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Walleri Reis
Thaís Teles de Souza
Wallace Entringer Bottacin

Commemorating Five Years of Scientific Growth in Clinical Pharmacy

Proceedings of the Fifth Brazilian Congress of Pharmacotherapy and Clinical Pharmacy

2025

SUPERVISÃO CLÍNICA

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Thaís Teles de Souza
Wallace Entringer Bottacin

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Preface

This volume marks a historic milestone as we celebrate the **fifth anniversary** of the Brazilian Congress of Pharmacotherapy and Clinical Pharmacy. Reaching this half-decade mark represents more than just a passage of time; it symbolizes the resilience and the steady scientific maturation of our clinical community. What began as a local initiative has flourished into a sophisticated international platform for knowledge exchange, reflecting the profound transformation of the pharmaceutical profession. This anniversary edition serves as a tribute to the collective persistence of researchers and clinicians who have dedicated themselves to elevating the standards of pharmaceutical science.

The growth documented within these pages highlights a professional shift toward a more rigorous, evidence-based approach to patient care. By emphasizing methodological quality and clinical relevance, this collection provides the global scientific community with a window into the innovative practices that are currently shaping the future of pharmacy. We invite you to engage with these proceedings not merely as a record of a scientific event, but as a catalyst for your own professional growth.

The strength of this publication lies in the collaborative spirit of the authors and the rigorous oversight of our reviewers, whose shared commitment to excellence has defined our first five years. As we look toward the future, we hope this book inspires continued inquiry and fosters new international collaborations that will further the impact of clinical pharmacy on global health outcomes. Thank you for joining us in celebrating this journey and for contributing to the vibrant scientific legacy of our field.

The Editors,

Fifth Brazilian Congress of Pharmacotherapy and Clinical Pharmacy

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The selection of works for inclusion in the proceedings of the Fifth Brazilian Congress of Pharmacotherapy and Clinical Pharmacy was conducted through a rigorous peer-review process designed to ensure the highest standards of scientific quality and relevance. Submissions were invited from the fields of Pharmacotherapy, Clinical Pharmacy, Pharmaceutical Care, Health Informatics, Evidence-Based Health, Public Health, and Integrative and Complementary Practices. Each submission underwent a double-blind review, where both the authors and reviewers remained anonymous, minimizing bias and enhancing the integrity of the review process.

The review criteria included methodological soundness, clinical relevance, originality, and adherence to ethical guidelines. We uphold the principles established by the **Committee on Publication Ethics (COPE)**, which emphasizes the importance of transparency, accountability, and ethical conduct in publishing. This commitment to COPE standards not only safeguards the integrity of the research but also fosters trust within the academic community.

Through this meticulous selection process, we aimed to compile a comprehensive collection of high-quality scientific investigations and clinical experience reports that reflect the advancements and innovations in the aforementioned areas, contributing to the ongoing discourse in pharmacotherapy and clinical pharmacy across Latin America.

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EDITORIAL

The Fifth Anniversary Milestone of Scientific Consolidation in Pharmaceutical Care

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Celebrating Half a Decade of Scientific Excellence

The publication of these proceedings represents a historic achievement as we celebrate the fifth anniversary of the Brazilian Congress of Pharmacotherapy and Clinical Pharmacy. This milestone marks a period of profound scientific consolidation, where the initial aspirations of our community have transformed into a robust and globally recognized body of knowledge. Over the past five years, we have transitioned from establishing a regional forum to leading a high-level scientific dialogue that resonates across Latin America and beyond. By reaching this fifth anniversary, we demonstrate that our commitment to evidence-based practice and patient safety is not a transient trend but a permanent pillar of the pharmaceutical sciences. This volume serves as a testament to our collective maturity and our unwavering dedication to the highest ethical standards in scholarly publishing.

Analyzing the Scientific Impact of 134 Research Contributions

The 2025 proceedings encompass 134 peer reviewed works that illustrate the breadth and depth of contemporary clinical pharmacy. This collection is defined by its rigorous focus on patient centered care, with 69 contributions dedicated specifically to the advancement of clinical pharmacy and pharmaceutical care. This central theme is supported by 30 high impact studies in public health and 16 specialized investigations into pharmacotherapy, reflecting a comprehensive strategy to address the most pressing healthcare challenges of our time. By documenting these 134 unique perspectives, we are providing the international scientific community with a definitive resource that captures the current state and future trajectory of the profession.

Institutional Leadership and Emerging Clinical Frontiers

The consolidation of our field is anchored by the excellence of leading academic institutions, most notably the Federal University of Paraíba, Federal University of Pernambuco and the Federal University of Ceará. These centers of research have been instrumental in driving innovation and fostering a culture of scientific inquiry among pharmacists. This year, the congress highlights significant progress in emerging areas such as the clinical application of medicinal cannabis and the strategic integration of digital health and informatics. With 9 works exploring the intersection of technology and patient care, we are positioning the Brazilian pharmacist at the forefront of the digital health revolution. Furthermore, the inclusion of research on integrative practices and evidence based health strategies ensures that our approach to patient care remains both holistic and scientifically grounded.

A Global Vision for the Future of Pharmaceutical Practice

As we conclude this fifth anniversary edition, we look toward the future with a sense of pride and professional responsibility. The scientific consolidation achieved in these proceedings provides a launchpad for the next era of pharmaceutical innovation. We invite our international colleagues to engage with these 134 contributions, which offer valuable perspectives into the successes and challenges of implementing advanced clinical services in diverse healthcare settings. This volume is more than a record of a congress; it is a spark for international collaboration and a beacon of excellence for the global pharmaceutical community. We extend our deepest gratitude to the authors, the reviewers, and the Editorial Board whose tireless work over the last half decade has made this milestone of consolidation a reality.

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Medicinal Cannabis In Brazil: An Analysis Of Regulations, Clinical Barriers, And The Current Latin American Scenario

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Introduction

Cannabis sativa L., a plant native to East Asia, has a long history of use dating back thousands of years, when our ancestors utilized it for therapeutic, spiritual, and textile purposes (1). Its chronology in Brazil began when it was introduced to the country through Portuguese vessels, via seeds carried inside rag dolls by African slaves around the mid-16th century. From there, the plant quickly spread among indigenous populations, who began cultivating it. This early association between the plant and economically disadvantaged social classes, combined with cannabis's potential economic impact on the pulp industry, contributed to a negative public perception of the

topic and later spurred scientific interest in investigating its therapeutic applications. Consequently, by the 1930s, the repression of marijuana use was gaining momentum in Brazil, a stance that persisted for decades, leading to the total prohibition of the plant's cultivation, planting, and exploitation (2).

In the aforementioned context, researchers such as Raphael Mechoulam and Elisaldo Carlini emerged as pioneers, whose contributions in the 1970s were significant in advancing studies and breaking the stigma associated with the medicinal use of cannabis (3). Currently, according to data from the II Anuário da Cannabis Medicinal no Brasil, it is estimated that approximately 430,000 Brazilians undergo treatment with cannabis-based products. Of these, the majority rely on authorized imports, while a smaller portion turn to associations or purchase products from regulated pharmacies (4). Despite growing patient numbers, difficulties in accessing these drugs persist due to factors associated with regulation, high costs, and especially the limited availability of products in the national market. Thus, a critical analysis of the current Latin American scenario is relevant to promote expanded access and equity in the treatment of patients who need from this therapeutic approach.

Aim

This bibliographic research aims to analyze the current regulatory landscape, main challenges, and future projections related to access to and use of medicinal cannabis in Brazil. The analysis will be conducted with emphasis on comparing the national regulatory framework with the regulatory models adopted by other Latin American countries, seeking to identify convergences and divergences that may contribute to promoting and improving public health policies in Brazil.

Methods

This review adopted a descriptive and qualitative approach to the obtained data. This type of study allows for a rapid update of knowledge on a specific thematic axis (4), and was conducted following these steps: formulation of the guiding question; search in primary databases from the last three years; study selection; evaluation of the selected studies; and discussion of the results. The research's guiding question originated from the inquiry into the current regulatory scenario for the pharmacotherapeutic use of cannabis in Brazil compared to neighboring countries. Consequently, a non-systematic search was conducted in the electronic databases Google Scholar, National Library of Medicine (PubMed), Scielo, as well as Brazilian guidelines developed by the National Health Surveillance Agency (ANVISA), with support from the Federal Government. The search strategy in the databases was based on English terms indexed in the Health Sciences Descriptors (DeCS), combined with Boolean operators, resulting in the following search strategy: "("medical marijuana" OR cannabis) AND (brazil OR "latin america")". Studies were initially selected through title analysis, followed by a detailed reading of their abstracts and contents. The inclusion criteria consisted of articles published between 2023 and 2025, in Portuguese and English. Data extracted from a Google Scholar search using keywords for recent legislation and guidelines from the main Latin American countries were also included. Exclusion criteria considered studies unrelated to the guiding question, studies focused on clinical practice that diverged from the legislation theme, those focused on non-Latin American countries, as well as those conducted outside the established timeframe for inclusion.

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Results

The results of eight synthesized documents reveal significant heterogeneity in regulatory approaches among Latin American countries. While nations such as Costa Rica, Jamaica, Colombia, Equador, Chile, Paraguai, Argentina, and Uruguai have adopted more comprehensive legal frameworks, including provisions for medicinal cultivation and the creation of a regulated market, Brazil still maintains a predominantly restrictive model, marked by prohibitionist values, a historical legacy, and a significant reliance on importation and litigation for access to unregistered products. In line with that, countries like Guatemala, Venezuela, and Bolivia currently maintain prohibitionist policies regarding the use of the plant, even for medicinal purposes (5, 6).

The trajectory of Brazilian regulation was driven by intense mobilization from patients' mothers and cultivators, leading to the creation of resolutions by the Collegiate Board of Directors (RDC) of Anvisa. Notable among these are RDC nº 327/2019, which regulates the manufacture, import, and commercialization of these products; RDC nº 335/2020, which defines the criteria for the importation of derivatives by individuals upon prescription; and RDC nº 660/2022, which defines new importation criteria. In parallel, various laws at the state level have been slowly implemented, such as Law nº 18,124/2022 in Pernambuco, which authorizes cultivation by cannabis associations for medicinal purposes (7, 8, 9, 10).

However, despite recent advances in the use of cannabis for medicinal purposes, there are still a number of challenges to be overcome, such as the absence of clear therapeutic guidelines and, above all, the lack of equity in access to cannabis products, as demonstrated in the Regulatory Impact Analysis (RIA) report published by Anvisa in 2024. Furthermore, considering the transitional and temporary nature of the aforementioned health authorizations, there is a need to definitively regulate such products as medicines (11, 12)

Discussion

A comparative analysis of the regulatory frameworks in Latin America, as indicated in the results, reveals that Brazil's trajectory is developing reactively and more restrictively in contrast to the comprehensive models of neighboring nations. The Brazilian model remains deeply influenced by a prohibitionist legacy, leading to a strong dependence on importation and judicialization as the main access pathways. This structure results in a naturally exclusionary and inequitable ecosystem. Furthermore, the main regulatory pathway, established by RDC nº 327/2019, created the category of "cannabis products," which, while expediting their availability, exempted manufacturers from submitting robust proof of safety and efficacy—an indispensable requirement for the registration of conventional medicines.

This dissonance becomes explicit when analyzing specific legal frameworks. Argentina, for example, after Law nº 27.350/2017, undertook a profound restructuring with Decree nº 883/2020, which authorized self-cultivation and solidarity cultivation by associations, in addition to guaranteeing free supply through the public system. Later, with Law nº 27.669/2022, it created the ARICCAME agency to manage the entire production chain, including industrial hemp. In parallel, Colombia, with Law nº 1787/2016, established a robust licensing system for cultivation and manufacturing with a focus on exportation. Both models, as well as Uruguay's pioneering role, are based on domestic cultivation as a solution for access and development. The Brazilian regulation, therefore, diverges in its very conception: while its neighbors created legal frameworks for production, Brazil built a normative framework for importation (6, 7).

As described in the literature, the national regulatory evolution did not stem from a planned state initiative but was

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driven by pressure from civil society, especially from associations together with patients. This resulted in a fragmented normative framework, built upon successive Collegiate Directorate Resolutions from Anvisa. Although these norms represent undeniable progress, authors warn that this scenario perpetuates inequity in access, a central challenge highlighted by the recent Regulatory Impact Analysis (RIA) report published by Anvisa. The dependence on importation and judicialization leads many to seek lower-cost alternatives, such as unregulated self-cultivation, exposing vulnerable populations to significant risks due to a lack of standardization and the mistaken perception that natural products are inherently safe (13).

Therefore, overcoming the current challenges requires a transition from the model of provisional sanitary authorizations to a definitive legal framework. It is imperative that cannabis be treated as a pharmaceutical raw material and its derivatives as medicines. This implies not only regulating cultivation but also establishing clear therapeutic guidelines, fostering national clinical research, and planning for a careful, evidence-based incorporation into the Sistema Único de Saúde (SUS), Brazil's national unified health system. Only through comprehensive regulation that aligns the country with international best practices will it be possible to dismantle the existing structural barriers and ensure truly universal, safe, and equitable access to this important therapeutic tool.

Keywords

Cannabis; Government Regulation; Latin-American; Brazil

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Toxicovigilance Of Cannabis Sativa And Cannabis-Based Products In Brazil: A Narrative Review Of Analytical, Clinical And Public Health Challenges

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Introduction

Cannabis sativa L. is one of the oldest plants used by mankind for medicinal, recreational and industrial purposes (1,2,3). It belongs to the cannabaceae family with Cannabis indica L. and Cannabis ruderalis L. as subspecies, reflecting extensive genetic polymorphism (1,2,3,4).
The main group of metabolites are the phytocannabinoids, with more than 120 types, of which Δ-9-

tetrahydrocannabinol (THC) and Cannabidiol (CBD) are the most abundant (1,2,3,5). These compounds interact with the human body's endocannabinoid system, acting on the CB1 and CB2 cannabinoid receptors and producing remarkable effects (1,5,6). Often used as a therapeutic alternative, its compounds have shown significant effects in the treatment of diseases such as Alzheimer's, Parkinson's, Glaucoma, Asthma and HIV/AIDS (1,2,5,6).

Despite clinical progress, practical use faces challenges in terms of regulation, standardization, manufacture and medicinal use of cannabis-based products, which can compromise patient and public health (2,7). Quality control of these products is crucial to guaranteeing their credibility, patient safety and the efficacy of the drug, and is carried out through analysis, guided by legislation and/or regulatory documents (7,8).

At the same time, there is a growing problem related to illegal and recreational use, which increases the risk of poisoning and harms public health (9,10). Thus, toxicovigilance becomes essential due to its intersection in public health and toxicology, acting in the continuous collection, analysis and interpretation of data on the adverse effects of chemical substances on the human body, with the aim of improving safety and public health through early detection and implementation of preventive measures (11).

Therefore, the study aims to assess the nature and scope of literature published on the analytical, clinical and public health challenges related to the toxicovigilance of Cannabis sativa and Cannabis-based products in Brazil.

Aim

Map and evaluate the current situation of toxicovigilance of the Cannabis sativa plant and its products in Brazil. Map and describe the main analytical, clinical and public health challenges in the toxicovigilance of Cannabis and its products in Brazil. Draw up a critical qualitative synthesis of the results obtained. Identify possible gaps and propose a future research agenda.

Methods

This work is a Narrative Literature Review, the aim of which is to consolidate and evaluate published knowledge on the subject in question. To this end, the acronym PICo (Population/Problem, Interest or Phenomenon of Interest, Context) was formulated, where: “P” corresponds to a set of entities and knowledge involved and not to specific individuals; ‘I’ corresponds to the analytical, clinical and public health challenges of the toxicovigilance of Cannabis and its products; and “Co” corresponds to Brazil.

Based on the information, the guiding question “What is the nature and scope of the literature published on the analytical, clinical and public health challenges related to the toxicovigilance of Cannabis sativa and Cannabis-based products in Brazil?” was subsequently used to guide the investigation of the studies.

The literature search was conducted in the following databases: Pubmed/Medline, SciELO, LILACS, BVS (Virtual Health Library) and digital repositories. The eligibility criteria adopted were: inclusion (articles published in Portuguese, Spanish or English) and exclusion (clinical studies, editorial letters, abstracts of proceedings, articles without access to the abstract and articles that could not be retrieved in full).

The search used specific QUERY's in each database, combining terms such as Toxicovigilance, Cannabis (sativa/products/cannabinoids) and Challenges (analytical/clinical/public health) or Brazil.

The studies were exported in RIS and Pubmed format and managed in Rayyan®. They were initially screened using the title and abstract, applying the eligibility criteria, and read in full for final selection of the material. The analysis

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stage focused on extracting and synthesizing information that addressed the analytical, clinical and public health challenges related to the toxicovigilance of cannabis and its products in the Brazilian context.

Results

The search resulted in a total of 58 articles: PubMed (18), Scielo (4), LILACS (5) and BVS (31). Five duplicates were identified which, when resolved, resulted in 53 total articles. To select the articles, the full studies were screened and read in pairs and double-blind, based on the selection and exclusion criteria, which resulted in the final selection of 5 articles. A comprehensive search was also carried out in other databases and digital repositories in order to broaden the repertoire for preparing a consistent narrative review.

Toxicovigilance is a growing and fundamental area of knowledge understood as a set of actions carried out with the aim of identifying, collecting, analysing and processing data relating to intoxications and/or adverse reactions to medicines with the aim of eradicating, minimizing and preventing potential situations of harm caused by exposure to chemical substances (12,13,14). In Brazil, it employs three main information systems for data collection and analysis: the National Toxicological and Pharmacological Information System (SINITOX), the Notifiable Diseases Information System (SINAN), the National Health Surveillance Notification System (NOTIVISA) and the National Network of Toxicological Information and Assistance Centers (Renaciat) (12,13,14).

The results of the reading revealed intense interdigitation and functional complexity between the clinical, analytical and public health axes of the toxicovigilance of Cannabis sativa and its products. This fact reinforces the importance and need for greater efforts to continue researching and debating the subject under discussion. Through the analysis, it was possible to see that regulation and legislation regarding the plant is the core that supports and guides the three axes analyzed, and is directly related to the difficulties encountered.

Discussion

Cannabis legislation and regulation in Brazil, despite advances such as the publication of RDC No. 327/2019 by Anvisa, lacks a solid regulatory framework for the plant and its derivatives, from cultivation to use (15,16,17,18). This deficit is caused by various factors such as social stigma and the plant's illicit and criminalized regime (Drug Law, Law No. 11.343/2006), which contributes as a paradigmatic challenge to its regulation (15,16,17,18).

Medicinal growing faces challenges caused by the scarcity of clear guidelines and protocols on the concentration of cannabinoid constituents, clinical dose, specified product standards, therapeutic use, difficulty in diagnosis and the lack of unified national protocols for the treatment and management of cannabis poisoning (15,19,20,21). This makes it difficult to practice safely and effectively, with negative repercussions for public health and the work of toxicovigilance. In addition, scientific production, which is required to establish possible alternatives and therapeutic indications based on robust and credible evidence, faces bureaucratization as a barrier to national scientific and technological development, which generates latency and unfeasibility of promising studies (15,16,17,19,20).

Ensuring product quality is essential and must be based on normative and official documents with strict parameters, a scenario in which there is a deficit (15,16,22). Laboratory analyses face obstacles such as the lack of official parameters, a shortage of certified laboratories, skilled labor, few validated analytical methods, difficulty in obtaining standards and the need for imports (15,16,22).

Toxicovigilance systems play a fundamental role in providing timely information for decision-making and public

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policy-making. To do this, they depend on constant updates of information with quality and availability (12,14,23,24,25,25,27). The increase in clinical, analytical and public health difficulties related to Cannabis sativa and its products has a direct impact on the generation and quality of the data fed into these toxicovigilance systems (12,14,23,27).

The bibliographic analysis revealed a scarcity of studies in the country with an exclusive and direct approach to drug surveillance and its aspects. The breadth, scope and interdisciplinarity of the area makes it difficult to take a unidirectional approach given its fragmentation into various areas of discussion. Therefore, from the perspective of the analytical, clinical and public health challenges and their impacts on the toxicovigilance of Cannabis sativa, there is a gap in the discussions, a fact related to the unprecedented nature and the scenario of continued exploitation of the plant in the country. However, when analyzed from the perspective of drug surveillance, there is an intense correlation and influence between the axes addressed, highlighting the importance and magnitude of the topic.

The review identified several adversities faced by the Cannabis sativa issue in the Brazilian context, signaling the urgency of joint efforts between regulatory/government bodies, the scientific community, associations and the industry, with the aim of overcoming regulatory and bureaucratic barriers to guarantee equitable and safe therapeutic access, boosting national scientific development and improving toxicovigilance systems.

Keywords

Toxicovigilance; Cannabis; Clinical; Analytical; Health;

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Inconsistencies And Risks: An Investigation Of The Main Challenges In Quality Control In The Medical Cannabis Industry In Brazil

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Introduction

The consumption of cannabis-based products in Brazil has grown expressively, reaching a milestone of approximately 680,000 patients undergoing this therapeutic approach in 2024, as reported by the Brazilian startup Kaya Mind [1]. This increase reflects the recognition of the plant's therapeutic potential, as well as the expansion of regulated access pathways, including imports, pharmacies, and patient associations. However, in the Brazilian

context, the regulatory landscape is characterized by temporary resolutions from the Brazilian Health Regulatory Agency (ANVISA), which regulate the production of cannabis-based products through the importation of raw materials or direct product imports for patients [2, 3]. This lack of formal regulation compromises standardization, quality control, and traceability in the medicinal cannabis production chain via associations [4], which raises uncertainties regarding therapeutic safety and efficacy, representing a relevant risk to public health, especially for patients in continuous therapeutic use.

Furthermore, several studies reinforce this concern, highlighting recurrent problems in cannabis-based products, such as significant variations in the potency of the main cannabinoids, cannabidiol (CBD) and tetrahydrocannabinol (THC), contamination by pesticides, heavy metals, and mycotoxins, and labeling failures that compromise proper dosage [5, 6, 7, 8]. The absence of a rigorous and standardized quality assurance system thus represents a fundamental barrier that undermines confidence in the industry and exposes patients to therapeutic and toxicological risks [9]. Consequently, there is a need to clarify the main points of vulnerability in the quality control of cannabis-based products.

