The challenges of doctor-pharmacist-patient interactions in preventing medical errors: An overview

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Abstract

Introduction: Medication errors remain a major global problem for patient safety. They are often associated with misunderstandings in the prescription, dispensing and administration of medicines. The literature suggests that collaboration between doctors, pharmacists and patients is one of the most effective strategies to prevent them.

Purpose: This paper aims to examine the specific roles of each actor and to analyze effective forms of their collaboration to minimize medication-related medical errors.

Methodology: The review includes 44 international sources published between 2018 and 2024, including scientific articles, institutional guidelines and meta-analyses. Special focus was given to empirical studies on collaborative practices in community and hospital pharmacies.

Results: Evidence shows that pharmacist interventions and patient involvement improve adherence to therapy and reduce errors. Models such as PPMC and CDTM have yielded positive results in different countries. However, obstacles such as the lack of common protocols, legal barriers and insufficient communication continue to limit the impact of collaboration.

Conclusions: Strengthening physician-pharmacist-patient collaboration is crucial for patient safety. This requires systemic reforms, interprofessional training and policies that promote active patient involvement in the decision-making process.

Key words: *medication errors, pharmacist, physician, patient, collaboration, patient safety, medication use*

Introduction

Medication-related errors, those that occur during prescribing, dispensing, or administering drugs remain one of the most persistent and dangerous problems in modern healthcare. The World Health Organization (WHO, 2019) ranks these errors among the leading causes of preventable patient harm worldwide. Each instance not only increases the risk of complications, hospitalizations, or even death, but also imposes a substantial financial burden on health systems globally, with costs estimated in the billions of dollars annually (WHO Collaborating Centre for Patient Safety, 2020).

Addressing such a complex and high-risk issue requires more than the competence of individual professionals. Patient safety today depends on a well-coordinated, multidisciplinary approach, especially in cases involving polypharmacy, chronic illness, or elderly patients contexts where the potential for medication errors is especially high (International Pharmaceutical Federation, 2018; WHO, 2022). Within this collaborative framework, pharmacists play a central role. Their clinical expertise in medication management enables them to evaluate prescriptions, prevent drug interactions, educate patients, and support individualized treatment plans (FIP, 2020; Farr & Bates, 2021). Research consistently shows that when pharmacists are actively engaged in care, treatment adherence improves, adverse effects decrease, and outcomes in conditions like hypertension, diabetes, and asthma are significantly better (Chisholm-Burns et al., 2020; Lee et al., 2019; Alhabib & Alhossan, 2020).

Yet the success of the pharmacist's contribution relies heavily on effective collaboration both with prescribing physicians and with the patients themselves. In practice, such collaboration is often limited. Barriers include poor communication, vague or overlapping professional roles, and institutional limitations such as the

absence of shared health information systems (Mercer et al., 2020; Zheng et al., 2022; Rakvaag et al., 2020). Patients, too, are frequently sidelined left uninformed or excluded from conversations about their own therapy, which can result in misunderstanding and poor adherence (Tobiano et al., 2024; Giles et al., 2020).

Multiple international reports, including from FIP and the CDC, underline the importance of collaborative triads doctors, pharmacist, and patient to ensure a seamless and safe treatment process (CDC, 2020; FIP, 2022). When pharmacists are fully integrated into care teams and have access to patient records, the risk of medication error drops significantly, and clinical results improve (Health Quality Ontario, 2020). Despite these benefits, pharmacists often face systemic obstacles ranging from lack of training in adverse event reporting to time constraints and unsupportive institutional cultures (Abduelkarem & Mustafa, 2021; Alfadl et al., 2023). These barriers can prevent the flow of critical information that is essential for patient safety.

Given these complexities, this paper aims to review and critically analyze recent empirical evidence on the challenges of collaboration among physicians, pharmacists, and patients. It focuses on how the presence or absence of such collaboration affects the rate of medication errors, and what structural, professional, and educational changes are needed to support more effective interprofessional partnerships. Through a thematic analysis of international studies published in the last decade, this review seeks to identify current gaps and offer informed recommendations for improvement.

The aim of this review is to provide a comprehensive and critical synthesis of international empirical research on the dynamics of collaboration among physicians, pharmacists, and patients, with particular attention to how such cooperation contributes to the prevention of medication errors. The key objectives of the review include: identifying the primary obstacles that impede effective communication and coordination between physicians and pharmacists in clinical practice; highlighting the essential role of patient engagement in the safe management and use of medications; evaluating interprofessional collaboration models that have shown proven efficacy in enhancing patient safety; delivering evidence-informed recommendations to improve collaborative healthcare practices and guide policy development that supports structured, tripartite interaction in patient care.

Methodology

This paper follows a narrative literature review approach to examine how collaboration between doctors, pharmacists, and patients helps prevent medical errors. Rather than applying a systematic or meta-analytical method, the review

focuses on a thoughtful selection of recent, peer-reviewed empirical studies that align with the paper's aims. The literature search was carried out between March and May 2025 using databases such as PubMed, Scopus, ScienceDirect, Web of Science, and Google Scholar, included keywords "physician-pharmacist collaboration", "medication errors", "patient safety", and "polypharmacy risks". Filters were applied to limit results to studies published from 2018 to 2025. Studies were included if they presented original empirical data (qualitative, quantitative, or mixed-methods), focused on interprofessional collaboration, and explored its impact on patient safety or medication-related outcomes. A total of 43 studies met these criteria. They covered a range of healthcare settings-hospital, outpatient, and community—and came from diverse regions, including North America, Europe, Asia, and the Middle East. The selected studies were analyzed thematically. Key findings were organized around four main topics: the role of each professional in preventing errors, models of collaboration, institutional and interpersonal barriers, and the involvement of patients in communication and treatment. All sources were documented using APA 7 style, and the review emphasized both the presentation of results and critical evaluation of their relevance and quality.

