dispensing errors and prevention," 2018.

[6] J. R. Leal, J. Conly, E. A. Henderson, and B. J. Manns, "How externalities impact an evaluation of strategies to prevent antimicrobial resistance in health care organizations.," *Antimicrob. Resist. Infect. Control*, vol. 6, p. 53, 2017, doi: 10.1186/s13756-017-0211-2.

[7] E. Freidson, *Profession of medicine: A study of the sociology of applied knowledge*. University of Chicago Press, 1988.

[8] M. Yu, J. Chen, S. Zheng, H. Wang, and X. He, "Reduce medication errors in tube feeding administration by establishing administration standards and standardizing operation procedures," *Drugs Ther—Perspect.*, vol. 36, pp. 69–74, 2020.

[9] I. Dumitrescu, M. Casteels, K. De Vliegher, L. Mortelmans, and T. Dilles, "Home care nurses' management of high-risk medications: a cross-sectional study.," *J. Pharm. policy Pract.*, vol. 15, no. 1, p. 88, Nov. 2022, doi: 10.1186/s40545-022-00476-2.

[10] R. Koppel *et al.*, "Role of computerized physician order entry systems in facilitating medication errors," *Jama*, vol. 293, no. 10, pp. 1197–1203, 2005.

[11] P. J. Helmons, L. N. Wargel, and C. E. Daniels, "Effect of bar-code-assisted medication administration on medication administration errors and accuracy in multiple patient care areas," *Am. J. Heal. Pharm.*, vol. 66, no. 13, pp. 1202–1210, 2009.

[12] M. Wilcock, G. Harding, L. Moore, I. Nicholls, N. Powell, and J. Stratton, "What do hospital staff in the UK think are the causes of penicillin medication errors?," *Int. J. Clin. Pharm.*, vol. 35, pp. 72–78, 2013.

[13] W. H. Organization, *Global patient safety action plan 2021-2030: towards eliminating avoidable harm in health care*. World Health Organization, 2021.

[14] P. Nichols, T. Copeland, I. A. Craib, P. Hopkins, and D. G. Bruce, "Learning from error: identifying

contributory causes of medication errors in an Australian hospital," *Med. J. Aust.*, vol. 188, no. 5, pp. 276–279, 2008.

[15] E. M. Ladd, W. R. Doucette, and A. J. Stubblefield, "The value of mentorship," *J. Am. Pharm. Assoc.*, vol. 48, no. 3, pp. 335–339, 2008.

[16] M. R. Cohen and J. L. Smetzer, "Preventing dispensing errors," *Medicat. Errors*, vol. 2, pp. 205–234, 2007.

[17] J. M. Mansur, "Medication safety systems and the important role of pharmacists," *Drugs Aging*, vol. 33, pp. 213–221, 2016.