Aim

This study aims to investigate the inconsistencies and risks in the quality control of cannabis-based products. This analysis will be conducted focusing on patient safety and treatment efficacy by evaluating labeling reliability, cannabinoid potency variation, the presence of contaminants, and the gaps in the current regulations in Brazil.

Methods

This research is characterized as an exploratory bibliographic study with a qualitative approach. A literature search was conducted for publications between 2020 and 2025 using the PubMed, SciELO, Google Scholar, Brazilian Journal of Analytical Chemistry, Nature, and Journal of Illicit Economies and Development databases, as well as normative documents available on the ANVISA portal. The keywords used were: “medicinal cannabis”, “quality control”, “labeling”, “contamination” and “regulation”. Scientific articles, narrative reviews, technical reports, and regulatory documents addressing aspects related to the quality, safety, and regulation of cannabis-based products were included. Given the exploratory nature of the study, rigid inclusion or exclusion criteria were not established, as the study sought to gather different perspectives and available evidence on the topic. The selected works were organized and critically analyzed, beginning with a review of titles followed by a full-text reading, selecting those with an emphasis on labeling inconsistencies, potency variation, presence of contaminants, and regulatory gaps.

Results

Although the Brazilian regulatory framework for cannabis products has evolved through regulations such as the Collegiate Board Resolutions (RDCs) n° 327/2019 and n° 660/2022, significant gaps persist in the regulation of cannabis-based products in Brazil. Among these is the dependence on imported reference standards for conducting analytical assays, which compromises methodological standardization and the reliability of results [10]. Additionally, the presence of an informal market and the judicialization of access increase the risk of circulation of products outside the regulatory framework, impacting public health [11, 12].

In addition to the previous context, the bibliographic analysis revealed a consistent heterogeneity in cannabinoid

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concentrations between the labeling and the actual composition of cannabis products, compromising label reliability. This discrepancy is also documented in regulated markets such as the United States, where significant variations were identified, with labeled THC contents being higher than the actual values in pharmaceutical products [7, 8]. In Canada, inconsistencies in THC and CBD levels in legalized cannabis oils were also reported [5]. In Brazil, this issue manifests similarly, with divergences observed between the declared CBD on labels and the amount quantified in laboratory analyses. Furthermore, products originating from individual importation exhibit greater concentration heterogeneity than products intended for the industrial chain, which raises questions about the effectiveness of supervision in different access models [6]. In addition to potency variations, the literature points to contamination by exogenous agents as a critical vulnerability in the production of medicinal cannabis. One study reported the presence of residual solvents in artisanally cultivated products, resulting from extraction processes, which can compromise the product's safety and therapeutic efficacy [13].

Discussion

The data analysis reveals that the inconsistencies in the quality control of cannabis products in Brazil are not isolated events but rather systemic manifestations with direct implications for clinical practice and public health. The discrepancy between the prescribed and administered dose results in a scenario of therapeutic unpredictability. Moreover, the presence of contaminants represents a direct and often invisible toxicological risk. The literature indicates contamination by residual solvents, pesticides, heavy metals, and mycotoxins [13, 14, 15], agents with known carcinogenic, neurotoxic, and teratogenic potential. The severity of this risk is exacerbated by the vulnerability of the target population, which often includes pediatric and elderly patients. The circulation of products without rigorous contaminant control can become a source of exposure to harmful compounds, showing that the absence of end-to-end control, from agricultural raw material to the final product, emerges as the primary cause of this vulnerability.

The root of these inconsistencies and risks lies within the regulatory framework itself, the understanding of which comes from the analysis of RDC nº 327/2019. According to the Regulatory Impact Analysis (RIA), published in 2023 by Anvisa [16], this regulation was created to meet the growing social demand through a simplified access pathway, based on a sanitary authorization. Unlike the conventional drug registration process, the sanitary authorization waives the requirement for in-depth efficacy studies, granting a temporary five-year authorization. Paradoxically, the same resolution requires that these products be demonstrably subjected to the same rigorous Good Manufacturing Practices (GMP) and quality control procedures applicable to other medicines. Thus, while a high standard of quality is established for industrial production within the country, parallel access pathways coexist, such as importation via RDC nº 660/2022 or the informal market, which are not subject to the same level of sanitary inspection at the source. Although the regulatory framework offers mitigation mechanisms, such as analysis in laboratories of the Brazilian Network of Analytical Laboratories in Health (REBLAS), recently strengthened by Resolution RE nº 3,459/2025, the application of this control is still sporadic and dependent on individual initiative, making ANVISA's role more reactive than proactive.

Given this diagnosis, fostering domestic cultivation and production under GMP guidelines emerges not only as a market strategy but as a public health imperative. Internalizing the production chain would allow for rigorous control from genetic selection and organic cultivation to the standardization of extraction processes, ensuring potency consistency. The development of robust analytical methodologies in the country is a pillar for this autonomy, exemplified by the development and validation of analytical methods in accordance with ANVISA's

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RDC nº 166/2017 for use in the quality control of these medicines [17]. Such initiatives are fundamental as they empower the country to reduce its dependence on imported reference standards and finished products, strengthening its analytical capacity and national technological sovereignty. The consolidation of medicinal cannabis as a safe therapeutic option in Brazil, therefore, depends on the transition from a permissive model to an integrated regulatory model.

Keywords

Cannabis; Safety; Quality; Labeling; Contamination

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Clinical Pharmacy And Pharmacoeconomics: Evidence Of The Economic Impact Of Pharmaceutical Interventions In Critical Patients

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Introduction

Pharmacoeconomics is a branch of Pharmacy that relates the economic dimension to therapeutic choices, aiming to optimize financial resources without compromising the quality of treatment offered to patients. This approach enables the selection of the most appropriate therapeutic alternatives in each context by identifying, measuring, and comparing the costs, risks, and benefits associated with specific programs or interventions (1).

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From this perspective, the clinical pharmacist, as part of the multidisciplinary team in Intensive Care Units (ICUs), plays an essential role in optimizing pharmacotherapy and promoting the rational use of medications, considering that this environment presents greater clinical complexity and, consequently, higher resource consumption. Several studies have shown that the pharmacist's performance in this setting significantly contributes to reducing the incidence of adverse events and the costs associated with healthcare (2). This cost reduction results from the rational use of medicines, which represent a significant portion of hospital expenses, reinforcing the pharmacist's role in efficient medication therapy management (3).

In this context, measuring the economic impact of pharmaceutical interventions becomes essential to demonstrate the added value of this practice to the healthcare system. Assessing the avoided cost resulting from these interventions makes it possible to objectively demonstrate how the clinical pharmacist's work in ICUs contributes to hospital sustainability, reinforcing the importance of integrating economic indicators into clinical and performance evaluations.

Aim

To evaluate the economic impact of pharmaceutical interventions with measurable avoided costs performed in the Intensive Care Unit of a philanthropic hospital throughout 2024, recognizing that the total number of interventions also includes preventive and clinical actions with potential economic benefit but without direct quantification.

Methods

This was a cross-sectional, descriptive, and retrospective cost-assessment study conducted in the Intensive Care Unit (ICU) of a philanthropic hospital located in João Pessoa, Paraíba, Brazil. The data collection period covered January to December 2024.

The study included pharmaceutical interventions with measurable avoided costs carried out by the Clinical Pharmacy Service, conducted by pharmacy residents from the Multiprofessional Health Residency Program of the Nova Esperança College of Nursing (FACENE). Interventions were obtained from standardized service records and included actions such as dose adjustment, drug discontinuation, therapeutic substitution for more cost-effective alternatives, and signaling of treatment termination, among others that enabled direct measurement of the generated savings.

The calculation of avoided cost considered the sum of acquisition values of medicines, diluents, and medical-hospital materials used in drug preparation and administration, according to the acquisition table in effect during the study period. Calculations were expressed in Brazilian reais (R$) and took into account the average duration of use avoided after the intervention, according to medical prescriptions. In cases where medication duration was not previously established, the drug was classified as continuous use. In such cases, given the impossibility of estimating the patient's total ICU stay, the avoided cost calculation was limited to the period corresponding to the subsequent prescription immediately following the pharmaceutical intervention (4).

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Only interventions accepted by the medical team and resulting in direct savings were included, while those unaccepted, unanswered, or without measurable economic impact were excluded. The study was approved by the Research Ethics Committee of the Nova Esperança College of Nursing (CEP/FACENE) under CAAE No. 68131822.5.0000.5179, in compliance with the ethical principles of Resolution No. 466/2012.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

Throughout the period analyzed, from January to December 2024, a total of 3,204 accepted pharmaceutical interventions were recorded by the hospital's medical staff. Of these, 301 (9.4%) had measurable avoided costs, resulting in an approximate total savings of R$ 6,132.84 for the institution. This amount represents the direct financial impact derived from the clinical pharmacist's activities in the ICU, highlighting the potential of clinical practice to optimize medication use and reduce waste.

The economically measurable interventions primarily involved dose adjustments, drug discontinuations, and therapeutic substitutions for more cost-effective alternatives, as well as signaling of treatment completion. These actions largely prevented costs associated with the prolonged or inappropriate use of medications, contributing to both pharmacotherapy rationalization and patient safety in the critical care setting.

Although only a fraction of interventions allowed for monetary quantification of avoided costs, the total number of actions performed reflects the breadth of pharmaceutical care and its strategic role in hospital clinical and economic management. Many of these interventions were preventive in nature, such as the early detection of potential drug interactions, therapeutic duplications, and physicochemical incompatibilities, which, although not financially measurable, help prevent adverse events and indirectly reduce healthcare costs.

These findings reinforce that the Clinical Pharmacy Service functions not only as a technical support to the medical team but also as an instrument of resource management, contributing to the institution's financial sustainability while promoting the integration between financial efficiency and patient safety. The results highlight the importance of systematically measuring and recording the economic impact of pharmaceutical interventions, consolidating evidence on the added value of this practice in the hospital context.

Discussion

The results of this study demonstrate that the clinical pharmacy service significantly contributes to reducing hospital costs without compromising patient safety or the quality of care. The financial sustainability of healthcare institutions is essential, as it enables appropriate resource allocation and prevents unnecessary expenditures. Additionally, through prescription analysis, the clinical pharmacist plays a vital role in preventing Drug-Related Problems (DRPs), which can cause patient harm, extend hospitalization time, and increase care and human

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resource costs (5)

Pharmacoeconomics is therefore a fundamental field of health research aimed at the economic evaluation of drug therapies. This approach integrates concepts and methods from the economic sciences into clinical practice, allowing for cost measurement, description of therapeutic outcomes, and assessment of the relationship between investment and benefit in healthcare services. Its main goal is to maintain therapeutic effectiveness and patient quality of life while ensuring the rational use of available resources (6).

Several studies have demonstrated a positive correlation between pharmaceutical interventions and hospital cost reduction, underscoring the direct economic impact of the pharmacist's clinical role (7,8). In a cardiology hospital in Santa Catarina, for instance, 41.8% of pharmaceutical interventions resulted in significant cost savings for the institution (9,10). Similarly, a systematic review on the economic evaluation of clinical pharmacy services conducted in China revealed that 80% of the included studies reported relevant economic benefits for hospitals, reinforcing the added value of these practices (11).

Although the total avoided cost observed in this study (R$ 6,132.84 across 301 interventions) was lower than in some previous reports, it still represents tangible evidence of direct economic benefit and reinforces the value of tracking such outcomes. The 100% acceptance rate of the recorded interventions reflects the clinical and scientific credibility of the pharmacist among the medical team, promoting interprofessional collaboration and effective care delivery.

In the ICU setting, where clinical complexity and intensive medication use are predominant, the impact of pharmaceutical interventions becomes even more evident. A study conducted in university hospital ICUs in Paraná found that 14.6% of prescriptions presented some type of drug-related problem, demonstrating the importance of continuous pharmacotherapeutic review as a strategy to prevent adverse events and reduce indirect costs. Likewise, research carried out in a teaching hospital in Mato Grosso do Sul showed that 97% of pharmaceutical interventions were accepted by the medical team, most commonly those related to inclusion, discontinuation, or dosage adjustment, reinforcing the importance of the clinical pharmacist's presence in the care of critically ill patients (10, 12).

Thus, the findings of this study align with existing literature and show that the Clinical Pharmacy Service serves as a strategic management tool, influencing not only safety and therapeutic effectiveness but also the financial sustainability of healthcare institutions. Even though a considerable portion of interventions has a preventive and non-measurable economic nature, they play a decisive role in preventing medication errors, minimizing adverse events, and optimizing available resources.

Keywords

clinical pharmacy; pharmacoeconomics;

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Epidemiological Profile Of Schistosomiasis In Paraíba Between 2015 And 2025: A Temporal Analysis Based On Sinan

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Introduction

Schistosomiasis is a neglected infectious parasitic disease closely associated with poverty, social inequality, and the lack of basic sanitation. Among the species of the Schistosoma genus, S. mansoni is the main one responsible for human infections in Brazil. Nationally, schistosomiasis ranks as the second leading cause of disability-adjusted life years (DALYs) among neglected tropical diseases. Brazil shows the highest incidence in nine states, seven of which are located in the Northeast region, including Paraíba. Historically, the state has been identified as one of the regions with the highest endemicity, with high prevalence in rural areas and among school-aged

populations. Although the National Schistosomiasis Control Program (PCE) has reduced prevalence rates, the current epidemiological scenario reveals new challenges, such as the expansion of transmission to nontraditional and urban areas. Conducting studies on schistosomiasis mortality and distribution in Paraíba is essential to improve public policies and resource allocation. This study aims to analyze the temporal evolution of cases and the spatial distribution of schistosomiasis in Paraíba between 2015 and 2025, based on official notification data.

Aim

To analyze the temporal evolution and spatial distribution of schistosomiasis cases in endemic municipalities of Paraíba monitored by the Schistosomiasis Control Program (PCE) between 2015 and 2025, aiming to identify epidemiological trends, variations in spatial distribution, and possible changes in the disease's transmission pattern, in order to evaluate the effectiveness of surveillance and control actions.

Methods

This is a descriptive, retrospective, time-series study with a quantitative approach. The data were obtained from the number of reported cases in the Information System for Notifiable Diseases (Sinan Net), made available by the Department of Informatics of the Unified Health System (DATASUS). Records of confirmed schistosomiasis cases in the state of Paraíba between 2015 and 2025 were considered.
The analyzed variables included year of notification, macroregions of residence, number of coproscopic examinations performed, number of positive cases, clinical form, and disease outcome. A literature review was conducted in the PubMed, SciELO, and CAPES Journal Portal databases, using the descriptors "Schistosomiasis AND Paraíba" and "Schistosomiasis AND History AND Brazil." Only articles published between 2007 and 2024, in English or Portuguese, and specifically addressing Paraíba or the historical trajectory of the disease in Brazil were included.

Results

A total of 877 cases of schistosomiasis were confirmed between 2015 and 2025. The distribution of cases by macroregion showed a concentration in Macroregion I – João Pessoa, with 483 cases (55%), followed by Macroregion II – Campina Grande, with 375 cases (43%). Macroregion III – Sertão/Alto Sertão recorded a significantly lower number, with only 19 cases (2%).
The historical series analysis identified incidence peaks in 2016 and 2017, with 126 cases reported in each year. After this period, a decline was observed, with 47 cases in 2018 and 30 in 2019. A new increase occurred in 2024, with 116 cases. Of the total, 370 cases (42.2%) presented one or more parasite eggs in coproscopic examinations. The most common clinical form was the intestinal form, with 400 cases. Regarding disease outcome, most cases were recorded as "Cured" (527 cases). However, a significant proportion of records were categorized as "Ignored/Blank" for variables such as qualitative analysis (353 cases; 40.2%) and disease outcome (323 cases; 36.8%).

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Discussion

The analysis confirms the persistence of schistosomiasis as a public health problem in Paraíba. The concentration of the disease in the macroregions of João Pessoa (55%) and Campina Grande (43%) reinforces its strong association with socioeconomic conditions and poor sanitation infrastructure—factors that favor the maintenance of the transmission cycle. The low number of cases in the Sertão (2%) suggests more restricted transmission patterns or potential underestimation of cases due to limitations in diagnostic coverage.
The temporal variation (peaks in 2016/2017 followed by decline) may be related both to the intensification of PCE activities and to seasonal factors. The high proportion of "Ignored/Blank" records in the notification systems (up to 40.2%) highlights data quality gaps and weaknesses in surveillance, which limit a more detailed analysis of the epidemiological situation.
Therefore, it is concluded that tackling schistosomiasis requires integrated and continuous actions involving not only case diagnosis and treatment but also investments in sanitation infrastructure, health education, and the strengthening of epidemiological surveillance and data collection, aiming at the effective reduction of the disease burden in Paraíba.

Keywords

Schistosomiasis. Neglected tropical diseases. Epidemiology.

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Expansion Of Clinical Pharmacy And Management Of Medication-Related Problems In Oncology: A Multidisciplinary Approach

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Introduction

The Paraná Oncology Institute is an outpatient institution in constant expansion, keeping pace with the increasing incidence of cancer in Brazil and worldwide (1). This growth re-presents a challenge for clinical pharmacy practice, especially in a context where institutional management often focuses much of its efforts on the acquisition and handling of anti-neoplastic drugs due to their high cost.

However, patient experience and the principles of value-based healthcare (VBHC) (2)(3) are recognized as fundamental dimensions for the sustainability of oncology institutions. In this context, the expansion of pharmaceutical care, with an emphasis on clinical pharmacy consultations—both for the initial patient intake and continuous pharmacotherapeutic follow-up—becomes essential (4).

Moreover, the comprehensive care of oncology patients requires the involvement of a multidisciplinary team. Services such as patient navigation in oncology, combined with support from nutrition and psychology, have

demonstrated a positive impact on the effectiveness of care and the integration of services, reinforcing the role of clinical pharmacy as a strategic component of the therapeutic process (5).

Aim

To expand and enhance pharmaceutical care in oncology through the growth of clinical pharmacy consultations. To conduct pharmaceutical intake consultations for patients star-ting new oncological treatment regimens, providing individualized guidance and resolution of medication-related problems (MRP). To develop continuous pharmacotherapeutic follow-up, focusing on safety, adherence, and optimization of clinical outcomes.

Methods

This is an observational, retrospective, and descriptive study conducted at the Paraná Oncology Institute (IOP). The main objective was to analyze the increase in the number of clinical pharmacy consultations between August 2024 and August 2025. Data were collected from institutional records, including the number of consultations. The analysis involved evaluating the monthly progression of consultations and the number of medication-related problems (MRP), as well as assessing the resolution rate. MRPs were classified according to the Cipolle classification (6).
The number of referrals from the multidisciplinary team to the clinical pharmacy service was also analyzed for the period between January 2025 and August 2025. All clinical pharmacy consultations were conducted in person at the start of treatment, including patients receiving parenteral and oral therapy. Initial consultations for antineoplastic treatments were scheduled and organized by the IOP patient navigator nurses. Continuous pharmacotherapeutic follow-up was scheduled by the clinical pharmacist and primarily conducted through teleconsultations. Follow-up included analysis of MRP resolution and monitoring for adverse drug reactions (ADR) and adherence after the first cycle of oral therapy.

Results

To achieve the reported results, it was necessary to adjust the work schedule by functional site, assigning a pharmacist exclusively to clinical pharmacy consultations. Other sites included antineoplastic preparation and support for medication dispensing. The pharmacist dedicated to consultations was able to focus entirely on patient care and MRP resolution without dividing attention among other tasks.
This reorganization resulted in a 96% increase in clinical pharmacy consultations, from 52 in August 2024 to 102 in August 2025. Analysis of MRPs revealed a 115% increase in total problems detected; however, the resolution rate at the first consultation decreased by 33%. The MRPs resolved immediately were primarily safety-related, such as drug interactions, and indication-related, such as missing prescriptions for supportive medications used to manage adverse effects of antineoplastic therapy, allowing treatment continuity. The most frequent MRP not resolved in the first consultation was non-adherence to therapy for non-oncological diseases.
The number of referrals from the multidisciplinary team to the clinical pharmacy service in-creased 350%, from 8 in January 2024 to 28 in August 2025, totaling 56 referrals during this period. The majority of referrals came from nutrition (48%), psychology (41%), and nursing (11%).

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Discussion

The significant increase in clinical pharmacy consultations was achieved after assigning a pharmacist exclusively to this functional site, highlighting that human resource management strategies directly impact outcomes, both in terms of consultation volume and the detection and recording of MRPs.
It is expected that the increase in consultations is associated with a concomitant rise in MRPs, as one activity influences the other, especially considering that oncology patients often present polypharmacy, including medications for chronic diseases in addition to anti-neoplastic therapy.
The reduction in first-consultation MRP resolution rate may be related to the higher number of consultations and the focus on more comprehensive and individualized care. Among MRPs not resolved initially, medication non-adherence was the most frequent, with all cases referred to the psychology service (7).
The substantial increase in referrals to the clinical pharmacy service is directly associated with the effectiveness and expansion of clinical consultations. The role of oncology nutrition services is particularly noteworthy, as patients are often referred to the pharmacist for assistance in managing antiemetics and laxatives, optimizing support for oncological therapy.
Results from this study reinforce the importance of the continuous expansion of clinical pharmacy consultations, aiming for effective follow-up of unresolved MRPs, strengthening the safety and quality of care for oncology patients. Furthermore, they contribute to improved clinical outcomes, reduction of unnecessary costs, multidisciplinary integration, and a focus on patient-centered outcomes (8).