Results

Preventing medical errors is a complex process that requires precise coordination between healthcare professionals and the patients themselves. At the center of this collaboration are three key actors: the doctor, the pharmacist and the patient. Each actor carries specific responsibilities and functions, which, when combined effectively, significantly reduce the risk of errors in prescribing, dispensing and administering medications.

Our overviwe found that *the pharmacist* represents an indispensable link in the chain of medication care, helping to maintain patient safety through direct education, individual counseling and monitoring of drug side effects (pharmacovigilance). In modern healthcare settings, the role of the pharmacist has gone beyond the dispensing of medicines and has expanded to deeper clinical functions, which are directly related to preventing medical errors and improving treatment outcomes (FIP, 2020; Farr & Bates, 2021).

Patient education is one of the fundamental tasks of the pharmacist. Many patients do not have sufficient knowledge about how to use medicines, the side effects that may occur, or the rules for storing them. The pharmacist, in this context, serves as a reliable source of information, clarifying the most common questions related to dosing, timing of taking medicines, and preventing unwanted interactions (Alhabib & Alhossan, 2020; Sleath & Carpenter, 2018). Personalized advice from the pharmacist has been proven to significantly improve treatment

adherence, a key factor in avoiding complications related to medication misuse (Chisholm-Burns et al., 2020). In addition to education, pharmacists play an active role in monitoring and reporting adverse drug reactions – a process known as pharmacovigilance. Pharmacists are often among the first professionals to encounter adverse drug reactions and can identify risky patterns of use through direct patient observation. This allows them to intervene early, alert the appropriate physician, and help prevent further harm (Gonzalez, Pérez, & Sosa, 2023). However, pharmacists' capacity to perform this role is often limited by institutional barriers, including a lack of clear protocols, high workload, and lack of access to electronic health record systems (Abduelkarem & Mustafa, 2021; Alfadl, Ibrahim, & Hassali, 2023). In addition, continuing professional education of pharmacists is essential to keep them up to date with the latest developments in pharmaceutical therapies and safety reporting practices. Without institutional support, a collaborative structure and appropriate training, pharmacists cannot fully exercise their role, even when they are professionally prepared. According to a systematic review conducted by Yousefi and Ahmadi (2021), interventions that include pharmaceutical education and counseling have had a significant impact on improving clinical outcomes, especially in patients with chronic diseases. In summary, the pharmacist is not simply a dispenser of medicines, but a key figure in the medication safety system, who through education, counseling and clinical supervision helps to significantly reduce errors and improve the patient's experience with their therapy.

Physicians play a central role in the patient treatment process, as they are responsible for clinical decision-making, including establishing the diagnosis and prescribing pharmacological treatment. The decisions that physicians make about the type, dosage, and combination of medications have a direct impact on the safety and health of the patient. For this reason, safe prescribing of medications is a fundamental component in preventing medical errors. One of the most common sources of errors is the failure to assess the patient's medication history, the prescription of medications that interact negatively with existing therapies, or the duplication of prescriptions for the same substance. At this point, collaboration with the pharmacist is essential, as he can provide a second perspective on the prescription and help identify potential risks that the physician, due to workload or lack of information, may not be aware of (Smith & Bates, 2019; WHO, 2019). Safe prescribing is not an isolated act, but a collaborative process. The integration of the pharmacist into medical decision-making, particularly in hospital settings and structured primary care, has resulted in significant reductions in medication errors. In a classic study, Leape et al. (1999) reported that pharmacist participation during medical visits in intensive care units reduced the number of medication errors by more than 60%. In addition to accurate prescribing, physicians have an important function in coordinating care between different professionals,

including pharmacists and nurses. In systems where this coordination is missing or fragmented, the risk that treatment information will not be transmitted correctly increases significantly, leading to double prescribing, interruption of therapy, or patient confusion (Mercer et al., 2018; Zheng, Wang, & Zhang, 2022). An additional challenge is related to the use of integrated health data systems. Doctors often do not share the same IT system with pharmacists, limiting the possibility of immediate exchange of information on prescriptions, reported effects or changes made to therapy. As a result, pharmacists do not have access to complete patient data and are forced to operate in a fragmented manner. Furthermore, the role of the doctor is not only technical, but also educational and communicative. The patient often refers to the doctor as the main figure of health authority and, if he does not receive clear and complete information about the therapy, he risks not following the treatment properly. Therefore, the doctor's communication with the patient and with the pharmacist is essential for building a sustainable and effective collaboration model (Tobiano et al., 2024; Briesacher et al., 2019).

In summary, the doctor has a decisive influence on the safety of pharmacological treatment. Through accurate prescribing, interprofessional communication and coordination of care, he directly contributes to the prevention of medical errors. However, this role cannot be fully fulfilled without a clear collaboration structure with the pharmacist and without the active involvement of the patient in decision-making.