Keywords

pharmaceutical consultations, clinical pharmaceutical

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Medication Reconciliation In Intensive Care Units: Indicators Of Adherence And Clinical Performance Of The Pharmaceutical Service

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Introduction

Medication reconciliation is a structured clinical service aimed at ensuring therapeutic continuity and reducing unintentional discrepancies during transitions of care. Institutions such as the World Health Organization (WHO) and the Institute for Safe Medication Practices (ISMP) recognize this practice as a priority strategy for patient safety, particularly in critical care settings such as Intensive Care Units (ICUs) (1,2). In these environments,

therapeutic complexity, clinical severity, and frequent prescription changes create conditions conducive to medication-related errors, thereby increasing morbidity and mortality associated with adverse drug events (3). International literature shows that up to 67% of hospitalized patients experience at least one medication discrepancy, and approximately one-third of these errors have the potential to cause significant clinical harm (4). In Brazil, although the topic has gained attention, few studies have assessed adherence and effectiveness of medication reconciliation in ICUs, especially in institutions located in the Northern region, where structural challenges are greater. Considering that hospital quality of care is increasingly guided by international accreditation standards such as Qmentum and Joint Commission International (JCI), evaluating the effectiveness of clinical pharmacy services in hospitals with established medication reconciliation practices is essential for generating reliable indicators and driving continuous improvement (5).
Therefore, this study aims to analyze adherence to the medication reconciliation service among patients admitted to an ICU, providing evidence that supports clinical practice and reinforces the relevance of the clinical pharmacist in hospital care.

Aim

To evaluate adherence to the medication reconciliation service upon admission of patients to the Intensive Care Unit.

Methods

This was a retrospective, observational, and descriptive quantitative study conducted between January 2023 and August 2024 in the Intensive Care Unit of a private hospital in Northern Brazil. Adult patients (≥18 years) admitted during the study period who underwent the medication reconciliation process were included, while those with incomplete electronic data were excluded.
Medication reconciliation was conducted by clinical pharmacists in collaboration with physicians and nurses, following an institutional protocol based on international guidelines from the Joint Commission International (JCI) and the Institute for Safe Medication Practices (ISMP). The process consisted of a systematic comparison between the patient's most recent pre-admission prescription and the first ICU prescription to identify intentional and unintentional discrepancies.
The analyzed variables included: (a) overall adherence rate to the service; (b) proportion of reconciliations completed within 48 hours of admission, in accordance with international best practices; (c) mean time to reconciliation completion; and (d) distribution of reconciliations by work shift and day of the week.
Data were extracted from anonymized hospital electronic records to ensure confidentiality. Statistical analysis was performed using Python (version 3.9), applying descriptive statistics and Pearson's chi-square test, with statistical significance set at $p<0.05$.
Because the study involved retrospective analysis of secondary, anonymized, and aggregated data with no possibility of patient identification, it was exempt from ethics committee review, in accordance with Brazilian National Health Council Resolutions 466/2012 and 510/2016.

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Results

Between January 2023 and August 2024, a total of 2,235 ICU admissions were recorded. Of these, 2,126 underwent medication reconciliation, corresponding to an overall adherence rate of 95.1%. Among these, 1,988 reconciliations were completed within 48 hours after admission, resulting in a 93.5% adherence rate to the institutional protocol. The mean time to completion was 18.06 hours.

Temporal analysis showed a higher frequency of reconciliations during the afternoon and on weekdays, while weekends showed a significant drop in adherence ($p<0.05$). No significant differences were observed concerning patient sex or age group.

These results demonstrate that the institution performs above national and international benchmarks, where average reconciliation rates range between 70% and 90% (1,2). The high adherence rate suggests consolidation of clinical pharmacy practices and effectiveness of the implemented workflows. However, the reduced adherence during weekends indicates the need for structural and operational adjustments to ensure consistent service coverage.

Discussion

The results strengthen the evidence that medication reconciliation should be considered an essential and mandatory practice within patient safety policies nationwide. It is widely recognized as one of the most effective strategies to reduce medication-related errors in hospital settings. Particularly in ICUs—where clinical complexity and pharmacological interventions are intense—its implementation serves as a direct indicator of the maturity of clinical pharmacy services (1,2).

The present study demonstrated an overall adherence rate exceeding 95%, higher than the average reported in international research (70%–90%) (3,4). This reinforces the effectiveness of the implemented model and consolidates the role of the clinical pharmacist in preventing unintentional discrepancies. Previous studies conducted in hospitals accredited by the Joint Commission International (JCI) and by the Canadian Qmentum program highlight that pharmacist integration within multidisciplinary teams is crucial for ensuring therapeutic continuity and reducing adverse events (5,6). However, literature also indicates that institutions with inconsistent or unsystematic reconciliation practices—particularly with reduced staffing on weekends—exhibit increased rates of discrepancies and process delays (7).

These findings are consistent with the present study, where lower adherence during periods of reduced professional coverage suggests the need for schedule optimization and enhanced communication among shifts. The mean reconciliation time of 18 hours is aligned with international recommendations that recommend completion within 48 hours of hospital admission (8). This performance reflects high operational efficiency and integration with the care team. Nonetheless, implementing automated solutions—such as electronic alerts and prescription system integration—could further expand coverage and mitigate workload-related variability.

The high adherence rate also indicates that the reconciliation process is institutionalized and aligned with patient safety principles established by the WHO and ISMP. This scenario is particularly relevant for the Amazon region, where published data on structured hospital clinical pharmacy services remain scarce. Thus, this study not only quantifies adherence outcomes but also provides practical insights for replication of the model in other regional institutions, strengthening the culture of safety and the clinical role of pharmacists in critical care.

In summary, the findings emphasize medication reconciliation as a key indicator of care quality and patient safety,

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particularly in hospitals pursuing international accreditation. The consolidation of this service in routine practice represents a significant advancement for clinical pharmacy and underscores the importance of continuous investment in professional education, process automation, and sustained clinical support across all shifts.

Keywords

Medication Reconciliation; Intensive Care Units; Clinical Pharmacy; Patient Safety; Quality of Health Care

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Medication Education In Schools: Effects Of Educator–Pharmacist Collaboration On Knowledge, Skills, And Safety — An Integrative Review

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Introduction

Promoting the responsible use of medications in childhood is a public-health priority, since children present pharmacokinetic/pharmacodynamic particularities, a high frequency of off-label use, and a risk of adverse reactions and preventable hospitalizations (1,2). Outside the hospital setting, dosing and unit-of-measure errors occur on a large scale—in the United States, one episode every 8 minutes among children <6 years—and can be mitigated by appropriate labeling and measuring devices (2,3). In Brazil, self-medication affects 22.2% of children aged 0–12 years, being more common among older children, in lower-income families, and in those without health insurance; analgesics/antipyretics are the most used (4). This scenario is compounded by gaps in medication literacy among caregivers and students, which sustain unsafe practices (3,4). The school is a strategic setting for

prevention and health education. Experiences involving pharmacists, both in-person and virtual, have shown gains in knowledge and attitudes regarding safe medication use among students and communities (5,6). There is, however, a lack of systematized curricular models co-constructed with educators and evaluated by robust outcomes (knowledge, behavioral intention, and safety markers). Interprofessional collaboration, advocated by the WHO, and the integration of pharmacists into teams are associated with better clinical and safety outcomes in primary care; pharmacist-led educational interventions reduce medication errors (7–9). In Brazil, the Programa Saúde na Escola (PSE) offers a cross-sectoral basis to incorporate and scale such interventions (10). In view of this, we conducted an integrative review to synthesize the effectiveness and feasibility of collaboration between educators and pharmacists in school-based programs on the responsible use of medications, identifying key components and gaps for future implementations (2–5,7–10).

Aim

To synthesize the evidence on the integration of pharmacists and educators in school-based programs focused on the responsible use of medications in children, describing pedagogical and clinical components, professional roles, gains in knowledge/attitudes/skills, and signals of impact on safety, as well as methodological gaps and opportunities for large-scale implementation.

Methods

Conducted an integrative review according to Whittemore and Knafl (11), with reporting aligned to PRISMA 2020 and the PRISMA-S extension for search transparency; the strategy was designed and peer-reviewed according to PRESS guidelines, ensuring accuracy and reproducibility (12–14). We searched MEDLINE/PubMed, ERIC, Scopus, Web of Science, CINAHL, SciELO, LILACS, and grey literature (Google Scholar), covering January 2000 to October 2025, in Portuguese, English, and Spanish. The search combined MeSH/DeCS and free-text terms for Schools, Pharmacists, Interprofessional Relations, Health Education, Medication Errors, Self-Medication, and Child, in addition to synonyms (“school-based,” “pharmacy-led,” “medication safety education”); we included empirical studies involving pharmacists and educators working jointly with children (≤18 years) in school/community settings, reporting at least one outcome of interest (knowledge, attitudes, behavioral intention, dosing skill, medication errors, self-medication, or safety markers), and excluded hospital-only studies, studies without educator participation or without a pharmacy component, editorials/opinions, and reports focused solely on undergraduate training. Study selection occurred in two stages (title/abstract; full text) by two independent reviewers, with disagreements resolved by a third reviewer and agreement calculated (Cohen’s κ); data extraction was standardized (setting, design, sample, professional roles, pedagogical components, dose/fidelity, outcomes, instruments, effects). Methodological quality was assessed with RoB 2 for trials (15) and the appropriate JBI checklists for quasi-experimental, cross-sectional, and qualitative studies (16–18). Synthesis was narrative and thematic, with standardized effect sizes calculated when applicable; the certainty of evidence was judged using GRADE and, for qualitative syntheses, GRADE-CERQual (19,20).

Results

School programs co-designed by educators and pharmacists consistently increase attitudes toward the safe use of medications among children and the school community, with high acceptability among students and teachers

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(5,6,19,20). Interventions that train label reading and milliliter-based dosing with a syringe enhance practical skills and reduce simulated dose errors, consistent with foundational experimental evidence linking metric tools and clear instructions to fewer household mistakes (2,3,19,20). When roles were made explicit—with educators adapting language and activities to the developmental stage and pharmacists ensuring technical rigor—greater implementation fidelity and decision-making were observed, aligning with syntheses that associate interprofessional collaboration with better safety outcomes and with meta-analyses showing reduced errors following pharmacist-led education (8,9). Synchronizing activities with the curriculum increased engagement and accuracy in dosing tasks and favored transfer to family routines (5,19,20). This is relevant in light of the burden of adverse reactions and off-label use in childhood and the pattern of self-medication observed in Brazil, which suggests a plausible safety impact when dosing competencies are taught early and in a standardized manner (1,4). In pediatric clinical settings, structured strategies for education on dosing safety have reduced the risk of error over time, reinforcing the coherence of the proposed mechanism and its potential applicability in the school environment (21,22). The body of studies is dominated by before–after and quasi-experimental designs, with small to medium samples and heterogeneous instruments, but the convergence of effects indicates that educator–pharmacist partnerships are feasible and effective and provide a concrete basis for adoption and scale in public networks with intersectoral support, including the Programa Saúde na Escola (5,6,8–10,19–22).

Discussion

A structured collaboration between educators and pharmacists proved to be a powerful arrangement to raise knowledge, attitudes, and practical skills, with high acceptability in the school context. These findings are articulated in three lines of evidence. First, they respond to the safety problem already described in childhood, marked by adverse reactions, off-label use, and household dosing errors that can be mitigated by metric instruments and clear instructions (1–4). Second, they reflect consolidated principles of interprofessional collaboration associated with better patient safety outcomes, which supports the plausibility of impact when pharmaceutical expertise is integrated into pedagogical practice (7–9). Third, they align with school experiences that documented measurable gains in medication literacy, label reading, and decision making.(5,6,19,20) From a pedagogical standpoint, the synthesis converges with popular education by producing dialogic, contextualized learning and, by treating medication as a technical and cultural object that requires critical reading, the child is shifted from the position of a passive user to that of a subject who understands, questions, and decides based on evidence and values of care (23,24). This Freirean key approaches the field of health literacy in the functional, interactive, and critical dimensions, offering a path to reduce inequities and the social gradient of self-medication observed in Brazil (4,25,27). A practical finding with strong theoretical grounding is the synchronization of workshops with the mathematics and science curriculum when the class works with units and milliliter measures, because this raises engagement, accuracy in dosing tasks, and transfer to family routines (5,19,20). At the systemic level, the PSE emerges as an institutional pathway for the adoption, standardization, and scaling of co-designed interventions, with the potential to compose safety targets, including the global Medication Without Harm agenda that seeks to reduce medication-related harm (10,26). The presence of the pharmacist in the school, however, does not replace clinical care. It qualifies prevention and health literacy, articulating school, family, and the care network, and favors informed decisions about when to treat at home and when to seek the health service. (1,26).Before and after or quasi-experimental designs predominate, with small samples and heterogeneous instruments, rarely assessing maintenance of effect or long-term outcomes. This study integrated two traditions

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rarely connected in the field of pediatric pharmacotherapy, interprofessional education and popular education, and proposes transferable design principles, which consist of making the roles of educators and pharmacists explicit, anchoring practice in metric dosing, synchronizing with the curriculum, employing plain language and culturally situated materials, involving families, and monitoring fidelity and effect with comparable metrics. In light of external coherence and alignment with public policies, we advocate the progressive adoption of this model in public networks, with continuous evaluation and a focus on equity (5–10,19–27). It becomes evident that this collaboration is not a pedagogical adornment, but rather a technically sound, ethically committed, and socially necessary response to reduce medication-related harm in childhood, build enduring competencies, and strengthen the bridge between school, family, and health.

Keywords

Medication safety; School-based education; Interprofessional collaboration

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Report Or Omit? Underreporting And Inconsistencies In The Recording Of Benzodiazepine Poisonings In The Elderly In Paraíba (2018–2023).

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Introduction

Benzodiazepines (BZDs), introduced in the 1950s, have become one of the most widely prescribed classes of medications worldwide due to their efficacy in treating insomnia, anxiety, epilepsy, and aggression, as well as their low incidence of respiratory depression when administered orally (1). However, their prolonged use has revealed significant adverse effects, such as daytime drowsiness, cognitive decline, and psychomotor changes (2), especially in the elderly, the population most exposed to these drugs (3).

In Brazil, a national study found a 9.3% prevalence of BZD use among the elderly, confirming their significant use in this age group (4). This situation is aggravated by the pharmacokinetic and pharmacodynamic changes of aging, which increase the risk of poisoning, drug interactions, and clinical complications. Furthermore, factors such as self-medication, indiscriminate use, and insufficient health monitoring contribute to the vulnerability of this population (5).

Given the high consumption and associated risks, it is essential to investigate the epidemiological profile of BZD poisoning in the elderly, especially at the regional level, where data are scarce. Furthermore, it is important to assess the quality and comprehensiveness of notifications, considering that reporting errors can hinder surveillance and the planning of prevention strategies. In this context, this study aims to analyze reports of BZD poisoning registered in the Paraíba Notifiable Diseases Information System (SINAN-PB) between 2018 and 2023, in order to identify patterns and risk factors and inform surveillance and prevention strategies.

Aim

To analyze reports of benzodiazepine poisoning in elderly individuals in Paraíba (2018–2023), focusing on distribution patterns, quality, and consistency of records.

Methods

This is a quantitative, documentary, and retrospective study based on reports of benzodiazepine poisoning in elderly individuals (≥60 years) recorded in the Notifiable Diseases Information System (SINAN) of the state of Paraíba between 2018 and 2023. The data were made available by SINAN in Microsoft Excel spreadsheets, corresponding to the information contained in the exogenous poisoning investigation form, which defines suspected cases as individuals exposed to chemical substances (medicines, pesticides, household products, food, among others) and presenting clinical and/or laboratory signs consistent with poisoning.
The spreadsheet was filtered by age (≥60 years) and the toxic agent (benzodiazepines). Columns for the benzodiazepines involved, cities in Paraíba, and number of reports per year were selected. Confirmed ICD codes were also analyzed. The inclusion criterion for variables was their relevance to the topic. Finally, the data were organized into tables and graphs in Microsoft Excel, allowing descriptive analysis and interpretation of benzodiazepine intoxication patterns among elderly individuals in the state of Paraíba, supporting the discussion.

Results

Between 2018 and 2023, 15 cities in Paraíba reported a total of 83 cases of benzodiazepine poisoning in the elderly. Campina Grande and João Pessoa accounted for more than 50% of these reports (48 cases), while municipalities such as Picuí, Itabaiana, Santa Rita, Itaporanga, Cabedelo, and Souza each reported only one report.

Regarding the types of BZDs involved in poisonings among the elderly, clonazepam accounted for almost 60% (n=48) of the reported cases (Graph 4). The other benzodiazepines identified were less frequent: diazepam (n=13), alprazolam (n=10), bromazepam (n=5), lorazepam (n=2), and cases reported generically as "benzodiazepine" (n=4), without specifying the active ingredient.

Regarding the annual trend (2018-2023), peaks in cases were identified in 2022 (n=20) and 2023 (n=24). However, a turning point occurred in 2020, a year marked by the onset of the pandemic in Brazil and also in the Northeast region with the largest increase in clonazepam use. Cases jumped to 13, after two years with lower numbers (9 in 2018 and 8 in 2019).

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Most cases were classified as nonspecific according to the International Classification of Diseases (ICD). Only the codes related to benzodiazepine use (T424 and Y471) were specific. The remaining records included poisonings by antidepressants (T432) and unspecified or general categories (T659, Y14, Z000), as well as cases of self-poisoning with psychotropic drugs (X61 and X615) and with unspecified substances (X64).

Discussion

During the five-year period, only 15 municipalities in Paraíba reported cases of benzodiazepine poisoning in the elderly, representing a tiny fraction of the state's 223 municipalities. Considering the regional prevalence of benzodiazepine use among the elderly was 8.3% (4) and the estimated population of Paraíba of 4 million inhabitants (6), approximately 38,022 elderly individuals are projected to use these drugs. The discrepancy between this estimated number of users and the low number of reports strongly suggests the existence of underreporting. Thus, although not all benzodiazepine use results in poisoning, the contrast between high consumption and official records highlights flaws and inconsistencies in the reporting system.

This evidence emphasizes the need to develop strategies that increase epidemiological surveillance and raise awareness among healthcare professionals about the importance of reporting. Underreporting undermines true understanding of the scale of the problem and limits the effectiveness of public policies. Studies show that active pharmacovigilance programs in the elderly significantly increase the number of reported adverse events and contribute to optimizing medication use in this age group (7). However, professionals' lack of knowledge about when and how to report remains an obstacle, reinforcing the need for educational initiatives (8).

Furthermore, clonazepam was the most consumed BZD in the country between 2019 and 2020 (9). It is provided by the SUS (Unified Health System) (10) and has an intermediate-to-long half-life, which increases the risk of adverse effects in the elderly population and, consequently, the number of poisonings (11). Even with this increase, the total number of reports remains low, suggesting possible underreporting, either due to failures in reporting reports or older adults failing to seek medical care. Brazilian studies have already indicated significant underreporting of deaths during the COVID-19 pandemic in Brazil (12). Furthermore, 2019 and 2021 coincided with the peak of the pandemic, a period during which many elderly individuals avoided seeking medical care, which possibly contributed to the reduction in the number of reports (13).

The findings of this analysis point to a confusing scenario in the reporting records. Despite extensive data collection, only two specific ICD codes related to benzodiazepines were identified (T424 and Y471). The remaining records contained nonspecific classifications (T659, Y14, Z000) or diagnoses that did not indicate the pharmacological class studied (X64). Some of these diagnoses were not directly related to the substance mentioned as the cause (BZD), highlighting clear flaws and inconsistencies in the reporting process.
This problem may be associated with two main factors: clinical difficulty in accurately determining the substance involved and poor reporting quality. Several studies have already demonstrated that, in Brazil, there is a problem of inconsistency in clinical records, including compulsory notifications (such as violence) or in primary care records (14).

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Keywords

Benzodiazepines. Elderly. Poisoning. Epidemiological surveillance.

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Epidemiological Aspects Of Haemophilus Influenzae Meningitis In Recife (Pe), Brazil, 2015–2025: Implications For Pharmacist Practice

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Introduction

Haemophilus influenzae is a Gram-negative bacteria that can colonize the nasopharynx asymptomatically, but can also cause serious infections, such as meningitis, which is still considered a major public health problem (1–6). Before the introduction of the vaccine against serotype b (Hib), the disease was responsible for high morbidity and mortality rates, especially in children under five years of age and immunocompromised individuals (2–5,7).

Bacterial meningitis stands out among central nervous system infections due to its high mortality rate and neurological sequelae (6–9). In addition to the pathogen's biology, socioeconomic factors, poor sanitation, overcrowded housing, and social inequalities increase the vulnerability of populations (10–15).
In Brazil, Recife, Pernambuco, presents conditions that favor the occurrence and reporting of cases, due to its high population density, disparities in access to health services, and greater diagnostic capacity compared to neighboring municipalities (16–20). Between 2020 and 2021, the COVID-19 pandemic significantly altered epidemiological dynamics, impacting the vaccination schedule, the profile of health care demand, and the reporting of health problems (7,8,21–25). Recent studies indicate that pandemic containment measures influenced the circulation of invasive bacterial diseases, including meningitis (7,8,23). Therefore, investigating the temporal and spatial evolution of H. influenzae meningitis allows us to understand the persistent challenges in disease control, guide public policies, and reinforce the importance of pharmacists as strategic agents in surveillance, prevention, and rational medication use (39–43).

Aim

To analyze the epidemiological aspects of Haemophilus influenzae meningitis in the city of Recife, Pernambuco (2015–2025), considering incidence, age profile, spatial distribution, and temporal evolution, and to propose innovative strategies for pharmaceutical intervention, including health education, home visits, and therapeutic monitoring (39–45).

Methods

This retrospective, descriptive, time-series epidemiological study analyzed confirmed cases of Haemophilus influenzae meningitis in Recife, Pernambuco, from 2015 to 2025 (16–22). Data were collected from the Notifiable Diseases Information System (SINAN) via TabNet/DATASUS (17–18) and complemented with mortality data from the Mortality Information System (SIM) to estimate case-fatality rates (19). Intercensal population estimates from the Brazilian Institute of Geography and Statistics (IBGE) were used to calculate incidence (20).
All confirmed H. influenzae meningitis cases, regardless of serotype, with residence or notification in Recife were included (16,21). Cases classified as “unknown etiology” or “unspecified” were excluded.
Beyond descriptive analysis, the study used an exploratory approach combining scientific literature and local context to propose pharmacist-led strategies to reduce morbidity and mortality (39–43). These were organized into three key areas:
Health education: pharmacist-led campaigns in primary care units and schools, with community health agents (CHAs) and Social Assistance Reference Centers (CRAS), promoting vaccination and early recognition of meningitis symptoms (41–45).
Surveillance strengthening: training health professionals, including pharmacists, to improve SINAN reporting, reduce underreporting, and use home-visit data for more accurate monitoring (16,17,22,39).
Pharmacotherapy support: integrating hospital and primary care pharmacists in antibiotic therapy monitoring and post-discharge follow-up to ensure rational use, evaluate efficacy, and prevent antimicrobial resistance (33–38).
This innovative component complements epidemiological analysis, linking findings to professional practice and public health, and emphasizing pharmacists as active agents in prevention and disease management.

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Results

Between 2015 and 2025, 2,106 cases of Haemophilus influenzae meningitis were confirmed in Recife-PE, accounting for about 51.3% of all reports in the Metropolitan Health Macroregion (16–18). The estimated fatality rate was 7.9%, mainly affecting children under five and the elderly—groups more prone to severe complications (6,8,16,19). Despite the historical decline after the introduction of the Hib vaccine, H. influenzae meningitis remains a relevant public health issue, reflecting the circulation of non-b serotypes and challenges in vaccine adherence and surveillance (2–5,7,10).

The historical series peaked in 2015 (≈260 cases), followed by a progressive decline until 2019. During the COVID-19 pandemic (2020–2021), cases dropped to ≈120–140/year, likely due to reduced reporting, containment measures, decreased healthcare seeking, and delayed childhood vaccination (7,8,21–25). From 2022 onward, a slight increase was observed, averaging 170 cases per year until 2024, suggesting renewed bacterial circulation with the relaxation of distancing measures and partial recovery of vaccination coverage (23,24,26).

Cases were highly concentrated in Recife, possibly due to higher population density and the presence of diagnostic and reporting centers (16,19,20). Evidence also points to an increasing role of non-b H. influenzae serotypes, underscoring the need to strengthen laboratory surveillance, case reporting in SINAN, and evaluation of vaccine strategies amid potential serotype replacement (3,5,6,26). These findings highlight the importance of integrating epidemiological surveillance, primary care, and hospital services, with pharmacists and other professionals playing key roles in clinical monitoring, health education, and the rational use of antimicrobials.

Discussion

The results demonstrate that, even after the introduction of the Hib vaccine, H. influenzae meningitis remains a public health challenge in Recife (1–6,10). The number of registered cases and the 7.9% fatality rate confirm its severity, especially among children and the elderly (6,8,19). The concentration of cases in neighborhoods with greater socioeconomic vulnerability demonstrates the relationship between social inequality, limited access to health services, and a higher risk of illness (10–15).

The annual fluctuations reflect multiple factors: variations in vaccination coverage, limitations in the reporting system, changes in population behavior during the pandemic, and socioeconomic inequalities that influence both the risk of exposure and access to diagnosis (7,8,21–25). The COVID-19 pandemic has highlighted the extent to which health emergencies can indirectly impact other infectious diseases, interfering with the epidemiological profile and health indicators (7,8,23,24).

In this context, the role of pharmacists is strategic at various levels of public health. In the community and primary care setting, they implement home visits in partnership with community health agents (CHAs) and CRAS (Brazilian Health Centers), strengthening ties with the population and promoting health education (41–45). In epidemiological surveillance, they contribute to improving case reporting in SINAN (National Health System), reducing underreporting and supporting evidence-based public policies (16–22, 39). Information collected during home visits can complement the monitoring of incidence and spatial distribution, making it more efficient and targeted (41–44).

In clinical practice, hospital and primary care pharmacists monitor patients using antibiotic therapy, providing

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guidance on adherence, preventing complications, and bacterial resistance (33–38). The collaboration between hospitals, primary care units, CRAS (Brazilian Health Centers), and the community creates an integrated model, promoting continuous, multidisciplinary care (39–43). Therefore, the findings of this study not only describe the epidemiology of H. influenzae meningitis but also support innovative pharmacist-led interventions, such as group home visits and health education, capable of reducing morbidity and mortality, expanding vaccination coverage, and strengthening primary care (39–45).

The findings reinforce the need to maintain public policies to expand vaccination coverage, invest in timely laboratory diagnostics, and integrate epidemiological surveillance actions (10,16–20,46). The active involvement of pharmacists in these processes strengthens the multidisciplinary approach, which is essential to reducing morbidity and mortality and avoiding setbacks in the control of H. influenzae meningitis (39–43).

Keywords

Haemophilus influenzae;meningitis;pharmacists;public health;epidemiology;

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Adverse Drug Reactions To Antimicrobial Therapy In Critically Ill Septic Patients: A Retrospective Study In A Brazilian Public Hospital

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Introduction

An adverse drug reaction (ADR), according to the WHO, is defined as “any response to a drug which is noxious and unintended and occurs at doses normally used in humans”. ADRs are often directly associated with the quality of care and/or insufficient knowledge among healthcare professionals. Antimicrobial agents are frequently used in intensive care units (ICUs), particularly in critically ill patients such as those with sepsis (1,2,3). These patients are more prone to ADRs due to the clinical severity of their conditions, the complexity and high-risk nature of pharmacotherapy, and polypharmacy (4). Well-known antibiotic-related ADRs include Clostridioides difficile (C. difficile) infections, severe rash, and bone marrow suppression. Most multidisciplinary teams in Brazilian ICUs, especially in public hospitals, operate with fewer professionals than recommended. Furthermore, the shortage of qualified clinical pharmacists specialized in the care of critically ill patients may contribute to the underdiagnosis and underreporting of ADRs (1,2,3,4). Knowledge of the main adverse reactions to antimicrobial therapy in septic patients is essential to support early identification and guide pharmacotherapeutic management in this population.

Aim

To describe the demographic profile of patients with and without ADRs, and to analyze and characterize ADRs related to antimicrobial therapy in critically ill patients with sepsis and/or septic shock.

Methods

This retrospective, descriptive, cross-sectional study was conducted in a public hospital specializing in cardiovascular health, located in Florianópolis, SC, Brazil. The institution has 126 beds for clinical and surgical care and 23 ICUs beds. Data were collected from medical records and pharmaceutical interventions involving patients with sepsis and/or septic shock (inclusion criteria) between January and December 2024. The variables analyzed included sex, age, antimicrobial therapy, ICU admission, need for mechanical ventilation, length of hospital stay, occurrence of ADRs, type of reaction, associated drugs and clinical outcomes. Data were transcribed into an electronic spreadsheet and subsequently organized into a database (Excel®) for analysis and visualization.

Ethics
The study was approved by the Hospital Research Ethics Committee (report number 83317924.0.3001.0113).

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

A total of 82 septic patients were included in the study (n = 82) and 40% (n=33) experienced one or more adverse reactions to antimicrobial therapy. 1) Patients without ADRs: This group included 49 patients (n = 49). The average age was 68±11 years, with 63% (n=31) males and 37% (n=18) females. ICU admission occurred in 91% (n=45) of cases; 75% (n=37) required vasoactive drugs; 55% (n=27) required mechanical ventilation; 22% (n=11) were referred to the palliative care team; and 43% died (n=21). The average length of hospital stay was 26 days (range: 1–76 days), with 49% of patients having less than 21 days of hospitalization. A total of 13 pharmaceutical interventions were performed, of which 77% (n=10) were related to drug-related problems. The drugs who needed adjustment were meropenem, piperacilin-tazobactam (PIP/TAZ), metronidazole and teicoplanin. 2) Patients with ADRs: This group included 33 patients (n=33). The average age was 71±12 years, with 51% (n=17) male and 49% (n=16) female. ICU admission occurred in 97% (n=32) of cases; 85% (n=28) required vasoactive drugs; 73% (n=24) required mechanical ventilation; 36% (n=12) were referred to the palliative care team; and 42% (n=14) died. The average length of hospital stay was 36 days (range: 11–101 days), with 85% (p=0,0021) of patients having more than 21 days of hospitalization. A total of 23 pharmaceutical interventions were performed, of which 96% (n=22) were related to drug-related problems. The medications that required adjustments were the same as those in the group without adverse reactions, plus vancomycin. The most frequent ADRs were diarrhea (71%, n=29); acute renal failure (12,2%, n=5); thrombocytopenia (9,8%, n=4) and drug-induced skin reaction (7%, n=3). Suspected C.

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difficile infection occurred in 39% (n=13) patients, with 23% (n=3) of the cases being positive. The most frequent related medications were PIP/TAZ (59%, n=26), vancomycin (15%, n=5) and linezolid (7%, n=3).

Discussion

The epidemiological profile of septic patients with and without adverse drug reactions was similar, with the majority classified as elderly (82%, n=34). Patients who experienced ADR had a higher need for ICU admission, vasopressor use, and mechanical ventilation. Regarding hospital length of stay, approximately 85% of patients with ADR remained hospitalized for more than 21 days, showing a statistically significant difference compared with patients without adverse reactions (51%, p=0.0021). The difference between groups demonstrates that the occurrence of adverse events may increase the severity of the clinical condition, length of hospitalization, and healthcare costs (5). The average daily hospitalization cost in the Brazilian Unified Health System (SUS) is R$286.73, resulting in an additional R$2,867.30 in hospitalization costs for patients with adverse reactions (6). Pharmaceutical interventions in the group of patients without adverse reactions included advising the care team on the need for dose adjustments, treatment duration, dosage regimen, and clinical indication. Early detection of drug-related problems may have contributed to reducing the incidence of adverse reactions (4). In the group of patients who developed adverse reactions, the pharmaceutical team guided the healthcare staff on dose adjustments, dosage regimen, and antimicrobial therapy changes. Pharmaceutical recognition of factors that may cause or prolong adverse reactions may have contributed to reducing their duration or the incidence of new events in this group. Antibiotic-associated diarrhea is considered one of the most common adverse events of this therapeutic class (7), corroborating the findings of the present study, in which diarrhea accounted for more than half of adverse events (71%, n=29). PIP/TAZ was the main antibiotic associated with adverse events (59%) and it was associated with 90% (n=26) of diarrhea cases in our study. Lack of awareness and recognition of diarrhea as a potential adverse event of PIP/TAZ may result in patient harm, such as suspension or reduction of enteral diet infusion and unnecessary therapies or laboratory testing. Suspicion of C. difficile infection occurred in 39% (n=13) of patients, but only 3 cases were confirmed. Additionally, adverse reactions such as acute kidney injury and phlebitis were associated with vancomycin (15%, n=5), requiring therapy change and/or new venous access placement. Linezolid was associated with cases of thrombocytopenia and pancytopenia, requiring blood transfusion and therapy modification (7%, n=3). In many cases, the identification and management of adverse reactions occurred belatedly, which may be related to lack of knowledge or limited availability of clinical pharmacists. The longer the time to recognition and management of these events, the higher the risk that reversible damage may become irreversible. While more common reactions, such as diarrhea, are usually identified and managed promptly, severe events such as pancytopenia are often detected late, which may even result in patient death.
Conclusion: The description of the profile and adverse reactions in critically ill patients may help pharmacists in guiding the clinical care team. Pharmacists can and should be considered key players in the identification and management of common, rare, and very rare ADR. This work was supported by the National Council for Scientific and Technological Development (CNPq).

Keywords

Diarrhea; Thrombocytopenia; Pharmacist; Sepsis; Hospitalization

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Health Education Interventions: Some Prevention Strategies For Cardiovascular Diseases

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Introduction

Cardiovascular diseases (CVDs) are one of the primary causes of mortality in Brazil, and are frequently associated with modifiable risk factors, such as poor diet, a sedentary lifestyle, and smoking (1). In this context, health education aimed at adopting healthy lifestyle habits constitutes an effective prophylactic strategy, by promoting knowledge and encouraging behaviors capable of reducing potential cardiovascular risks (2). Various educational interventions, such as board games and health literacy programs, show potential for facilitating the understanding of information related to nutrition, physical activity, and risk factor control, especially when adapted to the characteristics and needs of the target audience (3). Furthermore, public policies that incentivize healthier food choices reinforce the positive impact of health education on promoting cardiovascular health. Therefore, health education can contribute significantly to reducing the impact of CVDs by offering accessible, attractive, and effective prevention strategies (1,3).

Aim

To investigate possible health education strategies aimed at preventing cardiovascular diseases, with an emphasis on educational interventions, health literacy programs, educational games, and actions promoting healthy lifestyle habits, as published in original articles in the years 2023 and 2025.

Methods

This is a narrative literature review, conducted in September 2025, focusing on health education strategies aimed at promoting healthy lifestyle habits in the prevention of cardiovascular diseases. The PubMed and SciELO databases were consulted, using the descriptors “health education”, "healthy lifestyle habits”, "cardiovascular disease prevention”, and "health promotion”, in both Portuguese and English. Publications were included that addressed educational interventions, health literacy programs, educational games, and healthy practices associated with the prevention of cardiovascular diseases. Articles that dealt only with cardiovascular diseases without a connection to lifestyle habits or educational strategies were excluded, as were studies published before 2023, as they do not reflect the current scenario of health promotion actions in Brazil.

Results

For the analysis of the publications, fifty articles were identified in the databases. Of these, five published between 2023 and 2025 were selected and analyzed because they addressed health guidance as a means of combating cardiovascular diseases (CVD). The study revealed satisfactory and multifaceted effects regarding the effectiveness of health education as a strategy for preventing cardiovascular diseases (CVD), which are responsible for about 32% of all deaths in Brazil. Key among these are coronary artery disease (CAD) and Stroke (CVA or Stroke) (4). Promoting healthy lifestyle habits, encompassing nutritional guidelines and physical activity, is crucial, as factors like smoking contributed to 8.7 million global deaths, with one-third of these being due to CVD (5). Pedagogical strategies have proven capable of provoking changes: health literacy is crucial, and studies have shown that individuals with less schooling have a higher percentage incidence of CVD (18.02% for 0 to 5 years of education, compared to 14.55% for years) (2), which suggests the importance of understanding health information. Playful interventions, such as educational games (which, in one study, had 14 specialists positively assessing their content and practical relevance) (3), are effective in engagement, stimulating adherence to healthy practices, especially in patients with coronary artery disease (CAD). The data reinforces that combining public policies with pedagogical tools boosts population adherence, which is fundamental for reducing risk factors such as obesity and hypertension.

Discussion

The findings, supported by epidemiological data, according to official data from the Mortality Information System (SIM) present in the studies (6) reinforce that effective cardiovascular prevention requires the integration of both individual and environmental factors. Health literacy acts as a cognitive facilitator, being inversely associated with the presence of carotid artery plaques and high CVD risk scores (2). This statistically significant association found in the researched articles indicates that the ability to access and understand health information is a fundamental predictor of cardiovascular outcomes. The use of playful and interactive approaches, such as gamification, is

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validated by specialists (3), serving as a powerful tool to increase knowledge retention and engagement, overcoming the communication barriers often present in populations with lower educational attainment. The urgency of these interventions is highlighted by the global prevalence of CVD (1). The integration of public policies is fundamental, as modifying risk factors demands not only individual awareness but also social and environmental support. The high mortality and morbidity rate of CVD in Brazil and globally (4) justifies the need for continuous, systematic, and adapted interventions that combine facilitated literacy with structural support, training, and access to a healthy and safe environment for the population. Ultimately, these combined actions thus enable more promising strategies for both confronting and reducing the burden of CVD.

Keywords

Health education; Cardiovascular diseases; Disease

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Telepharmacy As A Strategy For Pharmaceutical Clinical Care In Chronic Diseases: Literature Review

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Introduction

The advancement of information and communication technologies (ICT) has led to significant transformations in healthcare services, particularly in the field of pharmaceutical care. Telepharmacy, regulated in Brazil by Resolution No. 727/2022 of the Federal Pharmacy Council (CFF), refers to clinical pharmaceutical practice mediated by digital tools, enabling pharmacists to perform consultations, pharmacotherapeutic follow-up, health education, and patient monitoring remotely (1). This modality emerges as a response to challenges related to access, adherence, and continuity of care, especially in the context of the rising prevalence of chronic diseases such as systemic arterial hypertension (SAH) and diabetes mellitus (DM), which are leading causes of morbidity and mortality in Brazil and worldwide (2,3).

Telepharmacy allows pharmacists to operate in settings previously limited by geographic barriers, benefiting rural populations, vulnerable communities, older adults, and patients with mobility difficulties (4). Additionally, it contributes to reducing healthcare costs and to maintaining the patient at the center of care, fostering self-care and shared responsibility in therapeutic management (5). Nevertheless, despite advances and reported benefits, telepharmacy still faces implementation barriers, including the need for technological infrastructure, resistance from some professionals to paradigm shifts, and concerns regarding ethical-legal aspects (6). In this context, analyzing the potential of remote pharmaceutical consultation as an innovative tool in pharmaceutical care is highly relevant.

Aim

To analyze the use of remote pharmaceutical consultation as a tool for health promotion, health education, and clinical care in patients with chronic diseases, through a literature review.

Methods

This study is a narrative literature review conducted between July 2022 and March 2025. Databases consulted included MEDLINE, PubMed, and Google Scholar, in addition to official documents from the Federal Pharmacy Council (CFF). The descriptors used were: “telepharmacy,” “chronic diseases,” “telehealth,” and “telemonitoring,” in Portuguese and English. Inclusion criteria covered publications addressing telepharmacy applied to the management of chronic diseases such as hypertension and diabetes, describing pharmaceutical interventions, clinical benefits, and/or challenges. Articles addressing telemedicine without specific focus on pharmaceutical care, and studies published before July 2022 (prior to the regulation of telepharmacy in Brazil), were excluded.

Results

The analysis of the literature showed that telepharmacy is an effective strategy to expand access and improve the quality of pharmaceutical care (7,8). Reviewed studies indicated that remote pharmaceutical consultations allow for monitoring of therapeutic adherence, prevention of drug-related problems (DRPs), and resolution of pharmacotherapy-related issues (PRIs). Among hypertensive patients, remote follow-up contributed to improved adherence to antihypertensive therapy, reduced blood pressure variability, and greater engagement in home blood pressure monitoring (9). For diabetic patients, remote care showed a positive impact on glycemic control, with improvements in glycated hemoglobin levels and increased adherence to self-monitoring of capillary blood glucose (10).

Telepharmacy has also proven relevant in health education, supporting lifestyle guidance, proper use of medical devices (such as glucometers and sphygmomanometers), and clarification of prescription-related doubts (11). This continuous support strengthens patient autonomy and shared decision-making, which are essential for the long-term management of chronic diseases.

Another relevant aspect is the reduction of geographic and economic barriers. Patients in remote areas, with mobility difficulties or physical limitations, find in remote consultations a feasible and accessible alternative to maintain clinical follow-up without compromising the quality of care (12). Furthermore, there are reports of reductions in both direct and indirect costs, benefiting patients (savings in transportation and time) as well as the healthcare system, which experiences fewer complications and avoidable hospitalizations (13).

Despite the benefits, the studies reviewed highlight important challenges: (i) the need for adequate and accessible technological infrastructure; (ii) digital literacy among patients and professionals; (iii) ethical and legal issues related to data confidentiality; and (iv) the need for well-

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Discussion

Compared to international practice, countries in Europe and North America have already consolidated structured models of telepharmacy, particularly aimed at the management of chronic conditions (15). In Brazil, the recent regulation of telepharmacy is still in an adaptation phase, but it paves the way for significant expansion. Integrating telepharmacy into the Unified Health System (SUS) and private healthcare services may represent a strategic opportunity to expand coverage and reduce health inequalities (16).

This literature review demonstrates that telepharmacy is an innovative and promising tool in clinical pharmacy, especially in the care of patients with chronic diseases such as hypertension and diabetes mellitus. Remote pharmaceutical consultations have been shown to expand access, reduce costs, improve therapeutic adherence, and strengthen patient empowerment without compromising quality of care. Although structural and cultural challenges remain for its full implementation, telepharmacy is emerging as a fundamental component of digital health transformation, aligned with contemporary demands for equity, comprehensiveness, and continuity of pharmaceutical care.

Keywords

Telepharmacy. Chronic Disease. Pharmaceutical

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Integrative And Complementary Practices: Complementary Therapies, Phytotherapy, And The Role Of The Pharmacist In Primary Care.

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Introduction

In 2006, the National Policy on Integrative and Complementary Practices (NPICP) was implemented in the Unified Health System (UHS) by Ordinance GM/MS No. 971. Its objective is the democratization of practices with a holistic approach, comprehensive care, and prevention of health problems, emphasizing welcoming and humanized listening, in addition to building a professional-patient bond.

Currently, 29 ICPs are implemented, which are offered comprehensively and free of charge by the UHS, with Primary Health Care (PHC) being responsible for the majority of these services (1). Among the integrative and complementary practices offered by the UHS, phytotherapy stands out for using medicinal plants and their derivatives in treatment and health promotion. This practice is gaining strength due to its sustainability and because it constitutes a culturally rooted tradition in society (2). A recent national study showed that about 7 million adults (4.5%) used medicinal plants for the treatment of health problems in the two weeks prior to the survey (5). The pharmacist plays a very important role in the integration of ICPs, where they should provide guidance on the rational use of prescribed and non-prescribed medicines, including herbal medicines, ensuring better outcomes and quality of life for the patient (5). However, the effective integration of phytotherapy and other ICPs in the UHS faces significant challenges, such as a lack of professional training, structural limitations, and the need for greater scientific evidence - including Randomized Clinical Trials (RCTs) that evaluate efficacy and observational studies of effectiveness in the context of PHC, which are still insufficient or not very generalizable to the reality of the public health system (2). Given the identified challenges, this summary seeks to synthesize the evidence on phytotherapy, complementary therapies, and the role of the pharmacist in PHC, highlighting advances, challenges, and perspectives.

Aim

To synthesize and evaluate the evidence on the integration of phytotherapy and other ICPs in the PHC of the UHS, mapping barriers and facilitators, and to analyze the role of the pharmacist in the safety, effectiveness, and organization of care, including the implementation and governance of services. Specifically, to identify gaps in training, protocols, and infrastructure, and to gather applicable strategies to qualify the rational use, pharmacovigilance and monitoring of clinical and humanis.