In recent decades, the approach to *the patient* in health systems has evolved from a paternalistic model, where the patient was simply a passive recipient of care, to a collaborative model, where the patient is treated as an active partner in decision-making. This is particularly important in pharmacological treatment, where the success and safety of therapy depend not only on the correct prescription, but also on the correct and conscious adherence to medical and pharmaceutical instructions by the patient. Studies show that a significant percentage of medication errors occur at the level of use by the patient, as a result of misunderstanding the instructions, taking the wrong dose, stopping treatment prematurely, or self-medicating with unnecessary or inappropriate drugs (Briesacher, Gurwitz, & Soumerai, 2019). In this context, patient education and empowerment become essential for the prevention of errors. Direct advice from the pharmacist, clear communication from the doctor, and the opportunity to ask questions and express their concerns are elements that increase patient involvement in treatment and help build a lasting partnership (Alhabib & Alhossan, 2020; Sleath & Carpenter, 2018). Patients who feel involved are more likely to follow treatment properly, report side effects, and not change therapy without consultation. Furthermore, patients can help identify and correct errors that may go unnoticed by professionals. In a study conducted by Giles et al. (2020), it was evidenced that patients who had actively participated in discussions about the medications they were taking had a greater sensitivity to

potential risks, raising valid concerns that were later verified as real errors. Even in the discharge process or transitions of care, patient involvement is key to avoiding interruptions in therapy or taking the wrong medication. A recent pilot study by Tobiano et al. (2024) showed that interventions aimed at involving the patient in therapy discussions during discharge significantly improved communication and reduced uncertainty in medication administration at home. However, taking an active role by the patient requires education, time, and a supportive culture on the part of professionals. Not all patients feel empowered to raise questions, and they are often reluctant to challenge medical decisions, even when they have doubts. Therefore, creating an open and collaborative environment, where the patient is seen as a collaborator, not a passive subject, is the foundation of therapeutic safety. The patient is not a secondary figure in treatment – on the contrary, he is an active and essential actor in medication safety. Empowering it through information, involvement, and building trusting relationships with professionals is among the most effective strategies to reduce errors and increase the quality of healthcare.

Collaboration between doctors, pharmacists and patients does not happen by itself; it requires structures, processes and organizational cultures that enable and support it. Depending on the health system, level of care and local practices, this collaboration takes different forms – from informal information exchange to integrated models of multidisciplinary teamwork. Forms of collaboration directly affect the effectiveness of treatment, patient safety and the prevention of medication errors.

Clinical collaboration between doctors and pharmacists has taken different forms depending on the organizational context, health legislation and institutional culture of different countries. In some systems, pharmacists are directly involved in clinical decision-making, while in others they function more independently, with a mainly advisory role. These models, when operating in an integrated and well-coordinated manner, have shown tangible results in preventing medication errors, improving the quality of care and increasing therapeutic efficacy.

One of the most successful forms of this collaboration is the participation of clinical pharmacists in daily medical visits in hospital settings, especially in intensive care units. In a classic study by Leape et al. (1999), it was reported that the involvement of the pharmacist in the clinical team led to a reduction in medication errors by over 60%. This involvement enabled the identification of unwanted interactions, the correction of incorrect dosages and the provision of immediate recommendations for improving therapy.

Another advanced model is Collaborative Drug Therapy Management (CDTM), which is widely practiced in the USA, Canada and some countries of Northern Europe. This model gives clinically trained pharmacists the authority to modify or adapt a patient's therapy in accordance with protocols agreed upon with the prescribing physician. This formal collaboration is based on legal and

professional agreements, and has proven effective in improving the control of chronic diseases, such as hypertension and diabetes (Chisholm-Burns et al., 2020; Alhossan & Alazba, 2019).

According to the International Pharmaceutical Federation (2020), effective clinical collaboration relies on four key elements: clearly defined roles and responsibilities, mutual trust among professionals, open and well-documented communication, and strong institutional support through shared systems and standardized guidelines. These factors create a structured, reliable foundation for teamwork in healthcare.

In everyday clinical practice, these models do not always function ideally. In many cases, pharmacists face barriers such as lack of access to patients' medical records, high workload, or non-acceptance of their interventions by physicians, especially in systems where there are no well-defined protocols for collaboration (Mercer et al., 2020; Gonzalez et al., 2023). This situation is more pronounced in countries with more fragmented health structures, where interprofessional coordination is lacking and collaboration is based on individual relationships rather than on stable institutional mechanisms. However, where these models are successfully implemented, the results are clear and measurable: reduced prescribing errors, improved treatment efficacy, increased patient satisfaction, and reduced overall costs for the health system (WHO, 2022; CDC, 2020; Health Quality Ontario, 2020).

Interprofessional communication is the foundation on which every functional and effective relationship in healthcare is built. In the context of doctor–pharmacist–patient collaboration, clear, regular and reciprocal communication is not a luxury – it is a necessity to ensure that clinical decisions, therapy information and patient instructions are coordinated and without inconsistencies. Lack or fragmentation of communication is one of the most common causes of preventable medication errors, especially in situations where the prescription, distribution and use of medicines occur at different points in the healthcare system (WHO, 2019; Farr & Bates, 2021).

At a practical level, communication between a doctor and a pharmacist can take different forms: face-to-face discussions, telephone consultations, information exchange through shared information systems, or through written documentation. Successful collaboration models are closely linked to pharmacist access to patient medical information, which allows for more accurate therapy assessments and more informed interventions (Mercer et al., 2018; Zheng, Wang, & Zhang, 2022).

However, the reality is that in many settings, especially in community pharmacies, pharmacists do not have direct access to clinical data, limiting their role to a reactive level, based on partial information. This situation not only exposes patients to risks, but also forces pharmacists to work in a fragmented environment, where errors become more difficult to prevent and easier to go unnoticed (Mercer et al., 2020).

On the other hand, when communication is two-way, respectful, and based on professional trust, it creates opportunities for correcting misprescriptions, clarifying doubts about medications, and coordinating shared decisions. According to Gonzalez et al. (2023), pharmacists who are integrated into pharmacovigilance programs and have direct contact with doctors are more successful in identifying side effects and in interventions that improve patient safety.