Methods

A narrative literature review was conducted on the integration of phytotherapy and other Integrative and Complementary Practices (ICPs) in the Primary Health Care (PHC) of the UHS, covering the period 2010-2025 (last search: 09/26/2025). The consulted sources included SciELO, PubMed/MEDLINE, and LILACS/BVS, as well as official documents from the Ministry of Health/NPICP. The strategy combined DeCS/MeSH terms and synonyms for phytotherapy/Phytotherapy, integrative and complementary practices/Integrative Medicine, Primary Health Care/Primary Health Care, pharmacist/Pharmacists - linked by AND/OR and truncations (e.g., farmacêutic*, phytotherap*).
Regarding eligibility criteria, empirical studies (quantitative, qualitative, or mixed), reviews and guidelines, and normative documents relevant to the UHS were included, in Portuguese, English, and Spanish, that addressed PHC and the role of the pharmacist in the implementation, organization, or evaluation of ICPs (with an emphasis on phytotherapy). Exclusion criteria were: editorials/letters/opinions without data, duplicates, and studies outside the PHC/UHS context or exclusively hospital/private settings.
The selection occurred in two stages (title-abstract and full text), by two independent reviewers, with consensus to resolve disagreements. Data extraction included: study type, setting/level of care, ICP/intervention, scope of pharmaceutical practice, clinical, humanistic, and organizational outcomes, barriers/facilitators,

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instruments/protocols, and recommendations. The synthesis was narrative, with thematic analysis along three axes—advances, challenges, and perspectives—organizing sub-themes such as training, standardization/quality of supplies, pharmacovigilance and rational use, governance/implementation, and outcome monitoring. As this is a narrative review, there was no formal assessment of the risk of bias; the evidence was critically interpreted for its design, relevance and applicability to the PHC of the UHS.

Results

The narrative review convergently identified normative expansion and institutional arrangements alongside persistent obstacles to integrating phytotherapy and other ICPs in PHC. A progressive consolidation of the policy was observed, with the institution of the NPICP and expansions that raised the scope to 29 modalities, which constitutes a favorable regulatory environment for its provision in the primary care network (4-5). Among the structuring facilitators, NLMPI stands out, which guides the chain of care by listing species of interest to the UHS, and the "Living Pharmacy", which organizes the stages of cultivation, preparation, dispensing, and quality control within the territory, serving as an operational reference for municipal services and regional consortiums (6-7).
In contrast, training gaps remain in undergraduate and continuing education, with low inclusion of content on ICPs/phytotherapy and, consequently, less professional preparedness and engagement for incorporation into daily care (1-2). From an organizational point of view, the literature describes specific underfunding, irregular training, insufficient supplies, and heterogeneous workflows/protocols among municipalities, which makes it difficult to standardize processes and ensure continuity of care, especially in contexts of staff turnover and centralized purchasing (1). There is also unequal clinical evidence for certain interventions, with a scarcity of robust trials and real-world effectiveness studies to support coverage and use decisions in PHC, a scenario associated with limited funding and skepticism from some of the healthcare teams (2). On a sociocultural level, resistance persists, as well as incorrect use/self-medication and underreporting of adverse events, reinforcing the need for qualified information and pharmacovigilance routines integrated into primary care systems (1-2).
Recurrently, studies and regulations describe the pharmacist's role in the selection and standardization of s

Discussion

The review identified normative expansion and institutional arrangements favorable to integrating phytotherapy and other ICPs in PHC, but also persistent obstacles. Policy consolidation was observed with the institution of the NPICP and its expansion to 29 modalities, creating a favorable regulatory environment in primary care (4-5). Among the facilitators, the NLMPI stands out for listing species of interest to the UHS, and the "Living Pharmacy" for organizing everything from cultivation to quality control, serving as an operational reference for municipalities (6-7).

In contrast, training gaps persist (in both undergraduate and continuing education), with low inclusion of the topic, resulting in less professional preparedness and engagement for its incorporation into care (1-2). Organizationally, the literature describes underfunding, irregular training, insufficient supplies, and heterogeneous workflows, which hinder standardization and continuity of care, especially with staff turnover (1). Clinical evidence is also unequal, with a scarcity of robust studies to support its use in PHC, a scenario associated with limited funding and skepticism from health teams (2). On a sociocultural level, there is resistance, incorrect use, and underreporting

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of adverse events, reinforcing the need for qualified information and pharmacovigilance (1-2).

Recurrently, studies and regulations describe the pharmacist's central role in selecting supplies, implementing services, health education, and monitoring outcomes—functions essential for integrating ICPs into the public network (1,7).

Keywords

Phytotherapy; Primary care; Pharmacist; ICP.

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Impact Of The Antimicrobial Stewardship Program On The Use Of Reserve Antimicrobials In A University Hospital

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Introduction

Antimicrobial resistance has become one of the main challenges of our time, directly impacting the effectiveness of treatments and increasing mortality rates associated with infections (1). Given this worrying scenario, Antimicrobial Stewardship Programs (ASPs) have emerged as fundamental strategies for promoting the rational and safe use of these drugs, with a focus on therapeutic efficacy, patient safety, and resistance prevention (2). In this context, joint action between the Hospital Infection Control Service (HICS) and the pharmacy team is essential for the success of these initiatives, allowing a multidisciplinary approach to the analysis, prescription,

and monitoring of antimicrobial use. This integration strengthens surveillance, optimizes institutional protocols, and directly contributes to the reduction of multidrug-resistant bacterial infections (3).

Aim

To analyze the appropriateness of the use of reserve antimicrobials through the implementation of the ASPs in a university hospitalTo analyze the appropriateness of the use of reserve antimicrobials through the implementation of the PGA in a university hospital.

Methods

This is an observational, retrospective study conducted in the medical and surgical wards of a teaching university hospital in Ceará. In July 2025, the institution's Antimicrobial Stewardship Programs (ASPs) was restructured, with the implementation of medical consultation requests in the computerized system, in partnership with the Hospital Infection Control Service (HICS), which began to issue opinions on the use of reserve antimicrobials in response to the consultation request. The data were extracted from an Excel spreadsheet, prepared by the pharmacist responsible for the program, covering information for the months of June, July, and August 2025. A comparison was made between these two months to analyze the following variables: number of reserve antimicrobials prescribed, number of prescriptions with consultations requested, number of treatments with a defined duration after the consultation response and those without a definition, number of treatments that exceeded the established duration, those that were conducted according to the expected duration, and cases in which the HICS response did not define the treatment duration. It is worth noting that June was the adaptation phase to the new process, which was officially implemented in July. The analysis aims to contribute to the promotion of the rational use of these drugs. This study has been approved by the Research Ethics Committee under opinion number 7.694.041.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

In July, the month in which the consultation request policy was implemented, a total of 80 reserve antimicrobials (ATMR) were identified, of which 85% (N=68) had requested consultations, and among these, 16.18% (N=11) established the expected treatment time. Comparatively, in August, 89 ATMR were prescribed, and the number of consultations performed was 95.50% (N=85), among which 82.35% (N=70) defined the treatment duration. In addition, it was observed that in August, 82.35% (N=70) completed treatment within the established time frame, while 17.64% (N=15) exceeded the expected treatment time. However, in July, only 36.36% (N=4) were within the defined time frame, while the remaining 27.27% (N=3) exceeded the therapy time. It is worth noting that in June, the initial phase, only requests from consultants were analyzed, totaling 8 consultations, and the amount of treatment with a defined time was not collected. During this period, 18 ATMR were prescribed, and the percentage of requests was 44.44% (n=8).

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Discussion

Based on the above, it can be seen that one month after the restructuring of the PGA, there was an increase in the number of medical consultations requested, as well as the issuance of an opinion by the HICS, evidencing progress during implementation. These findings are consistent with national and international literature on the program. Interventions led by multidisciplinary teams, especially those involving pharmacists and infectious disease specialists, have demonstrated a positive impact (4). This process contributes to the analysis of the initiated antimicrobial therapy by the HICS in order to guide and ensure that the selected treatment is appropriate for the patient, considering the patient's clinical condition, hospital microbiota, and available antimicrobials. In this sense, the literature already demonstrates that the ASPs significantly reduces the inappropriate use of antimicrobials, mainly in the identification of incorrect prescriptions, increasing patient safety and reducing healthcare costs (5). Furthermore, as the new workflow has been consolidated, treatment time has been established more frequently, which has favored more efficient and optimized management. This has allowed for more precise control of the duration of therapy, contributing to the rational and safe use of anti-infective agents and positively impacting both clinical and economic outcomes.

Keywords

Anti-Infective Agents; Antimicrobial Stewardship

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"Tarja Preta": The Impact Of Interdisciplinary Extension On The Demystification Of Psychotropic Drugs And On Mental Health Care In The University Setting"

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Introduction

The progressive increase in mental health diagnoses reflects the contemporary lifestyle, characterized by high professional and academic demands and, often, by the neglect of self-care. In this context, psychopharmaceuticals (psychotropic drugs) have established themselves as a crucial therapeutic class, acting on the central nervous system to modulate mood, perception, and cognition in the treatment of disorders such as

anxiety, depression, and insomnia. However, their growing use is accompanied by challenges such as self-medication, drug dependence, and the spread of misinformation.
In response to this issue, the extension project "Tarja Preta – Informative and Strategic Actions for the Appropriate Use of Psychopharmaceuticals", developed at the Federal University of Paraíba (UFPB), was created to promote health education. The project aims to demystify the subject, discuss the rational use of medicines, combat prejudice, and address drug interactions, thus establishing a clear and accessible bridge between academic knowledge and social needs.

Aim

To report the experience of implementing the extension project "Tarja Preta" and to analyze the impact of its informative and strategic actions on raising awareness among the target audience regarding the appropriate use of psychopharmaceuticals, as well as on the promotion of mental health and self-care.

Methods

This is an Extension Experience Report from the Federal University of Paraíba (UFPB), carried out by an interdisciplinary team of students from the Medicine, Psychology, and Pharmacy programs, under faculty coordination. The primary target audience consisted of university students, a group particularly vulnerable to academic overload and the misuse of psychopharmaceuticals.
The methodology was structured in two main approaches:
Virtual Actions: Creation and management of the Instagram profile @tarjapretaufpb, used to disseminate informative posts, live sessions, and easily understandable stories, focusing on demystification and encouraging access to verified information.
In-person Actions: Organization of discussion circles, group dynamics, and interventions during freshman welcoming events (e.g., in Biomedicine and Occupational Therapy). These activities aimed at fostering support, exchanging experiences, and promoting open dialogue on mental health in the university context, highlighting the importance of self-care.
Additional pedagogical tools included the development of an educational booklet (digital and printed), addressing topics ranging from the concept of mental health and related disorders to medication storage and disposal, and pharmaceutical assistance within the Unified Health System (SUS). All activities were preceded by internal meetings and training sessions to ensure technical quality and an ethical approach to the subject.

Results

The "Tarja Preta" project achieved significant results both for the target audience and for the training of the extension team. In the social sphere, the virtual presence provided a constant channel of reliable information, actively combating misinformation. The discussion circles and group dynamics, in turn, created safe spaces for support within the university, essential for new students, encouraging the pursuit of professional help and self-care. The educational booklet served as an accessible and widely distributed material, ensuring the continuity of knowledge beyond the moments of direct intervention.
In the formative dimension, the project fostered the professional and civic development of the students by exposing them to complex and often neglected social realities. The interdisciplinary composition of the team

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(Medicine, Psychology, and Pharmacy) promoted a comprehensive and humanized view of mental health and the use of psychopharmaceuticals. The extension students developed critical thinking, communication skills, and pedagogical abilities to act as transformative agents and multipliers of accurate information within their communities, ensuring the perpetuation of the project's teachings beyond its duration.

Discussion

The results of the project demonstrate the impact of university extension as an effective mechanism for health education. The success in demystifying the topic and promoting the rational use of psychopharmaceuticals is directly linked to the integrated and accessible approach, which employed multiple channels (virtual and in-person) and active methodologies (discussion circles, group dynamics, and educational materials). By acting as facilitators rather than mere transmitters of knowledge, the extension team was able to break down barriers of prejudice and stigma associated with mental health and the use of controlled medication.
The experience highlights that technical information, when translated into accessible language, becomes a powerful tool for preventing self-medication and misuse. The project not only achieved its awareness-raising goals but also played a vital role in supporting university students, recognizing mental health as a determining factor for academic success. The team's interdisciplinarity was a distinctive element, enriching the discussion with clinical, psychotherapeutic, and pharmaceutical perspectives. It can be concluded that "Tarja Preta" represents a successful model of critical and conscious education on psychopharmaceuticals, transforming both the target audience and the future health professionals involved.

Keywords

psychotropic drugs; mental health care;

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Epidemiological Profile Of Viral Hepatitis In Paraíba: Analysis Of Cases And Deaths (2000–2023)

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Introduction

Viral hepatitis constitutes a major public health problem in Brazil, exhibiting a distinct epidemiological profile across regions (1). In the state of Paraíba, data from the Notifiable Diseases Information System (SINAN) and the Mortality Information System (SIM) allow for the analysis of the magnitude, temporal distribution, and associated mortality of Hepatitis A, B, C, and D between 2000 and 2023 (1, 2). Historically, Hepatitis A was linked to poor sanitary conditions and high incidence in children but showed a significant reduction in the last decade, possibly associated with improvements in sanitation and vaccination (3). Hepatitis B and C remain relevant, with variations

by sex and year of diagnosis, with Hepatitis C being the principal cause of deaths among the types analyzed. Hepatitis D, although rare, requires surveillance associated with Hepatitis B. Characterizing the epidemiology of hepatitis is essential for informing public policies, health planning, and prevention and treatment strategies aimed at vulnerable populations (4).

Aim

To describe the epidemiological distribution of cases and deaths from viral hepatitis in Paraíba, between 2000 and 2023, considering the type of hepatitis, sex, year of diagnosis, and associated mortality, using official data from SINAN and SIM.

Methods

This was a descriptive study based on secondary data from SINAN and SIM, covering viral hepatitis notifications up to December 2023. Total cases and incidence/detection rates per 100,000 inhabitants were analyzed, disaggregated by hepatitis type (A, B, C, D), sex, and year of diagnosis. Deaths were evaluated by underlying cause up to 2022, considering preliminary data from 2023. The analysis included the temporal distribution of cases, the comparison between sexes, and the calculation of case fatality rate for each type of hepatitis. Study limitations include underreporting, inconsistencies in records, and recent preliminary data.
As this study is based on the analysis of public domain secondary data, submission to an ethics committee was not required, in compliance with CNS Resolution No. 674/2022.

Results

Between 2000 and 2023, Paraíba registered a total of 783,725 viral hepatitis cases: Hepatitis A (171,255), Hepatitis B (289,029), Hepatitis C (318,916), and Hepatitis D (4,525). Hepatitis A showed a sharp decline from 2013, with only 63 cases in 2023. Hepatitis B peaked in 2018 (119 cases), with higher detection among males. Hepatitis C was the most frequent in 2023 (1,785 cases) and had the highest lethality, with 240 deaths registered. Hepatitis D maintained a low incidence (16 cases). The death analysis highlighted the predominance of Hepatitis C, reflecting late diagnosis and high morbidity and mortality (5).

Discussion

The significant reduction in Hepatitis A reflects possible advancements in sanitation, health education, and vaccination coverage. The persistence of Hepatitis B and C indicates active transmission, with predominance in men, possibly associated with risk behaviors, including sexual practices and injectable drug use (6). The high mortality of Hepatitis C suggests late diagnosis, insufficient screening, and barriers to treatment access, reinforcing the need for integrated strategies in primary health care. Hepatitis D, although rare, requires continuous surveillance and Hepatitis B vaccination as an indirect preventive measure (7). Study limitations include underreporting, preliminary data from 2023, and possible inconsistencies in records. It is recommended to strengthen testing and early diagnosis programs, expand Hepatitis B vaccination coverage, implement prevention strategies targeting vulnerable groups, and intensify health education actions focused on the male

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population. These data are fundamental for formulating public policies and planning preventive and therapeutic strategies in the state of Paraíba (5, 6, 7, 8).

Keywords

Viral; Vaccination; Incidence; Lethality

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Mortality From Viral Hepatitis In Paraíba: A 22-Year Analysis (2000-2022)

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Introduction

Mortality due to viral hepatitis represents an important indicator of the disease burden on public health, reflecting both incidence and the effectiveness of diagnosis, treatment, and care strategies (1). While Hepatitis A generally has low lethality, Hepatitis B and C can progress to chronic forms, cirrhosis, and hepatocellular carcinoma, becoming significant causes of death. Analyzing the viral hepatitis mortality pattern in Paraíba is crucial for assessing the impact of these diseases and guiding health policies. This study describes deaths where viral hepatitis was the underlying cause in the state between 2000 and 2022 (2, 3).

Aim

To describe the mortality from viral hepatitis as the underlying cause in Paraíba, by hepatitis type, and to analyze its temporal trend in the period from 2000 to 2022.

Methods

This was a descriptive study based on secondary data from the Mortality Information System (SIM). All deaths due to viral hepatitis (underlying cause) registered in Paraíba between 2000 and 2022, updated in May 2024, were analyzed. The data were disaggregated by hepatitis type (A, B, C, D) and year of death. The analysis consisted of describing the frequency of total deaths by type and evaluating the temporal trend throughout the historical series, using descriptive statistics. As this study involves the analysis of public domain secondary data, submission to an ethics committee was not required, in compliance with CNS Resolution No. 674/2022.

Results

In the 2000–2022 period, 336 deaths from viral hepatitis as the underlying cause were registered in Paraíba. Hepatitis C was the leading cause of death, with 240 deaths (71.4%), followed by Hepatitis B (76 deaths; 22.6%), Hepatitis A (18 deaths; 5.4%), and Hepatitis D (2 deaths; 0.6%). Hepatitis A recorded only 1 death in 2022. Hepatitis B peaked with 5 deaths in 2021. Hepatitis C showed an increasing trend in the number of deaths from 2019, reaching 26 deaths in 2022. The 2 Hepatitis D deaths occurred before 2012.

Discussion

Hepatitis C has been established as the most lethal form of viral hepatitis in Paraíba, accounting for over 70% of deaths during the period. The increase in Hepatitis C deaths from 2019 onward is a concerning finding and may be related to late diagnosis, limitations in access to treatment with direct-acting antivirals, or the disease's progression in individuals infected decades ago (4). The availability of highly effective treatment makes these deaths largely preventable, highlighting failures in the continuum of care. Hepatitis B mortality, although lower, remains relevant and reinforces the need to expand vaccination and early diagnosis. The few deaths from Hepatitis A are consistent with the self-limiting profile of the disease in most cases, and the isolated death in 2022 may represent a rare fulminant form (4, 5). The absence of Hepatitis D deaths after 2012 is a positive indicator of the control of Hepatitis B, upon which the delta virus depends. Study limitations include possible inconsistencies in the declaration of the underlying cause and delays in the consolidation of mortality data (4). To reverse the observed scenario, it is fundamental to strengthen the early detection of Hepatitis B and C, ensure universal and timely access to treatment, especially for Hepatitis C, and invest in the integration of primary care with the specialized network (5, 6, 7).

Keywords

Temporal; Chronicity; Prevention; Population

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Impact Of Public Policies On The Epidemiology Of Hiv/Aids In Paraíba: A Two-Decade Analysis (2000-2024)

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Introduction

The HIV/AIDS epidemic in Brazil has undergone significant transformations in its epidemiological profile, influenced by public policies implemented over the past decades (1, 2). In Paraíba, an integrated analysis of surveillance data allows for the evaluation of the impact of these strategies on the epidemic's behavior. This study analyzes the evolution of AIDS cases in the state between 2000 and 2024, relating changes in the epidemiological profile to key national and state policies for confronting the epidemic. These policies include the expansion of antiretroviral treatment access, combined prevention strategies, and harm reduction policies (3, 4).

Aim

To analyze the evolution of AIDS cases in Paraíba from 2000 to 2024 and its relationship with the public policies for confronting the epidemic implemented during the period.

Methods

This was a descriptive study based on documentary analysis and secondary data review from the Notifiable Diseases Information System (SINAN), the Mortality Information System (SIM), and SISCEL/SICLOM. Official documents from the Ministry of Health and the Paraíba State Health Secretariat regarding HIV/AIDS policies from 2000 to 2024 were analyzed. The analysis consisted of describing the temporal coincidence between the implementation of specific policies and the changes in the epidemiological profile of AIDS in the state, focusing on temporal trends, distribution by sex, exposure category, and vertical transmission indicators. As this study involves the analysis of public domain secondary data, it did not require submission to an ethics committee, in compliance with CNS Resolution No. 674/2022.

Results

A total of 12,131 AIDS cases were registered in Paraíba during the period, with significant changes in the epidemiological profile. A progressive increase was observed in the male-to-female sex ratio (1.9 in 2013 to 2.6 in 2023), indicating a greater concentration of the epidemic among men. Analysis by exposure category showed a predominance of MSM (Men who have Sex with Men) (30.7% of the total) and heterosexuals (38.4%). The detection rate in pregnant women increased from 1.6 to 2.4 per 1,000 live births between 2013 and 2023. AIDS-related deaths remained stable (161 in 2023), while the standardized mortality rate decreased from 3.5 to 3.2 per 100,000 inhabitants during the same period. The distribution by race/color showed a predominance of Brown individuals (61.3%), with a progressive increase in this proportion over the years.

Discussion

The data reveal the complex evolution of the AIDS epidemic in Paraíba, with significant changes influenced by public policies (3). The increase in the sex ratio reflects the feminization of the epidemic in previous decades and its subsequent re-concentration in male populations, possibly related to the greater effectiveness of prevention strategies among women. The sustained number of cases among MSM and heterosexuals indicates the need to refine combined prevention strategies in these populations. The rise in the detection rate among pregnant women may represent both the expansion of prenatal testing and the persistence of challenges in preventing vertical transmission (5, 6, 7). The stabilization of deaths, associated with the reduction in the standardized mortality rate, suggests a positive impact from the expansion of access to antiretroviral treatment (8). The predominance of cases among Brown individuals reflects the state's demographic profile but may also indicate inequalities in access to preventive measures. Limitations include the ecological nature of the analysis and the inherent underreporting in information systems. We recommend strengthening specific policies for key populations, intensifying combined prevention efforts, and ensuring the continuity of care for people living with HIV/AIDS (9).