Another important aspect is communication between professionals and patients. When this communication is fragmented – where the patient receives one piece of information from the doctor and another from the pharmacist, often in an incomplete or contradictory form – confusion increases and treatment adherence decreases (Briesacher et al., 2019; Giles et al., 2020). For this reason, it is essential that information is harmonized and that the patient is actively involved in treatment conversations, building a stable line of communication with both professionals.

Effective interprofessional communication is not only an auxiliary tool, but a guarantee of patient safety. It must be supported not only through a culture of collaboration, but also through technology, clear institutional guidelines, and ongoing training for both parties. Only in this way can physician-pharmacist collaboration function as a protective mechanism against preventable errors.

In recent years, the approach to health care has shifted from a model based on unilateral professional authority to a collaborative and patient-centered model, where the patient is no longer treated as a passive recipient of the service, but as an equal part of the care team. In this context, the involvement of the patient as an active partner in the doctor-pharmacist-patient collaboration has proven essential for the safety of medication use and the avoidance of medication errors (WHO, 2022; Giles et al., 2020).

Contemporary pharmaceutical care models, especially those applied in community pharmacies, have begun to develop specific programs aimed at patient engagement in the decision-making process for therapy, education on the use of medicines and self-monitoring for side effects. A clear example of this approach is the New Medicine Service in the United Kingdom, a pharmaceutical service based on personal counseling of patients who have just started new therapies. This service has been shown to be effective in increasing adherence to treatment and reducing misunderstandings about the use of medicines (NHS England, 2021).

Active patient involvement also helps in the early identification of prescription or dispensing errors, as a patient who is informed and aware of the treatment they are following is more likely to notice discrepancies and seek clarification. In a study conducted by Giles et al. (2020), it was found that patients who were educated about their therapy contributed to the detection of errors that had not been identified by professionals.

On the other hand, patient involvement requires doctors and pharmacists to adopt an open and non-dominant communication style, where space is given to questions, concerns and the active involvement of the individual in the choices about their health. This approach, known as shared decision-making, has been shown to improve not only the quality of medical decisions, but also the patient's sense of control and safety (Sleath & Carpenter, 2018; Briesacher et al., 2019).

However, the implementation of these models faces several challenges. Not all patients have the appropriate level of health literacy, the knowledge necessary to understand their therapies, or feel empowered to discuss openly with professionals. For this reason, ongoing pharmaceutical and medical education, as well as the development of simple and understandable materials for patients, are necessary to build a sustainable collaborative relationship (Alhabib & Alhossan, 2020; Tobiano et al., 2024).

In summary, models that include the patient as an active partner do not diminish the role of professionals, but rather strengthen the therapeutic relationship by making it more open, transparent, and safe. This collaboration is not only an ethical ideal, but a proven practical strategy to reduce medical errors and increase the quality of care at all levels of the health system.

Community pharmacies represent a direct and frequent point of contact between patients and the health system, especially in countries where access to primary or hospital care is limited. Due to their proximity to the population and their daily role in the distribution of medicines, community pharmacists have a great potential to positively influence medication safety. However, this potential often remains untapped due to structural constraints, lack of integration with other health professionals and unclear role in the interprofessional care network.

One of the main challenges faced by community pharmacies is the lack of systematic communication with prescribing physicians. In most cases, the pharmacist does not have direct access to the patient's clinical history and is not regularly involved in the therapeutic decision-making process. This forces the pharmacist to operate on the basis of partial information, often with only the prescription in hand, without knowing the patient's clinical context or possible interactions with other treatments (Mercer et al., 2020; Zheng et al., 2022).

Despite these limitations, studies conducted in countries as diverse as Poland, Peru, and the Middle East have shown that community pharmacists are willing to contribute more, but require clarity of competencies, more specialized training, and formal channels for communication with physicians (Wrześniewska-Wal et al., 2023; Gonzalez et al., 2023; Alfadl et al., 2023). Sustainable collaboration requires more than professional will – it requires institutional support, shared accountability protocols, and shared IT systems.

In some countries, initiatives have been developed to involve community pharmacists in enhanced services, such as periodic medication reviews for

patients with multiple medications, monitoring of side effects, or follow-up of patients who have recently been discharged from hospital. These services require direct collaboration with physicians and have shown positive results in reducing medication errors and improving patient adherence (Health Quality Ontario, 2020; FIP, 2022).

A concrete example is the involvement of pharmacists in the implementation of educational services for chronic patients (such as in the case of hypertension, asthma, and diabetes), where the pharmacist monitors medication use and provides additional instructions on how to administer it. These interventions, when implemented in collaboration with the prescribing physician and with patient involvement, increase the effectiveness of therapy and reduce the burden on the hospital system (Lee et al., 2019; Chisholm-Burns et al., 2020).

However, to have a real and sustainable impact, community pharmacies must be treated as an integrated part of the health network, not as an isolated structure oriented only towards the sale of medicines. This requires changes in public policies, dedicated funding for collaborative services, as well as greater recognition of the professional role of the pharmacist at the community level. Community pharmacies have an extraordinary potential to contribute to patient safety, but to realize this function effectively, it is necessary to build sustainable bridges of collaboration with doctors and the active involvement of patients. Only through this sustainable collaboration can the role of the community pharmacist evolve from a distributor of medicines to a guardian of therapeutic safety.

Despite the clear benefits that collaboration between doctors, pharmacists and patients brings in increasing medication safety, the effective implementation of this collaboration faces a number of challenges. These challenges are of an institutional, professional and cultural nature and directly affect the quality of care and the risk of medical errors. Below are five of the most important obstacles identified in the international literature.