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Keywords

Prevention; Sex; Exposure; Pregnant Women

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Socioeconomic Vulnerability And Epidemiological Profile Of Hiv/Aids In Paraíba: An Intersectional Analysis (2000-2024)

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Introduction

The HIV/AIDS epidemic in Brazil is deeply associated with social determinants of health, reflecting structural inequalities that influence both vulnerability to infection and access to prevention and treatment services (1, 2). In Paraíba, a state marked by significant socioeconomic disparities, an integrated analysis of epidemiological indicators and social variables can reveal populations in situations of greater vulnerability. This study investigates the intersections among race/color, educational attainment, exposure category, and the temporal evolution of AIDS cases in the state, proposing a critical analysis of the social factors shaping the epidemic (3, 4).

Aim

To analyze the relationship between socioeconomic conditions and the epidemiological profile of AIDS cases in Paraíba from 2000 to 2024, focusing on race/color, educational attainment, and exposure category.

Methods

This was a descriptive study based on secondary data analysis from the Notifiable Diseases Information System (SINAN) and correlated systems. We analyzed 12,131 AIDS cases reported in Paraíba between 2000 and 2024, focusing on the variables: race/color, educational attainment, exposure category, and temporal evolution. Descriptive statistical analysis and temporal trend analysis were used. Data interpretation considered the theoretical framework of the social determination of health and intersectionality, contextualizing the findings with state socioeconomic indicators. As this study involves the analysis of public domain secondary data, it did not require submission to an ethics committee, in compliance with CNS Resolution No. 674/2022.

Results

The analysis revealed that 61.3% of AIDS cases occurred among Black and Brown individuals, a group that accounts for approximately 62% of the Paraíba population. Regarding educational attainment, 35.3% of cases had incomplete elementary education, while only 8.6% had completed higher education. The temporal analysis showed a progressive increase in the proportion of cases among MSM (Men who have Sex with Men) (30.7% of the total) and a relative reduction among heterosexuals (38.4%). The detection rate in pregnant women increased from 1.6 to 2.4 per 1,000 live births between 2013 and 2023. The male-to-female sex ratio increased from 1.9 to 2.6 during the same period, indicating a greater concentration of the epidemic among men.

Discussion

The findings reveal marked social inequities in the AIDS epidemic in Paraíba. The overrepresentation of Black and Brown individuals among cases reflects historical inequalities in access to fundamental rights, including health education and prevention services (5). The predominance of low educational attainment among cases underscores the close relationship between educational precariousness and vulnerability to HIV. The increased concentration of the epidemic among MSM may indicate both greater structural vulnerability for this population and potentially greater effectiveness of prevention strategies among heterosexuals (6). The rise in the detection rate in pregnant women suggests improvements in prenatal testing but also persistent challenges in primary prevention among women of reproductive age. Limitations include underreporting and variable quality in the completion of notification forms. We recommend the implementation of intersectoral policies that address the social determinants of HIV, with specific actions for vulnerable populations, strengthening health education in schools, and ensuring universal access to combined prevention and treatment (7,8).

Keywords

Epidemic; Inequality; Educational Attainment; Race

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The Challenge Of Polypharmacy In The Ageing Population: Contributions Of Pharmaceutical Care To Therapeutic Response

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Introduction

Population ageing is accompanied by an increase in chronic diseases, a result of longer life expectancy and changes in the country's epidemiological profile. With advancing age, there is a greater prevalence of chronic non-communicable diseases, such as hypertension, diabetes mellitus, cardiovascular, osteoarticular and respiratory diseases, which require continuous monitoring, medical consultations and often prolonged use of medication to control symptoms and prevent complications [1]. This set of factors increases the complexity of health care, since the elderly have physiological changes typical of ageing that modify the absorption, distribution and elimination of

drugs, making them more vulnerable to adverse effects and drug interactions. In this scenario, polypharmacy, defined as the concomitant use of five or more medicines, is common [2]. Although it is often unavoidable for the treatment of multiple chronic conditions, polypharmacy is associated with adverse reactions, drug interactions, dosage errors, falls, hospitalisations and even mortality, as well as increasing costs for the healthcare system [2,3]. The challenge lies not only in the number of drugs prescribed, but also in correct adherence, storage, therapeutic duplication and lack of regular monitoring. Faced with these issues, the role of the clinical pharmacist is fundamental in promoting the safe and rational use of medicines. This professional periodically reviews prescriptions, assesses potential interactions, identifies potentially inappropriate medicines, advises patients, family members and carers on the correct form of administration and participates in multi-professional decisions, including safe prescription processes [4]. Their inclusion in health services reduces adverse events, improves therapeutic adherence and optimises clinical results, favouring the quality of life of the elderly.

Aim

To analyse the relevance of pharmacists' role in managing polypharmacy in the elderly, highlighting their contributions to the safe use of medicines and improving quality of life.

Methods

This is a narrative review with a qualitative and descriptive approach. The research was carried out in the following stages: 1) formulation of the guiding question; 2) search for scientific articles in reliable and comprehensive databases; 3) selection of articles; 4) evaluation of the selected articles; 5) discussion of the results. The study's guiding question was: How does the pharmacist's work contribute to safety in the use of medicines and to the quality of life of elderly people with polypharmacy? Original articles were selected from the Virtual Health Library and searched using the SciELO and Medline databases, using the descriptors: "Polypharmacy", "Health of the Elderly" and "Pharmaceutical Assistance". The inclusion criteria were studies in Portuguese and English, published in the last 5 years (2020-2025), which addressed the topic. Studies that were not fully available were excluded. The selection process consisted of a thorough analysis of the abstracts to check eligibility according to the guiding question.

Results

26 articles were identified and, after applying the inclusion and exclusion criteria, 9 were analysed in this review. The studies show that polypharmacy is increasingly common in the elderly, due to ageing and the high prevalence of chronic diseases. Age-related physiological changes increase vulnerability to adverse reactions and drug interactions, making pharmaceutical monitoring essential to ensure adherence, review of prescriptions and rational use of medicines [5]. Elderly people with metabolic diseases such as hypertension, diabetes and dyslipidaemia are among the most affected. It is estimated that 70% use continuous treatment and many use four or more drugs, increasing therapeutic risks. In this context, pharmaceutical care acts to review pharmacotherapy, provide health education and prevent complications [6]. The literature also points to the vulnerability of the elderly to self-medication and incorrect use of drugs, due to errors in doses, schemes and schedules. By monitoring pharmacotherapy, pharmacists minimise these risks, offering individualised support that promotes safety and correct adherence to treatment. This practice strengthens quality of life and prevents complications that could

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result in hospitalisation [7]. In the community setting, pharmaceutical care stands out as an accessible service, guaranteeing guidance, adherence, therapeutic safety and a reduction in the morbidity and mortality associated with the inappropriate use of medicines [8]. The findings reinforce that polypharmacy can be classified into degrees, varying according to the number of medicines. Although necessary, without monitoring it can cause intoxications, interactions and adverse reactions. The pharmacist, as part of the multi-professional team, plays an essential role in monitoring, promoting drug reconciliation and de-prescribing strategies when indicated [9]. Thus, their work is essential to ensure safety and quality of life for the elderly.

Discussion

Polypharmacy in the elderly is one of the main challenges in geriatric care because, although it is often necessary for the management of chronic conditions, it is strongly associated with negative outcomes such as adverse reactions, drug interactions, hospitalisations and higher mortality [1-3], which reinforces the need for strategies aimed at the rational use of medicines and the continuous monitoring of this population [4]. Although the simultaneous use of multiple medicines is often unavoidable, this practice carries significant risks, jeopardising patient safety and the sustainability of the health system [2,4]. In this scenario, pharmaceutical care plays a fundamental role in promoting the rational use of medicines, reviewing prescriptions, identifying therapeutic duplicates and guiding patients, family members and carers on the correct administration of drugs [5,7]. The clinical monitoring carried out by pharmacists enables interventions that reduce dosage errors, avoid intoxication and improve therapeutic adherence, which has a direct impact on the quality of life and autonomy of the elderly [6,8]. Furthermore, in the community setting, the pharmacist's accessible presence favours the fight against self-medication, the continuous monitoring of pharmacotherapy and the implementation of de-prescription strategies when necessary [3,9]. These actions are particularly relevant in highly prevalent chronic diseases such as hypertension, diabetes and dyslipidaemia, in which polypharmacy is recurrent and the optimisation of clinical results depends on multi-professional monitoring [6,7]. It is therefore clear that pharmaceutical care is an indispensable resource for preventing adverse events and promoting therapeutic safety in polypharmacy elderly people. The expansion of public policies that value the inclusion of pharmacists at different levels of care, as well as the strengthening of patient-centred clinical practices, are essential measures to ensure healthier ageing and a better quality of life for this constantly growing population [1,2,9].

Keywords

Polymedication; Elderly health; Pharmaceutical care.

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Exogenous Poisonings In A Brazilian Emergency Hospital: Epidemiological Characterization And The Role Of The Pharmacist

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Introduction

Exogenous intoxications are health problems that arise from the interaction between the human body and external substances, such as beverages, food, medicines, drugs of abuse, pesticides, plants and other chemical products. These interactions may represent a health risk, as they lead to changes in the normal functioning of the organism and can be aggravated depending on factors such as: type of toxicant, route of contact, quantity and duration of exposure (1).

In the global context, poisonings affect about 1.5% to 3% of the population, corresponding to approximately 4.8

million people in Brazil (2), the majority of which occur through the ingestion of medications, either accidentally or as a suicide attempt, reflecting the increase in indiscriminate use of medicines. In this context, the pharmacist can act in the dispensing of pharmaceuticals, providing guidance on their rational use, adverse reactions and the consequences of the abuse of such substances (3).

Aim

The present study aims to characterize the epidemiological profile of exogenous intoxications treated at an emergency hospital in the interior of Alagoas and correlate the role of the pharmacist in the prevention and management of this important public health issue.

Methods

This is an epidemiological study, with a descriptive and retrospective approach, carried out through data collection from the Notifiable Diseases Information System (SINAN) regarding exogenous intoxications treated at an emergency hospital in the interior of Alagoas, from the period of August 2024 to August 2025, which were requested from the hospital epidemiology sector. Statistical analyses were performed on the variables of age group, sex, toxic agent, route of exposure, type of contamination, need for hospitalization, outcome, and area of residence. Subsequently, lethality rates were determined using the formula: Lethality rate=(nº of deaths due to exogenous intoxication/ nº of exogenous intoxications) × 100.
Ethics: Submission to the research ethics committee was not necessary, as this is an epidemiological study using secondary data from public domain sources.

Results

In the period from August 2024 to August 2025, 1274 cases of exogenous intoxications were reported, of which were recorded among patients: under 1 year of age = 21 cases (1.65%), from 1 to 4 years = 158 (12.40%), from 5 to 9 years = 44 (3.45%), from 10 to 14 years = 79 (6.20%), from 15 to 19 years = 196 (15.38%), from 20 to 29 years = 329 (25.82%), from 30 to 39 years = 200 (15.70%), from 40 to 49 years = 140 (10.98%), from 50 to 59 years = 49 (3.85%), from 60 to 69 years = 35 (2.75%), from 70 to 79 years = 12 (0.94%), above 80 years = 11 (0.86%).
Regarding stratification by sex: female = 809 (63.50%) and male = 465 (36.49%). In 83 cases (6.51%) there was a need for hospitalization, while 1243 (97.56%) patients recovered without sequelae and 10 (0.78%) died due to intoxication.
Regarding the area of residence of the victims: urban = 795 (62.40%), rural = 434 (34.06%), peri-urban = 7 (0.54%), unknown information = 38 (2.98%). Among the main agents causing intoxications: medications = 845 (66.32%), household products = 79 (6.20%), rodenticides = 49 (3.84%), agricultural pesticides = 47 (3.68%), food and beverages = 50 (3.32%), drugs of abuse = 24 (1.88%), other toxicants and missing information = 180 (14.12%).
The most common routes of exposure were: oral = 1138 (89.32%), respiratory = 67 (5.25%), cutaneous = 28 (2.19%), ocular = 4 (0.31%), other routes or missing information = 37 (2.90%). Regarding the most frequent contamination circumstances: suicide attempt = 756 (59.34%), accidental = 261 (20.48%), environmental = 39 (3.06%), abuse = 37 (2.90%), therapeutic use = 26 (2.04%), other circumstances and missing information = 155 (12.16%).

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Discussion

It is observed that female individuals represent the majority of exogenous intoxication cases (63.50%), characterizing a significant prevalence, which may be related to the fact that women choose less violent methods when it comes to suicide attempts, with drug and medication ingestion being more frequent, while men use more lethal methods, such as hanging and firearms (4).

In addition, there is consistency regarding the main agents causing intoxications, the routes of exposure and the circumstances of contamination. Medications account for 66.32% of cases, oral route 89.32%, and suicide attempts 59.34%, respectively.

It is also noted that in the children's age range of 1 to 4 years, there is a higher number of cases (12.40%) when compared to other childhood age groups. This is an age group that is commonly exposed to accidental intoxications with household and chemical products and medication errors, which requires greater attention from legal guardians (5). In this context, it is observed that the main cause of exogenous intoxications, after medications, is the ingestion of household products, accounting for 6.20% of cases.

In general, the age group with the highest prevalence of cases is 20 to 29 years, equivalent to 25.82%, which correlates with previous studies that identify the 20 to 30 year age group as the most prevalent for suicide attempts (4). When analyzing internal data from the hospital in Alagoas, it is found that the highest percentage of cases are in the 15 to 39 year age group, corresponding to 57.32%, and, to some extent, the population’s easy access to medications and self-medication contributes to the increase in exogenous intoxication cases (3).

Thus, it is possible to characterize the epidemiological profile of exogenous intoxications in a hospital in the interior of Alagoas, which broadly resembles national poisoning data in terms of age and sex distribution; however, it is also possible to perceive local particularities and allow for direction toward future research, such as which medications and chemical and pharmaceutical products are frequently used and which populations require significant interventions.

Keywords

Exogenous poisoning; Epidemiology; Pharmacist; Drugs.

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Pharmaceutical Care In The Follow-Up Of Patients After Acute Myocardial Infarction: Contributions To Adherence And Therapeutic Safety

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Introduction

Cardiovascular diseases remain the leading cause of global mortality, with Acute Myocardial Infarction (AMI) being among the most prevalent manifestations with the greatest impact on morbidity and mortality (1). AMI is characterized by necrosis of part of the cardiac muscle due to ischemia from coronary artery obstruction, presenting with symptoms such as angina, diaphoresis, dyspnea, and nausea (2). Most cases are associated with recent thrombosis following rupture of atherosclerotic plaques and can be classified as ST-elevation myocardial infarction (STEMI), with complete coronary obstruction, high risk of death, and requiring immediate intervention; or non-ST-elevation myocardial infarction (NSTEMI), with partial obstruction, also requiring rapid treatment, though with relatively lower risk (2,3,4). Coronary reperfusion, via angioplasty or thrombolytic therapy, is the treatment of

choice, with early initiation crucial to preserve viable myocardium and reduce AMI-related mortality (2,5,6,7).

Given the severity of AMI and the need for follow-up, the pharmacist plays a key role. As part of the multidisciplinary team, the pharmacist contributes to prevention and post-AMI care, providing health education and ensuring adherence and treatment safety (1). Their responsibilities include medication reconciliation during care transitions, early identification of drug interactions and duplications, and promoting rational medicine use. Through systematic follow-up, pharmacists can prevent polypharmacy complications, reduce hospital readmissions, and support long-term adherence to therapies such as antiplatelets, beta-blockers, among others, essential to reduce post-AMI morbidity and mortality. Thus, their contribution extends beyond guidance, consolidating pharmaceutical care as a strategic component in care continuity and improved clinical outcomes.

Aim

To conduct a narrative literature review on acute myocardial infarction, gathering evidence on its pathophysiological mechanisms, risk factors, diagnosis, and therapeutic approaches, with emphasis on the contributions of pharmaceutical care to prevention and post-infarction follow-up, highlighting its relevance for treatment adherence, medication safety, and multidisciplinary integration in healthcare.

Methods

This study is a narrative literature review on acute myocardial infarction (AMI), addressing pathophysiological mechanisms, risk factors, diagnosis, pharmacotherapy, non-pharmacological therapies, and the role of pharmaceutical care in patient follow-up. The literature search was performed in PubMed and SciELO databases, using the following descriptors in Portuguese: “Infarto Agudo do Miocárdio,” “Doenças Cardiovasculares,” “Assistência Farmacêutica,” “Educação em Saúde,” and “Tratamento Pós-IAM.” Preference was given to recent publications, from 2020 to 2023, to reflect the most up-to-date advances on the subject. As exceptions, two book chapters (2006) addressing fundamental concepts of pathophysiology and treatment were included, as well as a classical 1998 article on thrombolytic therapy, due to its historical relevance and impact on the evolution of AMI management. The selected materials were organized descriptively and analyzed for their scientific relevance to support the discussion.

Results

A total of ten articles and two book chapters published between 1998 and 2023 were included, addressing different dimensions of AMI. Some publications provided conceptual and pathophysiological aspects, essential for the definition and classification of the disease. Three studies focused on therapeutic strategies used in AMI management, while others analyzed specific populations such as young adults, the elderly, and women, highlighting clinical and prognostic variations. Other studies discussed post-infarction follow-up, emphasizing the importance of continuity of multidisciplinary care and physical exercise as an adjuvant strategy. One study described the implementation of the “Code Infarction” protocol in Mexican hospitals, highlighting the relevance of structured emergency care protocols. Only one publication explicitly emphasized the pharmacist’s role, particularly in the prevention of cardiovascular diseases and support for medication adherence, pointing to the scarcity of evidence on their specific role in AMI management.

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Discussion

The pharmacist is a professional trained to guide and solve problems related to medication use, working in an integrated manner with the multidisciplinary healthcare team (1). In the context of AMI, their contributions range from medication reconciliation — preventing duplications and interactions — to careful review of prescriptions, ensuring compatibility, dose, and appropriate posology, as well as individualized analysis of the risk-benefit ratio (1). Studies conducted in hospitals in Latin America and the Caribbean since 2000, which evaluated hospital mortality in STEMI and NSTEMI patients, emphasize the importance of maintaining updated databases to understand the epidemiology of AMI, including incidence, prevalence, risk factors, and clinical outcomes (8). Such information guides public policies, resource allocation, and supports more effective prevention and treatment strategies (8).

In this context, pharmaceutical care is consolidated as a fundamental component of post-AMI care, ensuring treatment continuity, adherence to pharmacotherapy, and rational and safe use of medicines (1,9). In addition to clarifying doubts and monitoring possible adverse drug reactions, the pharmacist refers patients to other healthcare professionals when necessary, ensuring greater therapeutic safety (1). Their role also extends to primary and secondary prevention, through clinical follow-up of patients with risk factors — such as hypertension, diabetes, obesity, and smoking — and of specific populations, such as the elderly, women, and young adults (1,7,10,11,12). By promoting health education, the pharmacist guides proper medication use, healthy lifestyle habits, and treatment adherence, directly contributing to the reduction of recurrent cardiovascular events and to better post-AMI clinical outcomes (1,9).
Despite its relevance, pharmaceutical clinical practice remains underexplored, even though it has the potential to enhance medication safety and efficacy, reduce therapeutic errors, decrease hospitalizations, and positively impact patients' quality of life. Therefore, it is imperative to recognize and value the pharmacist's contribution, strengthening their integration into healthcare (1).

Keywords

Myocardial Infarction. Cardiovascular Diseases. Pharmaceutical

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Interprofessional Collaboration In Primary Care: Contributions Of Pharmaceutical Practice To Patient Safety And Therapeutic Rationality In João Pessoa-(Pb)

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Introduction

Primary Health Care (PHC) in Brazil faces persistent challenges, such as fragmented care, irrational medicine use, iatrogenesis, and inequalities in access (1). In João Pessoa (PB), despite initiatives like the “Remédio em Casa” program, gaps remain in integrating pharmaceutical care into multiprofessional teams (2). The Specialized Pharmacy of Paraíba highlights the need for collaboration among pharmacists, physicians, and nurses to manage

complex cases, optimize rational medicine use, and improve outcomes (3). However, conflicts in resource allocation limit integrated practices (4).

Comprehensiveness, a principle of the Brazilian Unified Health System (SUS), requires interprofessional collaboration, as shared decisions enhance PHC problem-solving and patient safety (1–3). The National Primary Care Policy (PNAB, 2017) warns that fragmented care and medicalization increase risks of iatrogenesis, poor adherence, and therapeutic duplication (4).

In this context, pharmacists go beyond dispensing, performing therapeutic reconciliation, pharmacotherapy review, health education, clinical monitoring, and using technologies for real-time alerts (5,11). In João Pessoa, with high chronic disease prevalence (883,278 inhabitants in 2024), 28% of prescriptions show errors in antimicrobials, analgesics, and antihypertensives, such as incorrect doses and drug interactions (6,8). Integrating pharmacists into teams is essential to rationalize therapy, reduce iatrogenesis, enhance adherence, and improve monitoring, particularly with digital support (9,13).

Aim

To analyze local evidence and experiences regarding the integration of pharmacists into interprofessional PHC teams in João Pessoa (PB), identifying collaborative strategies that promote patient safety, rational pharmacotherapy, ongoing health education, monitoring of clinical and epidemiological indicators, reduction of prescribing errors, the use of supportive technologies, and the strengthening of comprehensive care.

Methods

An integrative literature review was conducted between January and June 2024 in the PubMed, Scopus, SciELO, and Google Scholar databases, using the descriptors: pharmaceutical care, pharmaceutical services, prescription errors, interprofessionality, clinical pharmacy, information technologies, and primary health care (9,14).

Original articles, reviews, and experience reports addressing the role of pharmacists in interprofessional PHC contexts were included, covering practices such as therapeutic reconciliation, health education, monitoring of clinical indicators, and the use of technologies for recording and alerting medication-related problems. Studies that restricted pharmaceutical practice solely to dispensing were excluded.

After an initial screening of 152 publications, 38 studies were selected and organized into five categories:

i) models of collaborative practice;
ii) impacts on patient safety and rational pharmacotherapy;
iii) health education and accessibility to pharmacotherapeutic follow-up;
iv) monitoring of clinical, epidemiological, and technological indicators;
v) local experiences, including the context of João Pessoa (1,14).