Communication between healthcare professionals is the basis of any safe and effective patient care. However, in daily practice, communication between doctors and pharmacists is often fragmented, infrequent or reactive, creating a fertile ground for misunderstandings, medication errors and inadequate treatment of patients.

One of the most common obstacles is the lack of formal and structured channels for the exchange of clinical information. In many health systems, community pharmacists do not have access to patients' medical records, including diagnoses, laboratory tests, or past medication lists. As a result, any recommendations or corrections that the pharmacist may suggest regarding a drug prescription are based on partial information, limiting the impact of their intervention (Mercer et al., 2018; Zheng, Wang, & Zhang, 2022).

Furthermore, many pharmacists report feeling unappreciated when they contact physicians to discuss prescription uncertainties, and often receive

lukewarm responses or are ignored altogether (Rakvaag et al., 2020; Mohammed & Marouf, 2022). This creates a cold collaborative environment, where professionals feel hesitant to intervene, even when potential errors that compromise patient safety are apparent.

Another important problem is related to the lack of a culture of shared clinical responsibilities. In many countries, the role of the pharmacist is still traditionally seen as a dispenser of medicines, without being considered an active partner in the therapeutic process. This perspective reduces the incentive for collaboration and inhibits shared decision-making (Kelly et al., 2013; Alhossan & Alazba, 2019).

Even when there are efforts to build integrated communication platforms (such as shared electronic files), these are often not implemented in practice or are limited to certain users. As a result, valuable information is not always accessible in real time, making it difficult to respond to urgent situations or correct errors before they affect the patient.

On the other hand, lack of time and heavy workload also have a negative impact. Both doctors and pharmacists are often overwhelmed, not having the time to have full conversations about clinical cases. This leads them to focus more on fulfilling immediate tasks than on building professional relationships that support long-term patient safety (Gemmechu & Eticha, 2021; Tan et al., 2024). In summary, barriers to physician-pharmacist communication are fundamentally structural and cultural. Building sustainable bridges of collaboration requires not only improvements in technological infrastructure and institutional protocols, but also a paradigm shift that recognizes both professions as equal parts of the healthcare team.

A prominent obstacle to physician-pharmacist collaboration is the lack of clarity and consensus regarding professional roles and responsibilities, which often leads to silent conflicts, lack of coordination, and obstacles to interventions that are beneficial to patient safety.

In many countries and clinical practices, physicians still view pharmacists as support professionals, not as equal members of the healthcare team. This perspective is rooted in undergraduate education and subsequent professional experience, where a clear hierarchical division dominates instead of a collaborative model (Kelly et al., 2013; Rakvaag et al., 2020).

On the other hand, pharmacists often face difficulties in asserting professional authority, even when they identify problems with the prescribed therapy. They are reluctant to challenge the physician's decision-making, especially in settings where there is no genuine culture of interdisciplinary collaboration (Mohammed & Marouf, 2022). This role imbalance is not only a matter of perception, but also translates into a lack of responsiveness to potential errors and avoidance of shared responsibilities.

A study by Mercer et al. (2020) found that even in settings where some formal collaboration exists, physicians tend to adopt a leadership role and limit the pharmacist's role to verifying prescriptions and dispensing medications, without involving them in therapeutic decision-making. This also occurs in advanced health systems, where clear protocols that define boundaries and professional interaction are still lacking.

The challenges are further exacerbated when there is no shared approach to patient care. Physicians may follow more traditional or diagnosis-focused approaches, while pharmacists focus on optimizing drug use. In the absence of a collaborative platform, these two perspectives do not converge but remain separate, missing the opportunity for synergy that could prevent errors (Wrześniewska-Wal et al., 2023; Alhossan & Alazba, 2019).

In some cases, legal and regulatory structures are vague regarding pharmacists' responsibilities, making it more difficult for them to intervene in a safe and supported manner when they detect inaccuracies or potential for errors in prescriptions (FIP, 2020; WHO, 2022).

In conclusion, the lack of clear boundaries and mutual recognition of professional competencies creates a difficult terrain for healthy collaboration. Resolving this problem requires reforms in interprofessional education, clarification of roles in health policies, and cultivating an environment where the pharmacist profession is valued as an essential part of the safety chain in patient care.

In the context of medical errors and patient safety, an often underestimated aspect is the lack of active involvement of the patient in treatment decision-making. Although theoretically the patient is at the center of healthcare, in practice, he or she is often excluded from the decision-making process, especially when there is a lack of strong collaboration between doctors and pharmacists.

This exclusion occurs in several forms. First, patients rarely receive complete and clear information about the purpose, side effects and duration of the prescribed therapy. When information is provided, it is often technical, non-personalized and does not encourage discussion or questions from the patient. According to Giles et al. (2020), many patients feel hesitant to seek clarification because they fear appearing to challenge medical authority.

Second, the lack of patient involvement reduces the effectiveness of pharmaceutical interventions, as the pharmacist often has neither the opportunity nor the permission to discuss alternatives with the patient or to correct deviations in medication use without the involvement of the physician. This limits the pharmacist to a technical role and places the patient in a passive position, completely dependent on formal instructions.

A study by Tobiano et al. (2024) found that patients often do not fully understand changes in their therapies upon discharge from the hospital, and are rarely involved

in discussions about those changes. This increases the risk of medication errors after discharge from hospital care, especially in cases of polypharmacy.