Secondary data from the Ministry of Health, IBGE, and the Municipal Health Secretariat of João Pessoa were also used for local contextualization, with emphasis on the programs Remédio em Casa, Specialized Pharmacy, prescription error rates, and therapeutic adherence indicators (4,8,13,15).

Results

The analysis showed that the integration of pharmacists into interprofessional teams is associated with a reduction in drug-related problems (DRPs), greater treatment adherence, and enhanced patient safety (6,7,9,10).

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National and international studies indicate that pharmaceutical interventions can reduce prescription errors by up to 35%, including inappropriate dosages, therapeutic duplication, omission of essential medicines, and drug interactions, particularly involving antimicrobials, analgesics, antihypertensives, and hypoglycemic agents (7,8,10,11,14,15).

In João Pessoa, data from the Municipal Health Secretariat showed that approximately 28% of prescriptions contained errors in 2023, mainly among patients with chronic diseases (8,12,16). Experiences in Family Health Units (USFs) indicated that pharmacist participation in therapeutic reconciliation, pharmacotherapy review, and health education increased treatment adherence and reduced failures in continuity of care, especially after hospital discharge (9,12,14,17).

The use of information technologies, such as electronic health records, drug interaction alert systems, and monitoring of clinical indicators, facilitated communication among professionals, enabling rapid prescription analysis, problem reporting, and longitudinal patient follow-up (13,16–19). Reports highlight concrete benefits: greater medication adherence in patients with hypertension and diabetes, improved control of clinical parameters, advances in health education and accessibility to pharmacotherapeutic follow-up, as well as reduced therapeutic duplication and iatrogenesis (12,15,18,20).

Nevertheless, barriers remain, such as the insufficient presence of full-time pharmacists in teams, the lack of well-defined clinical protocols, and the need for stronger institutional recognition of interprofessional practice (19,21).

Discussion

The findings confirm that interprofessional collaborative practice strengthens the comprehensiveness of PHC, enhances service resolvability, and contributes to therapeutic rationality, preventing iatrogenesis and resource waste (1,3,5). In João Pessoa, the high prevalence of chronic diseases and the elevated rates of incorrect prescriptions highlight the urgency of more integrated strategies.

The use of digital technologies and effective communication among professionals enables the early identification of DRPs, risk reduction, and timely adjustment of pharmacotherapy (8,10,13,16,22). The pharmacist plays a key role in therapeutic reconciliation, prescription review, health education, monitoring of clinical indicators, and integration with digital systems, ensuring longitudinal follow-up and strengthening the bond with patients (11,15,17,18,23).

From an economic perspective, pharmacist integration shows positive impacts by reducing avoidable hospitalizations, readmissions, and complications related to inappropriate medication use, thereby optimizing the allocation of public resources in cities such as João Pessoa (4,18,20,26,27).

Although structural barriers persist, such as the shortage of full-time pharmacists and the lack of clinical protocols, local and national experiences demonstrate that interprofessional strategies supported by digital technologies promote significant gains in safety, adherence, therapeutic rationality, and comprehensiveness of care (17,18,26,27).

Keywords

Patient Safety;Interprofessional;Primary Health Care;Clinical Pharmacy

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Pharmaceutical Interventions In The Management Of Hydroelectrolytic Disorders In Patients In A Coronary Icu

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Introduction

Hydroelectrolytic disturbances (HEDs) correspond to alterations in homeostasis resulting from imbalances in body fluids and electrolytes, which play vital roles such as pH maintenance, nerve conduction, muscle contraction, and osmotic balance [1]. The stability of these parameters is essential, as even small variations can trigger relevant clinical manifestations. Among the most common HEDs in hospitalized patients are hypokalemia ($K^+ < 3.5$ mEq/L) and hypomagnesemia ($Mg^{2+} < 1.5$ mEq/L), conditions associated with cardiovascular, neurological, and respiratory complications, as well as increased mortality [1,2]. In critically ill patients admitted

to Intensive Care Units (ICUs), the prevalence of HEDs is high, affecting 15% to 20% of hospitalized individuals [1]. These imbalances are related to the severity of underlying diseases and the use of medications that interfere with water and electrolyte homeostasis, such as diuretics, proton pump inhibitors, and nephrotoxic drugs [2]. Furthermore, conditions such as sepsis, renal failure, cirrhosis, and postoperative states are frequently accompanied by hyponatremia, hypokalemia, hyperkalemia, hypocalcemia, and hypophosphatemia [2]. The complexity of pharmacotherapy in critically ill patients increases the risk of adverse events. Prescriptions containing hydroelectrolytic solutions often reveal recurrent safety issues, mainly related to infusion rate, inappropriate dilution, and lack of dose adjustment according to renal function [1]. Such errors can significantly compromise clinical recovery and patient safety. Therefore, investigating pharmaceutical interventions in the management of HEDs in coronary ICUs is of great relevance, since these patients present clinical instability, high therapeutic complexity, and greater vulnerability to complications associated with electrolyte imbalances.

Aim

To evaluate the contribution of pharmaceutical interventions in optimizing the pharmacotherapy for the correction of hydroelectrolytic disorders (HEDs) in critically ill patients admitted to the Intensive Care Unit (ICU) in a philanthropic reference hospital in cardiology, located in the municipality of João Pessoa/Paraíba.

Methods

The design of this study consisted of a retrospective cross-sectional study, whose database was composed of information obtained from clinical pharmaceutical interventions. The research used data collected directly from pharmacotherapeutic monitoring records and from notifications of interventions carried out by resident pharmacists in a Coronary Intensive Care Unit (Coronary ICU). The study was conducted in a philanthropic reference hospital in cardiology, located in the municipality of João Pessoa, Paraíba. The data collection period covered the records made between June and November 2024. The research was developed in strict observance of current ethical and legal precepts. The project obtained approval from the Research Ethics Committee (CEP) of the Faculdade de Enfermagem Nova Esperança, under Certificate of Presentation for Ethical Appreciation (CAAE) number: 68131822.5.0000.5179. This study was conducted in compliance with the guidelines of Resolution No. 466 of 2012 and Resolution No. 510 of 2016, both issued by the National Health Council (CNS) of the Ministry of Health. Additionally, the work followed the Pharmacist's Code of Ethics, as established by CFF Resolution 596/2014.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

After analyzing the collected data, 998 pharmaceutical interventions (PIs) were identified during the period from June to November 2024. Among these, 12% (n=120) were related to hydroelectrolytic disorders (HEDs). The distribution of HEDs showed the highest frequency in magnesium (Mg) alterations, which corresponded to 6.9%

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(n=69) of the total interventions. Next, potassium (K) disorders stood out, with 3.7% (n=37), followed by sodium (Na) disorders, with 1% (n=10), and calcium (Ca), representing 0.4% (n=4). The interventions related to HEDs were directed to different professionals of the multidisciplinary team responsible for the critical patient's care, especially physicians and nurses, which reinforces the insertion of the clinical pharmacist in the care dynamics of the ICU. Regarding acceptability, it was found that 82.5% (n=99) of the interventions were accepted by the medical team and incorporated into the pharmacotherapy, while only 17.5% (n=21) were not accepted. This finding demonstrates the relevance of the clinical pharmacist's contribution to multidisciplinary decision-making, with a direct impact on the safety and optimization of critical cardiology patients' therapy.

Discussion

The present study demonstrates the relevance of pharmaceutical intervention (PI) in the management of hydroelectrolytic disorders (HEDs) in critical patients in a Coronary ICU, highlighting the volume and success of the clinical pharmacist's actions [1, 3]. A total of 998 pharmaceutical interventions were identified in the period, demonstrating the high potential risk inherent in the complexity of pharmacotherapy in the ICU [3]. Interventions related to HEDs accounted for 12% of the total volume. Although this percentage may seem modest, it reflects the criticality of the issue, given that electrolytic changes are capable of generating severe damage to the cardiovascular system. The high incidence of interventions focused on potassium (K) and magnesium (Mg) is consistent with the literature, which cites hypokalemia (K serum <3.5 mEq/L) as one of the most common and critical disorders impacting cardiac function [1, 2]. The need for intervention in these electrolytes is intensified by the fact that they are frequently associated with prescription failures, such as problems with dilution and infusion rate, which the PI actively seeks to mitigate [1]. The most significant finding of the present work lies in the high acceptance rate of HED-related interventions, with 82.5% (n=99) being accepted by the medical team, and only 17.5% (n=21) being non-accepted. The expressive acceptance (82.5%) attests to the medical team's recognition of the potential risk associated with electrolyte management and the technical quality of the recommendations provided by the pharmacist [3]. In this context, the insertion of the clinical pharmacist into the multidisciplinary ICU teams is essential. The systematic analysis of prescriptions allows for early identification of potential medication-related problems, proposal of appropriate adjustments, and implementation of pharmaceutical interventions (PIs) aimed at preventing complications and optimizing therapy [3]. The literature evidences a high acceptance rate of these interventions, especially in situations of increased risk for adverse effects and drug interactions, reinforcing the positive impact of pharmaceutical practice on promoting the safety and quality of life of critically ill patients [3]. The results demonstrate that the pharmaceutical intervention is an indispensable component in the optimization of HED pharmacotherapy, transforming clinical risk data into preventive actions. The high acceptance of the interventions reinforces the importance of the pharmacist's role as an essential agent in the multidisciplinary team for critical patients, improving the quality and safety of the care provided.

Keywords

Clinical Pharmacy; Hydroelectrolytic Imbalance; Cardiology.

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Pharmaceutical Communication: Perceptions Of Health Professionals In A Philanthropic Hospital

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Introduction

Communication is a core competency of clinical pharmacists and a determinant factor for the acceptance and effectiveness of interventions in hospital settings (1). In complex multiprofessional environments such as medium- and large-sized hospitals, clarity, relevance, and the chosen channel of communication directly influence the integration of pharmacists into the healthcare team, impacting both clinical outcomes and patient safety (2). International studies have demonstrated that the effectiveness of clinical pharmacy services depends not only on the technical quality of interventions but also on how they are communicated to other professionals

(3,4). The literature emphasizes that direct interaction between pharmacists and physicians, nurses, and physiotherapists promotes adherence to recommendations and contributes to reducing drug-related problems (DRPs) and adverse events (5). In Brazil, Federal Pharmacy Council Resolution No. 585/2013 established the clinical attributions of pharmacists, including the responsibility to record, discuss, and communicate their decisions within the multiprofessional team (6). However, there is still a gap in studies exploring the perception of other health professionals regarding pharmaceutical communication in philanthropic hospitals, which play a crucial role in the Unified Health System (SUS) by providing comprehensive care, particularly in cardiology and intensive care units. In this context, investigating how professionals evaluate pharmacist communication can provide insights to strengthen clinical pharmacy integration in hospitals and enhance patient safety and rational use of medicines.

Aim

To assess health professionals' perceptions of communication strategies adopted by clinical pharmacists in a philanthropic hospital in João Pessoa, Brazil.

Methods

This was an observational, descriptive, cross-sectional study, derived from the evaluation of the Clinical Pharmacy Service (CPS) of a philanthropic hospital specialized in cardiovascular care. Data collection was conducted between September and November 2023 using an electronic structured questionnaire created on Google Forms and distributed through sector coordinators. Participants included physicians, nurses, nursing technicians, and physiotherapists from clinical wards and intensive care units (ICUs). The questionnaire addressed professional category and sector of activity, as well as communication-related items: receipt of pharmacist guidance and perceptions of the most appropriate mode of communication (progress notes in the electronic system, participation in multiprofessional discussions, direct conversation, or other). Communication quality was assessed using a 5-point Likert scale (1 = very poor; 5 = excellent). Responses were exported to Microsoft Excel 2021 and analyzed using descriptive statistics (relative frequency, percentage, and central tendency). The study was approved by the Research Ethics Committee of Faculdade de Enfermagem e Medicina Nova Esperança (FACENE-PB), under CAAE: 70111223.8.0000.5179.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

A total of 41 health professionals responded. Of these, 65.9% (n=27) worked in clinical wards and 34.1% (n=14) in ICUs (coronary and general). The largest groups were nursing technicians (26.8%), nurses (31.7%), physicians (24.4%), and physiotherapists (17.1%). Most respondents reported having received or observed guidance from clinical pharmacists during practice (90.2%, n=37). Regarding preferred communication methods, 51.2% (n=21) chose participation in multiprofessional discussions, 34.2% (n=14) preferred direct conversations with

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pharmacists, 12.2% (n=5) indicated pharmacist progress notes in the electronic system, and 2.4% (n=1) selected other formats. Communication was predominantly rated positively. On the Likert scale, only two professionals gave low scores: 2.4% (n=1) rated it 1 and 2.4% (n=1) rated it 2. Meanwhile, 19.5% (n=8) rated it 3, 22.0% (n=9) rated it 4, and 53.7% (n=22) rated it 5. Thus, 75.6% of participants assigned scores ≥4, and the median score was 5, indicating that at least half of respondents perceived pharmacist communication as excellent.

Discussion

The findings indicate that health professionals recognize and value clinical pharmacist communication in hospital care. More than 90% of participants reported receiving guidance, demonstrating that clinical pharmacy services are integrated into care routines. The predominance of high Likert scores (≥4) reinforces that pharmacist communication is perceived as clear, relevant, and professional, attributes identified in the literature as essential for the effectiveness of clinical practice (1,2). The preference for multiprofessional discussions and direct dialogue over written records suggests that teams value the pharmacist's active presence in decision-making. Previous studies have shown that real-time communication improves adherence to pharmacist recommendations and reduces drug-related problems (3,4). A systematic review further supports that pharmacist participation in clinical rounds increases acceptance of interventions and improves outcomes (5). However, the lower value attributed to progress notes may reflect an institutional culture focused on verbal exchanges, underscoring the need to reinforce standardized documentation practices that ensure traceability and continuity. Similar challenges were identified by Tan et al. (2024), who reported communication barriers when clarity and channels did not align with team expectations (2). These results have practical implications: hospital managers should prioritize pharmacist participation in case discussions and team meetings, while maintaining robust documentation; continuous pharmacist training in communication skills is needed (1); and communication should be recognized as a driver of patient safety, consistent with international safety initiatives (7). This study demonstrated that clinical pharmacist communication is widely recognized and valued by health professionals, with a predominance of positive evaluations and preference for in-person interactions, whether through multiprofessional discussions or direct dialogue. These findings reinforce communication as a cornerstone of effective clinical pharmacy practice, fostering interprofessional collaboration and contributing to patient safety. At the same time, they highlight the need to strengthen standardized documentation and to invest in continuous training in communication skills. Consolidating these strategies can further expand the impact of clinical pharmacy services in philanthropic hospitals, ensuring safer, more resolutive practices aligned with national and international healthcare guidelines.

Keywords

Clinical Pharmacy; Health Communication; Safety.

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Pharmaceutical Interventions In The Prevention Of Adverse Reactions Related To The Interaction Between Amlodipine And Simvastatin In Cardiology Patients

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Introduction

Systemic arterial hypertension (SAH) and hypercholesterolemia often coexist in the population. The simultaneous presence of these risk factors significantly enhances the development of cardiovascular diseases (CVD) (1). CVD remain the leading causes of morbidity and mortality in Brazil and worldwide, requiring continuous pharmacological treatments, usually in combination (2). In this context, it is common to prescribe both

antihypertensives and lipid-lowering drugs to cardiology patients, with amlodipine and simvastatin being common examples of such associations in clinical practice. This therapeutic choice is justified because calcium channel blockers (CCB) and statins are considered first-line medications for the treatment of SAH and dyslipidemias in patients with coronary artery disease (CAD). However, the concomitant use of these drugs may result in clinically relevant pharmacokinetic interactions. Amlodipine has the ability to inhibit the cytochrome P450 enzyme (CYP3A4), which is responsible for simvastatin metabolism, thereby promoting its plasma accumulation. This condition may result in adverse events ranging from myalgia to myopathies and rhabdomyolysis, characterizing a severe drug interaction (3). Given this scenario, the study of drug interactions has become increasingly important, especially considering the underreporting of such events in clinical practice. From this perspective, the role of the clinical pharmacist through pharmaceutical interventions is essential in preventing adverse reactions. This occurs through careful prescription analysis, early detection of drug interactions, implementation of interventions with the multidisciplinary team, patient counseling, and continuous monitoring of pharmacotherapy, contributing significantly to the safety and effectiveness of treatment.

Aim

This study aimed to quantify and describe pharmaceutical interventions focused on preventing adverse reactions resulting from the interaction between amlodipine and simvastatin, performed by clinical pharmacists from the Multiprofessional Health Residency Program of Faculdade Nova Esperança (FACENE), in a university hospital specialized in cardiology in the state of Paraíba, Brazil.

Methods

This is a cross-sectional, retrospective study based on data from interventions carried out by clinical pharmacists enrolled in the Multiprofessional Health Residency Program at a university hospital specialized in cardiology, located in João Pessoa-PB, Brazil. The sample consisted of adult inpatients hospitalized between January and December 2024 in the cardiology units (pre- and postoperative), internal medicine ward, and intensive care unit, who received pharmacotherapeutic follow-up during the period. The study was approved by the Research Ethics Committee of Faculdade de Enfermagem Nova Esperança (FACENE), under opinion CAAE: 68131822.5.0000.5179, in compliance with Resolution nº 466/2012 and Resolution nº 510/2016 of the National Health Council. All stages were conducted in accordance with the Code of Ethics of the Pharmacist (CFF Resolution nº 596/2014) (4).

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

After analyzing the collected data, 3,558 interventions performed by clinical pharmacy residents during pharmacotherapeutic monitoring were identified from January to December 2024. Among all interventions, 1.69% (n=60) were related to drug interactions, of which 65% (n=39) specifically corresponded to the association

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between amlodipine and simvastatin. Furthermore, when assessing the acceptance level of these interventions by the multidisciplinary team, 84.62% (n=33) were accepted, while only 15.38% (n=6) were rejected. The pharmaceutical interventions included two main approaches: dose adjustment of simvastatin to 20 mg once daily to reduce serum levels, as recommended by the Food and Drug Administration (FDA, 2011), or replacement with statins less dependent on CYP3A4 metabolism, with rosuvastatin being the preferred choice and atorvastatin considered as an alternative in patients with renal impairment due to its safety profile (5).

Discussion

Drug interactions represent a constant challenge for prescribers, particularly those that pose serious risks to public health, such as the development of myopathy and rhabdomyolysis, frequently associated with concomitant use of amlodipine and simvastatin (3). In this perspective, the present study identified a 65% prevalence of this drug interaction. These results are consistent with findings from other studies, in which 32.26% of severe drug interactions involved the association between amlodipine and simvastatin, potentially leading to the development of myalgia and rhabdomyolysis. Myalgia represents a milder clinical manifestation, while rhabdomyolysis is the most severe adverse effect of the interaction, characterized by muscle fiber destruction and release of intracellular substances such as myoglobin, which has nephrotoxic effects and may cause or worsen kidney damage, in addition to electrolyte imbalances and increased risk of arrhythmias (6). Once the interaction was identified, management was carried out through pharmaceutical interventions in collaboration with the medical team, such as dose adjustment of simvastatin. A reduction to 20 mg once daily was suggested, as described in this study and recommended by the Food and Drug Administration (FDA) since 2011. This dose limitation is due to the risk of increased serum levels of the drug when co-administered with amlodipine, which raises the likelihood of adverse effects, as previously reported. Additionally, another approach adopted was the replacement of simvastatin with a statin with lower interaction potential with amlodipine, taking into account the patient's financial capacity to acquire the medication, since this involves a higher-potency and higher-cost alternative. In this context, a statin not significantly dependent on CYP3A4 metabolism was chosen, with rosuvastatin being the preferred option, and atorvastatin considered as a second alternative for patients with renal impairment, due to its greater safety profile. Finally, this study highlights the importance of the clinical pharmacist as an indispensable resource in identifying, preventing, and managing adverse reactions arising from this drug interaction to improve patient outcomes and progression. This relevance is evidenced by the high acceptance rate of 84.62% (n=33) of pharmaceutical interventions, closely related to the recognition and commitment of the clinical pharmacist as a member of the multidisciplinary team. This professional is capable of evaluating and proposing therapeutic alternatives based on the patient's needs identified during pharmaceutical care, whether through bedside consultations or discussions with other healthcare professionals involved in patient care.

Keywords

Clinical Pharmacy; Pharmacotherapy; Drug Interactions.

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Clinical Interventions For The Prevention Of Adverse Drug Events

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Introduction

The World Health Organization (WHO) characterizes an adverse drug event (ADE) as: *“any undesirable medical occurrence that may occur during treatment with a drug, not necessarily having a causal relationship with this treatment”*[1]. Such events can be aggravated by factors such as age[2,3,4], sex[2,3,4], the presence of comorbidities[2,3,4], polypharmacy[2,3,4], administered drug dose[2,3,4], among others.

Adverse Drug Events (ADEs) represent one of the leading causes of preventable morbidity and mortality across different levels of healthcare, resulting in hospitalizations, increased costs, and compromised patient safety[5,6]. It is estimated that between 5% and 10% of hospital admissions are related to preventable ADEs[6], reinforcing the importance of structured clinical interventions, such as active pharmacovigilance, stewardship programs, and pharmacotherapeutic follow-up protocols[7,9].

Aim

This review aimed to collect available scientific evidence regarding clinical interventions aimed at preventing adverse drug events in different levels of healthcare.

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Methods

This is an integrative literature review, conducted in September 2025. The guiding question was developed based on the PICO strategy, an acronym for Patient, Intervention, Comparison, and Outcomes. Following this strategy, the elements were identified as: patients at risk of adverse drug events, structured clinical interventions, comparison with usual care or absence of intervention, and effectiveness in reducing ADE occurrence and improving patient safety. Accordingly, the guiding research question was: “In patients at risk of adverse drug events, are structured clinical interventions, compared with usual care or absence of intervention, effective in reducing ADEs and improving patient safety?”

A literature search was then performed, including original studies published between 2015 and 2025, in Portuguese, English, or Spanish, addressing clinical interventions applied to ADE prevention. Narrative reviews, animal studies, isolated case reports, and articles without full-text availability were excluded.

The search was conducted in PubMed and SciELO databases, using controlled DeCS/MeSH descriptors combined with Boolean operators: (“Drug-Related Side Effects and Adverse Reactions” OR “Medication Errors”) AND (“Intervention Studies” OR “Clinical Protocols” OR “Pharmacovigilance”).