On the other hand, the active involvement of the patient in the therapeutic discussion not only increases trust and adherence to therapy, but is a powerful preventive tool against medical errors. When patients feel empowered to ask questions, report concerns, or express disagreement, they can help catch errors before they happen—a form of "last-minute check" in the health safety system (Briesacher, Gurwitz, & Soumerai, 2019; Sleath & Carpenter, 2018).

Patient disengagement is also associated with other factors, such as: lack of time in consultations, lack of simple educational materials, inability to understand medical terminology, or previous negative experiences with the health system. This leaves many patients feeling unempowered to actively contribute to the choice and monitoring of their treatment (WHO, 2020; FIP, 2022).

To bridge this gap, it is recommended to build a shared decision-making model where doctors, pharmacists, and patients discuss together alternatives, risks, and therapeutic goals, giving the patient an equal voice in the decision. This model requires training for professionals, but also promoting health education for patients – to turn them from passive recipients of care, into active participants in their own safety.

In the last decade, many health systems have developed and tested concrete forms of collaboration between doctors, pharmacists and patients, with the aim of improving the use of medicines and reducing medical errors. These models provide practical examples of how successful collaboration can be structured and institutionalized.

One of the most documented models of doctor-pharmacist collaboration in preventing medical errors is Partnered Pharmacist Medication Charting (PPMC), widely applied in several hospitals in Australia and supported by safety care policies in the United Kingdom. This model consists of the active involvement of the pharmacist in the initial phase of prescribing medicines for hospitalized patients. Instead of the pharmacist intervening only after the prescription has been given, he becomes part of the process of compiling the therapy chart, together with the doctor.

This approach is fundamentally different from traditional practices where the pharmacist was simply a post-prescription controller. In the PPMC model, pharmacists participate in the medical community, assess the patient's medication history, contribute to the choice of medications, and monitor for potential errors from the outset (Tong et al., 2020). This proactive involvement increases the quality of decision-making and significantly reduces the risk of duplication, incorrect dosages, or harmful interactions.

Key benefits of this model are: significant reduction in prescribing errors, especially in elderly patients or those on multiple medications (polypharmacy);

increased efficiency in the transfer of information from the ambulance to the hospital or from one unit to another and improved doctor-pharmacist communication in real time, creating a culture of shared responsibility.

A study conducted in four Australian hospitals (Tong et al., 2020) reported a 78% reduction in serious medication errors when PPMC was used compared to the traditional model. Physicians also valued the presence of the pharmacist as a practical aid in decision-making, especially in complex clinical situations.

This model requires several prerequisites for successful implementation: formal training of pharmacists to make clinical decisions, equal access to patient data, and institutional support for the collaborative role. Changing the role alone is not enough; it is necessary to build an interprofessional culture, where the pharmacist's competencies are not perceived as an intervention, but as an added value to patient safety.

Partnership in prescribing is not only a means to reduce errors; it represents a fundamental change in the way healthcare is conceived – not as a fragmented process, but as a coordinated practice where each professional contributes their knowledge at the right time.

In the United States of America, one of the most advanced forms of collaboration between physicians and pharmacists is the model known as Collaborative Drug Therapy Management (CDTM). This model allows pharmacists, through an agreement signed with a physician (collaborative practice agreement), to take a broader role in the management of patients' drug treatment. Their involvement may include: reviewing medication history, changing dosage, stopping or starting new therapy, interpreting laboratory tests, and providing therapeutic advice, without the need for immediate physician approval for each action.

The implementation of CDTM models has been most successful in the management of chronic diseases, such as hypertension, diabetes, dyslipidemia, and asthma, where close monitoring and continuous adaptation of therapy are essential for sustainable results. Studies in this field show that pharmacists involved in CDTM have significantly improved patients' clinical parameters, such as blood pressure control or HbA1c levels (Chisholm-Burns et al., 2020).

A direct benefit of this model is the reduction of the burden on doctors, who can focus on more complex cases, while pharmacists are responsible for regulating and following up on routine and chronic treatments. At the same time, this collaboration also brings about better patient involvement in decision-making, as the pharmacist plays an important educational and supportive role.

However, the CDTM model requires several essential components to function properly: clear institutional and legal discourse on the pharmacist's role in treatment; advanced clinical training for participating pharmacists; mutual access to patient medical information (through shared systems) and financial

support and recognition for clinical pharmacy services, to ensure that this work is economically sustainable.

Difficulties in implementing CDTM include the lack of uniformity in legislation across US states, initial resistance from some healthcare professionals, and challenges in financial compensation for pharmacists (Alhossan & Alazba, 2019).

However, CDTM models are a key reference for systems that aim to increase physician-pharmacist collaboration. They demonstrate that when pharmacists are actively involved in a structured and structured manner, the impact on patient safety and treatment effectiveness is direct and measurable.

In the health systems of Canada and the Scandinavian countries (Sweden, Norway, Denmark, Finland), the approach to medical care is based on integrated care models, where interprofessional collaboration is an essential part of the institutional structure and not simply an individual initiative. In these countries, pharmacists are involved from the primary care level, working alongside family doctors, nurses and social workers as part of a unified team that follows the patient continuously.

This model aims not only to treat the disease, but also to prevent medication errors through continuous information exchange, joint consultations and multidisciplinary team meetings. Pharmacists not only advise on medications and monitor therapy, but are also involved in patient education, assessing the need for interventions, and improving treatment compliance.

A study by Mercer et al. (2020) on the relationship between doctors and pharmacists in primary care centers in Canada showed that the key to success is building a stable and reciprocal relationship, where the pharmacist is perceived as a clinical partner and not as a technical assistant. When trust is established and communication is open, the positive impact on patient safety and treatment effectiveness increases.

Also, in these models, the pharmacist has full access to the patient's clinical data through integrated electronic systems, which facilitates real-time analysis and decision-making. This practice is very different from traditional models in which the pharmacist operates in isolation from the rest of the system.

In Scandinavian countries, such as Sweden, pharmacists are regular participants in hospital meetings to review patient records, where potential risks of therapies are identified and concrete recommendations for change are made. This has significantly reduced the rate of serious side effects and reduced the need for readmissions to hospital (Rakvaag et al., 2020).

Essentially, the scandinavian and canadian model of integrated care operates on three main pillars: clearly and transparently divided responsibility among health professionals; structured and regular communication between clinical actors and involving the patient as an active participant in decision-making, in line with the

principles of patient-centered care. This model proves that a strong institutional cooperation structure is more efficient than fragmented or temporary solutions, making cooperation the standard rather than the exception.

In low- and middle-income countries (LMICs), the inclusion of pharmacists in healthcare teams faces a number of structural, cultural and legal challenges. However, even in these contexts, efforts have been made to develop adapted forms of doctor-pharmacist-patient collaboration, which aim to improve patient safety and reduce medication errors. A major challenge in these countries is the lack of sufficient human and technological resources, which limits access to electronic health information systems and divides professionals into fragmented groups. As a result, communication often occurs in an unplanned and unstructured manner. Pharmacists are often not integrated into clinical decision-making and are perceived more as drug suppliers than as therapeutic partners.

However, studies conducted in countries such as Peru, Ethiopia, India, and Iraq show that when pharmacists are actively involved, clinical outcomes and patient safety improve significantly. For example, the integration of clinical pharmacists into pharmacovigilance programs in public hospitals in Peru has led to increased reporting of adverse events and preventive interventions for potential errors (Gonzalez et al., 2023).

In Ethiopia, a study by Gemmechu and Eticha (2021) showed that the level of collaboration depends significantly on factors such as the pharmacist's professional experience, mutual trust, and support from hospital administration. If these elements are missing, pharmacists have difficulty gaining their place in the therapeutic process. In India, educational interventions and joint training programs for doctors and pharmacists have proven effective in improving collaboration and communication, especially in rural or high-patient-load settings. Although a strong legal infrastructure for CDTM-type models is lacking, local adaptations based on simple collaborative protocols have yielded positive effects in reducing polypharmacy and improving treatment compliance.

Another key challenge is the informality of role allocation. In some cases, pharmacists are forced to intervene without legal support or clear protocols, taking on responsibilities that may not be institutionally recognized.

However, the challenges shouldn't overshadow the potential for progress. In low- and middle-income countries (LMICs), interprofessional collaboration can be significantly improved through a few targeted strategies. First, the clinical training of pharmacists needs to move beyond theory and focus more on hands-on, practical skills. Many pharmacists are well-versed in drug knowledge but lack real-world clinical exposure. Second, collaboration doesn't require complex systems it starts with clear, simple protocols that fit the local context and resources. These guidelines should be easy to implement and support daily cooperation

among healthcare workers. Third, promoting mutual respect among professionals and increasing institutional recognition of the pharmacist's role are key. Without this cultural shift, even the best systems can fall short.

Finally, interdisciplinary training that brings doctors, pharmacists, and nurses together as a team can help break silos and foster a shared understanding of each role. With these steps, LMICs can unlock the benefits of genuine, practical teamwork in healthcare.Examples from low- and middle-income countries show that even in challenging conditions, effective collaboration is possible if supported by will, training, and inclusive health sector policies.

Although the importance of collaboration between physicians, pharmacists, and patients is widely recognized in the international literature, the implementation of this approach in practice faces a number of challenges that directly affect the quality of care and patient safety. These barriers can be divided into several main categories:

One of the most documented barriers in the international literature is related to the lack of effective communication channels between physicians and pharmacists, as well as limited access to patient clinical information. In many health systems, pharmacists do not have direct access to clinical data such as diagnoses, medical history, or treatment plans, which limits them to the role of drug dispensers and impairs their potential to prevent medical errors (Wrześniewska-Wal et al., 2023; Mercer et al., 2020). In some settings, information is considered the "property" of the physician and is not shared equally with other team members, excluding the pharmacist from clinical decision-making. The lack of integration of information systems between physicians, pharmacists, and nurses further exacerbates this situation, leaving room for misunderstandings and errors in the use of medicines.

On the other hand, in cases where shared information management systems have been developed, such as in the UK or Scandinavia, a significant improvement in the reporting of side effects, medication management, and compliance with therapy has been observed (Mercer et al., 2020; Tong et al., 2020). This shows that pharmacists' access to clinical information is a key element in ensuring patient safety and reducing medication errors.

Another strong obstacle to building a functional collaboration is the existence of professional stereotypes and the lack of mutual trust between physicians and pharmacists. In many professional cultures, pharmacists are viewed as mere drug logistics experts, rather than active contributors to clinical decision-making. This perception reduces motivation for collaboration and excludes pharmacists from therapeutic discussions (Mohammed & Marouf, 2022; Rakvaag et al., 2020).

On the other hand, pharmacists often face difficulties in establishing their professional authority, especially in settings where physicians have a dominant position. They may feel unvalued and hesitate to intervene even when they have

doubts about patient safety, to avoid conflicts or due to a lack of institutional support. This unbalanced dynamic negatively affects the flow of information and the rapid response to medical errors.

The literature emphasizes that building interprofessional trust requires shared experiences, interdisciplinary training, and collaborative protocols that clarify the roles of each professional (Kelly et al., 2013; Mercer et al., 2020). When pharmacists and physicians see each other as equal partners and recognize respective competencies, collaboration is not only enhanced but also brings direct benefits in reducing errors and improving clinical outcomes

Conclusions

Medical errors, especially those related to the use of medicines, represent a continuing challenge in health systems worldwide, affecting not only the quality of treatment, but also the safety and well-being of patients. This literature review has made it clear that structured and effective collaboration between doctors, pharmacists and patients is a key element in preventing these errors.

The role of pharmacists, supported by international organizations such as WHO and FIP, has expanded significantly in the last decade, including not only the distribution of medicines, but also clinical advice, therapeutic education, therapy monitoring and pharmacovigilance. In this context, evidence shows that pharmacist-led interventions have a direct impact on improving treatment adherence, reducing adverse effects and better managing chronic diseases.

However, to realize the full potential of this collaboration, a number of structural and cultural barriers need to be addressed. The lack of common protocols, legal restrictions, ineffective sharing of clinical data and insufficient communication are some of the factors that reduce the effectiveness of this collaboration. On the other hand, patient involvement in decision-making still remains weak and often underestimated, although the literature qualifies it as an important factor in increasing the safety of therapy. To improve the situation, this paper has identified a series of recommendations that range from restructuring health policies and developing interprofessional training, to promoting the active role of the pharmacist and empowering the patient as a co-decision maker. If these recommendations are addressed by the relevant institutions, the potential to significantly reduce medical errors and build a safer and more coordinated health system is real and achievable.

Recommendations

Based on the analysis of scientific literature and international sources, it is clear that to address the challenges of collaboration between doctors, pharmacists and patients, multifaceted interventions are required at systemic, institutional and professional levels.

Below are some key recommendations to improve interprofessional collaboration and reduce the risk of medical errors:

Formalization of collaboration protocols between doctors and pharmacists: In most health systems, the relationship between doctors and pharmacists is not supported by formal structures that define roles, responsibilities and boundaries of professional interaction. This lack of clarity makes collaboration fragmented, often haphazard, and dependent on personal relationships or the local culture of the institution. As a result, many opportunities to prevent medication errors remain unexploited.

Addressing this issue requires formalizing collaborative protocols, where pharmacists are given a clear and legally recognized role in medication management – for example through Collaborative Drug Therapy Management (CDTM) agreements. These models have been successfully implemented in the US, where pharmacists, in coordination with physicians, have the right to monitor, adjust, or renew the medication treatment of chronic patients (Alhossan & Alazba, 2019).

The establishment of such protocols not only strengthens the professional role of pharmacists, but also helps build trust and mutual respect between the professions. Furthermore, these structures help patients better understand who to turn to for various treatment and medication safety issues.

Integrating shared IT platforms for clinical data sharing. One of the biggest obstacles to effective collaboration between doctors and pharmacists is the lack of shared access to a patient's clinical data. In many countries, pharmacists do not have access to diagnoses, the full list of prescribed medications, laboratory results or side effect history. This limits them from making informed decisions and identifying potential errors in prescribing or using medications.

Addressing this challenge requires the development and integration of shared data platforms- IT systems that enable real-time sharing of clinical information between healthcare professionals involved in a patient's care. A good example is the use of shared electronic health records (EHRs), which have been implemented in several countries such as Finland, Australia and Canada (Tong et al., 2020).

When pharmacists have access to complete treatment information, they can play a greater role in controlling potential interactions, unnecessary duplications

or incorrect doses. Furthermore, data sharing strengthens transparency and promotes a culture of collaboration based on facts and not just perceptions.

Strengthening interprofessional training. One of the roots of the lack of effective collaboration between doctors and pharmacists is the lack of mutual exposure during the professional training process. Often, health professionals are trained in separate "silos", with little or no practical interaction with other professions. This directly affects how they understand each other's roles and in building professional trust.

Interprofessional training, which takes place in both undergraduate and postgraduate training, is an approach that has shown significant improvement in communication, understanding of responsibilities and willingness to share decision-making (WHO, 2022). Learning together, through clinical simulations, joint projects or integrated modules, helps to shape a collaborative culture that continues into real practice.

International health organizations such as WHO and FIP have strongly recommended the introduction of interprofessional education into the curricula of all health professions. Implementing this approach requires not only pedagogical changes, but also institutional and policy commitments that support it as a development priority.

Promoting the pharmacist's role as a patient educator and counselor. For many patients, the pharmacist is still seen as a technical professional who dispenses medicines, rather than as an advisor or active partner in healthcare. This affects not only the way patients interact with pharmacists, but also the way they are involved in decision-making about their therapy.

Promoting the pharmacist's advisory and educational role is key to improving compliance with treatment and reducing the risk of errors caused by misunderstanding, incorrect following of instructions or careless use of medicines (Sleath & Carpenter, 2018; Alhabib & Alhossan, 2020).

When the pharmacist is present and active in every step of the drug use process – from prescription to monitoring – he becomes a guarantor of patient safety.

Drafting national policies that promote patient involvement in decision-making. At the heart of drug safety is the patient himself. However, patient involvement in decision-making often remains limited, especially in systems where their role is perceived as passive. Lack of understandable information, fear of the authority of professionals and lack of self-confidence are some of the reasons that prevent patients from being co-responsible for their therapy.

Patient involvement should be institutionalized through national policies that: oblige professionals to provide clear and understandable information about treatment; guarantee the patient the right to ask questions and refuse therapy without penalty; support public health education initiatives that empower citizens to actively participate in their own care (Giles et al., 2020; Tobiano et al., 2024).

In countries where this approach has been successfully implemented, a significant reduction in medication errors has been observed, as well as an improvement in patients' experience with the health system as a whole.

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