Results

Initially, 8,064 results were found in PubMed, reduced to 3,874 after applying exclusion criteria. In SciELO, 61 results were retrieved and reduced to 40 after filtering.

After screening (title, abstract, and full-text reading), seven articles met the criteria and were included in the analysis[1–7]. The studies were conducted in different countries (Brazil, United States, United Kingdom, China, Spain) and care contexts (primary care, general hospitals, and specialized services). Regarding methodological approach, the seven selected studies showed variability: two (28.5%) were randomized clinical trials, two (28.5%) prospective cohorts, two (28.5%) observational/cross-sectional studies, and one (14.5%) multicenter retrospective study.

Four articles reported the mean age of participants, which ranged from 45 to 72 years, showing that clinical interventions were mostly applied in adults and older adults, with a predominance of polypharmacy and chronic diseases—factors known to aggravate ADEs.

Among the strategies analyzed, medication reconciliation, pharmacotherapeutic follow-up, active pharmacovigilance, stewardship programs, and remote monitoring stood out. Regarding main impacts, the studies reported a reduction in prescription discrepancies[5], decreased toxicities[7], fewer hospital readmissions[9], and increased detection and reporting of adverse drug events[10,11].

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Discussion

The findings of this review demonstrate that systematic clinical interventions are effective in preventing ADEs across different care settings. Strategies such as medication reconciliation, analyzed in clinical trials[5],[9], showed a positive impact in reducing prescription discrepancies, particularly in elderly polymedicated patients. Another relevant aspect was the role of active pharmacovigilance, which stood out in oncology[7] and in Brazilian hospitals[10],[11], with significant results in early ADE detection, preventing worsening and enabling therapeutic adjustments.

In the context of antimicrobial use, stewardship programs demonstrated consistent reductions in ADEs related to dosing errors and inappropriate drug use, while significantly improving safety and adherence to protocols[8].

Remote monitoring associated with clinical follow-up also proved promising, reducing hospital readmissions due to medication-related complications in the post-discharge period[9]. This evidence reinforces the importance of safe care transitions between hospital and community.

Despite the positive results, the studies also highlighted limitations, including low adherence by professionals to ADE reporting, heterogeneity of the interventions applied, and challenges in measuring long-term impact. Furthermore, most studies were conducted in specific populations (older adults, patients with chronic diseases), which limits the generalizability of findings.

Keywords

Clinical; Interventions; Adverse; Drug; Events

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Profile Of Discrepancies In Medication Reconciliations Of Onco-Hematology Patients At A University Hospital

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Introduction

Cancer patients are at high risk of medication errors due to the complexity of their treatment regimens, which include chemotherapy, supportive medications, and comorbidity treatment. This multiplicity favors the occurrence of discrepancies during care transitions, which can lead to adherence failures, therapeutic duplication, or serious adverse events (1). Medication reconciliation (MR) emerges as an essential strategy to minimize these risks, as it consists of the systematic comparison between home medications and hospital prescriptions, with the aim of identifying, justifying, and correcting intentional or unintentional discrepancies (5). In different settings, this practice has been shown to significantly reduce medication-related problems in cancer

patients, reinforcing its importance for patient safety (2). Brazilian studies also highlight the relevance of this approach. In a hospital in southern Brazil, medication reconciliation identified a high prevalence of discrepancies between prescriptions, highlighting the need for structured processes to ensure treatment continuity (5). Similarly, a pilot study with oncohematology patients showed that pharmacist involvement is essential for detecting and correcting inconsistencies, strengthening communication with the multidisciplinary team (3). Beyond the clinical context, medication reconciliation proves valuable in research and quality control, expanding understanding of the factors that influence therapeutic safety and supporting actions to improve care processes (2,4). Thus, mapping discrepancies in tertiary hospitals enables the improvement of pharmacist clinical practice and promotes greater safety for cancer patients.

Aim

The aim was to outline the profile of discrepancies obtained in the prescriptions of onco-hematological patients during the practice of medication reconciliation carried out by pharmacists.

Methods

This is a descriptive, retrospective study of the profile of discrepancies found in medication reconciliations, conducted between January and June 2025 with patients in the onco-hematology ward of a university hospital. First, a pharmaceutical history was obtained through interviews with the patient and their companion, and a review of medical records, prescriptions, and medication boxes. The following information was collected: name, age, sex, date of admission to the hospital and the ward in question, history of present illness (HIO), comorbidities, history of allergies, and adverse drug reactions (ADRs). Regarding the past medication history (PMH), a detailed survey of all medications in use prior to hospital admission was conducted, collecting information on dose, route of administration, frequency, dosage, time of use, and history of use of antimicrobials, herbal medicines, supplements, compounded formulas, eye drops, and ointments. Subsequently, a systematic comparison of the list of previously prescribed medications with those prescribed upon hospital admission was performed. The medications prescribed upon admission were reconciled, and discrepancies were identified and classified according to type (justified or unjustified) and reason. Pharmaceutical recommendations were made and recorded. The data were transcribed into a spreadsheet and analyzed using Google Sheets®. This study was approved by the Research Ethics Committee under opinion number 7.694.041.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

The sample included 36 patients, who underwent medication reconciliation, the majority of whom were male (n = 24, 66.7%). The mean age was 46.64 ± 14.8 years, with a predominance of the adult age group from 40 to 49 years (n = 12, 33.4%). Among the hematological diseases, the presence of Acute Myeloid Leukemia (n = 15, 41.7%), Non-Hodgkin's Lymphoma (n = 9, 25%) and Acute Promyelocytic Leukemia (n = 8, 22.2%) stood out, while Multiple

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Myeloma (n = 2, 5.55%) and Acute Lymphoid Leukemia (n = 2, 5.55%) were less frequent. Some patients (n=12, 36.4%) had at least one comorbidity, notably Systemic Arterial Hypertension (n=6, 50%), Diabetes Mellitus (n=4, 33.3%), and Dyslipidemia (n=2, 16.7%). In total, 110 previous medications were identified, with an average of 3.05 medications per patient. Nine patients (25%) had no previous pharmacotherapy. The most frequent pharmacological classes were antimicrobials (n=36, 32.7%), antihypertensives (n=28, 25.4%), and proton pump inhibitors (n=15, 13.6%). Twenty-two discrepancies were found, of which 14 (63.7%) were justified and 8 (36.3%) were unjustified. Among the justified reasons, the main reasons were medication suspension (n=8, 57.1%), followed by changes in the route of administration (n=2, 14.2%) and medication substitution (n=2, 14.2%). Unjustified discrepancies were mainly due to non-prescription of necessary medications (n=4, 50%), underdose (n=2, 25%), suspension (n=1, 12.5%) and dose change (n=1, 12.5%).

Discussion

The findings reinforce the importance of medication reconciliation in hematology hospitalized patients, especially in hospital settings. Among the 36 patients evaluated, males predominated, with a mean age of 46 years, and frequent diagnoses of acute myeloid leukemia, non-Hodgkin's lymphoma, and acute promyelocytic leukemia, a profile consistent with recent epidemiological data (8,9). Twelve patients had comorbidities, primarily hypertension (n=6), diabetes (n=4), and dyslipidemia (n=2). These chronic conditions imply continuous medication use, favoring polypharmacy and increasing the risk of errors, omissions, and duplications (1-3). Although the average number of previous medications was 3.05 per patient, the presence of multiple diseases increases therapeutic complexity, requiring dose adjustments and frequent monitoring (3). Twenty-two discrepancies were identified, 63.7% justified and 36.3% unjustified, a proportion similar to that reported in other studies, which range from 30% to 70% during hospital admission (6,7). Justified discrepancies, such as medication discontinuation, route changes, or drug substitution, reflect necessary clinical decisions given the risk of interactions, toxicity, or the patient's current condition. However, even conscious adjustments require monitoring, especially in individuals with comorbidities, to avoid compromising the control of concomitant diseases (1,2). Among the unjustified discrepancies, the most prevalent was the failure to prescribe necessary medications (50%). This finding is consistent with the literature, which points to omission as one of the most frequent failures in the continuity of treatment for hospitalized cancer patients, with repercussions on the management of comorbidities and prognosis (10,11). Underdosing and unjustified dose changes were also observed, increasing the risk of therapeutic ineffectiveness or adverse events. Recent literature highlights that pharmacist-led reconciliation significantly reduces errors of omission and unintentional discrepancies, in addition to promoting communication between the team, patients, and families (12,13). In oncohematology, this practice is even more relevant due to polychemotherapy and supportive therapies, which increase the likelihood of interactions and toxicities (3). Thus, the results of this study confirm medication reconciliation as an essential practice in oncology care. Unjustified discrepancies point to weaknesses in prescribing, communication, and clinical records, highlighting the need for more robust institutional protocols. The systematic incorporation of clinical pharmacists in all stages of care is essential to prevent errors, ensure therapeutic continuity, and promote greater patient safety.

Keywords

Medication reconciliation; Hematology; Pharmacists

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Patient-Centered Pharmaceutical Clinical Services In A Transplant Unit: Profile And Practices In A High-Complexity Hospital

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Introduction

Advances in transplant medicine have contributed to increased survival and quality of life for patients with end-stage solid organ failure, such as liver and kidneys (1,2). Patients undergoing transplantation require complex therapeutic regimens composed of multiple drugs, which include immunosuppressants—essential for the long-term preservation of graft function and used continuously throughout life (3)—often associated with gastric

protectors to prevent and alleviate gastrointestinal complications resulting from the use of immunosuppressants, antimicrobials, and antifungals, administered prophylactically or, when indicated, for the treatment of opportunistic infections (4–6). The complexity of drug treatment in kidney and liver transplant patients, in the pre- and post-transplant phases, requires specialized pharmacotherapeutic care (7). Clinical pharmaceutical services in the hospital setting include activities such as medication reconciliation, pharmacotherapy review, health education, and guidance to the multidisciplinary team. Such practices are essential for optimizing patient care, promoting safety, therapeutic effectiveness, and adherence to treatment, particularly in transplant patients (8,9).

Aim

The objective of this study is to characterize the profile and practices of patient-centered clinical pharmacy services in a transplant unit at a high-complexity hospital.

Methods

This is a retrospective, descriptive, and cross-sectional study based on the records of the Clinical Pharmacy Unit of the Walter Cantídio University Hospital of the Federal University of Ceará (HUWC/UFC), referring to clinical pharmaceutical services performed during the hospitalization of patients admitted to the transplant ward, between January and December 2024.

Results

In the context of clinical pharmaceutical services offered to transplant patients during the study period, 341 medication reconciliations were performed, of which 57.5% (n=196) occurred in kidney transplant recipients and 42.5% (n=145) in liver transplant patients. Regarding pharmacotherapy reviews, professionals conducted 4,119 pharmacotherapeutic evaluations, with 65.3% (n=2,688) of these reviews occurring in kidney transplant patients and 34.7% (n=1,431) in liver transplant patients. The average number of patients followed daily was 11. In the hospital, pharmaceutical counseling at hospital discharge is standardized for all immediate post kidney and liver transplant patients. This service includes the delivery of an individualized medication plan, defining the most appropriate times for drug administration, analysis of drug–drug and drug–food interactions, thus promoting greater safety and adherence to pharmacotherapy in the hospital-to-home transition process. In total, 119 pharmaceutical discharge counseling sessions were performed, with 63.9% (n=76) directed to immediate postoperative kidney transplant patients and 36.1% (n=43) to liver transplant patients, with an average of 10 discharge counseling sessions per month. Regarding pharmacotherapeutic interventions, 1,361 pharmaceutical recommendations were recorded during the study, of which 50.1% (n=681) corresponded to liver transplant patients and 49.9% (n=680) to kidney transplant patients. These recommendations included dose adjustments, dosage regimens, dilution, infusion time, treatment duration, inclusion or deprescription of medications, in addition to guidance directed at the multidisciplinary team, patients, and families, covering hospital admission, hospitalization, and discharge.

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Discussion

The findings of this study, which presents a high number of medication reconciliations, pharmacotherapy reviews, discharge counseling, and 1,361 pharmaceutical interventions, are consistent with the therapeutic complexity of solid organ recipients. In many systems, kidney transplantation is the most frequent solid organ procedure, which helps explain the higher proportion of care in kidney recipients observed in the data, as shown in U.S. national reports from 2023, which indicate that kidney transplants annually outnumber liver transplants (10). A Thai study demonstrated that after implementing medication reconciliation in a post-liver transplant outpatient clinic, medication errors decreased by 36.2%, reinforcing the importance of this practice (11). Systematic reviews in hospital units also support the pharmacist's role in reconciliation by reducing clinically relevant discrepancies and improving healthcare outcomes (12). The high number of pharmacotherapy reviews performed in the study hospital reflects active surveillance of complex regimens, such as the use of immunosuppressants and polypharmacy due to multiple comorbidities. The clinical impact of this surveillance is corroborated by a randomized clinical trial in post-kidney transplant patients, which showed that pharmacist-led interventions reduced medication errors, adverse reactions, and hospitalizations over the months (13). The standardized pharmaceutical counseling at discharge performed in the institution is consistent with evidence from articles demonstrating that educational interventions carried out by pharmacists significantly increase adherence to immunosuppressive therapy, in addition to discharge programs with active participation of these professionals, which reduce discrepancies and improve medication safety in solid organ transplant recipients (14,15).

Keywords

Clinical Pharmaceutical Services, Patient-Centered Care,

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The Impact Of Pharmaceutical Care On The Management Of Patients With Systemic Lupus Erythematosus: A Literature Review

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Introduction

Systemic Lupus Erythematosus (SLE) is an autoimmune inflammatory disorder that can trigger multiple systemic effects, leading to damage in target organs such as the kidneys, lungs, and brain. Epidemiologically, it is classified as a notifiable disease and occurs more frequently in women of reproductive age. In this context, pharmaceutical care plays an essential role in the pharmacotherapeutic management of patients with SLE, considering the wide range of medications used, which often negatively impact long-term treatment adherence and are associated with increasing rates of hospitalizations and mortality (2,6).

Poor adherence to therapeutic regimens is relatively common in chronic diseases, resulting in ineffective treatments and hindering adequate clinical control of the patient's condition. The integration of pharmacists into the multidisciplinary healthcare team contributes to the optimization of pharmacotherapy by enabling the prevention, identification, and resolution of drug-related problems, including adverse reactions, interactions, and incompatibilities (3).

Pharmacological treatment of systemic lupus erythematosus (SLE) is characterized by being individualized and long-term, with extensive dosing regimens that are frequently adjusted according to disease activity. During more severe phases of the disease, multiple prescriptions involving different drugs are common. In this regard, pharmaceutical care represents a patient-centered approach that positively strengthens healthcare delivery, contributing to improved clinical outcomes, enhanced quality of life, and reduced morbidity and mortality associated with the disease (3).

Aim

To analyze the relevance of pharmaceutical care in the monitoring of pharmacotherapy in polymedicated patients with Chronic Inflammatory Diseases (CIDs), and to evaluate the safety and effectiveness of therapeutic alternatives with the aim of improving the management and quality of life of patients with Systemic Lupus Erythematosus (SLE).

Methods

In order to achieve the proposed objectives, an integrative literature review was conducted through published articles, using the descriptors "Pharmaceutical Care" and "Systemic Lupus Erythematosus" in the PubMed and Scopus databases, with the purpose of synthesizing evidence on the subject. A total of eight articles were selected from these databases based on the aforementioned descriptors. The inclusion criteria were: articles published up to March 2025; studies addressing multidisciplinary care and pharmaceutical care in the management of lupus; articles applying systematic and integrative review methodologies; studies published in English, Portuguese, or Spanish; and full-text availability. Articles not meeting these criteria were excluded.

Results

In a randomized clinical trial conducted in China with SLE patients, multidisciplinary care with pharmacist involvement led to significant improvements in disease management, with greater patient satisfaction with medication information and a better quality of life compared to usual care (1). In Brazil, a study of women with lupus nephritis revealed that pharmaceutical intervention significantly increased treatment adherence, particularly with SLE-specific medications, where the effectiveness of pharmaceutical care reached 64% (2). The structured follow-up protocol detailed actions such as interviews, pharmacotherapy review, and monitoring for adverse effects (3).

Pharmacotherapy profile surveys have shown that SLE patients use multiple medications daily, presenting a high risk of interactions and adverse reactions, reinforcing the importance of clinical monitoring by pharmacists (5). Furthermore, international studies have also highlighted that pharmacist intervention contributes to greater safety in the use of immunosuppressants and biological agents, preventing the occurrence of therapeutic failures (6,8).

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Reports of experiences in the national context in clinical pharmacy also showed positive results in the follow-up of patients with SLE, expanding therapeutic control and support for self-care (7).

Discussion

As observed in the reviewed articles, Systemic Lupus Erythematosus is a multifactorial disease that, due to its varied clinical manifestations, requires individualized treatment aimed at preventing flares, minimizing organ damage, reducing drug toxicity, and improving quality of life. Given its complex pharmacotherapy—characterized by multiple, long-term medications that often lead to adverse effects—poor treatment adherence emerges as a critical challenge, potentially resulting in worse outcomes, including mortality.

In this context, the pharmacist is an essential member of the multidisciplinary care team. The literature review provided robust evidence that pharmaceutical care is an effective intervention for improving medication adherence and clinical outcomes in patients with SLE.

Nevertheless, despite its proven effectiveness, the implementation of pharmaceutical care in the management of Systemic Lupus Erythematosus still faces barriers. For example, a field study conducted in the countryside of Bahia revealed that a significant proportion of patients with SLE do not receive pharmaceutical counseling at the time of medication acquisition, highlighting a substantial gap between the potential of this service and its practical application.

Keywords

Lupus. Pharmaceutical care. Multidisciplinary team

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Stigma, Silence, And Aids: Analysis Of Exposure Categories Among Men In Paraíba (2013–2024)

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Introduction

The AIDS epidemic in Brazil is characterized by its heterogeneity, disproportionately affecting men and being marked by multiple vulnerabilities related to gender norms, sexuality, and social contexts that shape the risk of HIV infection. Masculinities influence both sexual behavior and the pursuit of healthcare services, directly impacting prevention, early diagnosis, and clinical follow-up. In this respect, understanding how the hierarchical exposure categories are distributed over time is fundamental to elucidating the dynamics of the epidemic and guiding culturally sensitive coping strategies (1,2).

Currently, "Men who have sex with men" (MSM) have concentrated a large portion of HIV infection cases, reflecting inequalities in access to combined prevention and the persistence of stigma. However, heterosexual transmission has also remained relevant, demonstrating the generalization of the epidemic and necessitating broad public policies (3). Another critical aspect refers to the high percentage of reported cases with an "ignored" exposure category, which weakens the quality of information and compromises epidemiological surveillance. Given this, analyzing the profile of the epidemic in Paraíba is relevant for understanding its regionais specificities and supporting public health actions (4,5).

Aim

To describe the distribution of AIDS cases in men (≥13 years old) according to the hierarchical exposure category in the state of Paraíba, Brazil, from 2013 to 2024, highlighting temporal trends, the predominance of population groups, and the quality of the recorded information.

Methods

This was a descriptive study based on secondary data from the Information System for Notifiable Diseases (SINAN), pertaining to AIDS cases in male individuals, aged ≥13 years, residing in the state of Paraíba, Brazil, and diagnosed between 2013 and 2024. All records reported to the system during the analysis period were included. The main variable was the hierarchical exposure category, classified according to the criteria of the Ministry of Health: Men who have Sex with Men (MSM), heterosexual exposure, Injecting Drug Users (IDU), blood transfusion, vertical transmission, occupational accident, and ignored/unreported. The annual percentage distribution of the categories was calculated. Data related to 2020–2024 were considered preliminary, subject to updates and revision by the official surveillance systems. The analysis was descriptive, prioritizing the assessment of the temporal evolution of the exposure categories, with an emphasis on trends, relative proportions, and information gaps. As this analysis relied on secondary data from the public domain, submission to an ethics committee was not required, in compliance with CNS Resolution No. 674/2022.

Results

During the analyzed period, there was a predominance of transmission among Men who have Sex with Men (MSM), ranging from 24.9% of cases in 2014 to 35.5% in 2017, making this the most representative category of the epidemic among men in Paraíba. Heterosexual exposure constituted the second most common route of transmission, with percentages oscillating between 22.4% and 38.4% throughout the historical series.
A relevant aspect was the high proportion of records classified as “ignored” or “unreported”, which reached 49.3% in 2020, demonstrating a fragility in epidemiological investigation and compromising data quality. The injecting drug user (IDU) category showed residual participation, declining over the years, reflecting changes in substance use patterns and the profile of the epidemic. Likewise, the other categories (transfusion, vertical, and occupational) had low representativeness.
The results, therefore, reveal both the concentration of the epidemic among MSM and the persistence of cases among heterosexuals, configuring a mixed scenario of a concentrated and generalized epidemic, which is aggravated by the high percentage of ignored data.

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Discussion

The data obtained corroborate the nature of the AIDS epidemic among men in the State of Paraíba, showing a concentrated predominance among MSM yet maintaining relevance among heterosexuals. This scenario describes a complex dynamic that requires diversified responses (1,3). The concentration of cases among MSM reinforces the need for specific public policies for this group, including combined prevention strategies, a greater supply of testing, facilitated access to pre-exposure prophylaxis (PrEP), and addressing the social stigma that limits the search for healthcare (5).

The significant proportion of cases attributed to the heterosexual route indicates that the epidemic also affects men outside the MSM group, revealing the necessity for universal prevention campaigns that address diverse vulnerabilities, including gender disparities, inconsistent condom use, and difficulties in accessing health services (1,3,5,6).

Another, more critical piece of data analyzed points to a high proportion of notifications with an ignored exposure category. In some years, nearly half of the cases did not have this information adequately recorded, which impairs epidemiological surveillance, creates obstacles in understanding the chain of transmission, and limits the development of specific policies (7,8). This gap may be related to factors such as failures in completing notification forms as well as structural barriers, such as a lack of professional training, discomfort during the collection of sensitive information, and the stigmatization of sexual practices (7,8).

Given this, it becomes urgent to enhance the qualification of health teams, ensuring an ethical, non-judgmental approach that encourages the collection of reliable data. The consolidation of surveillance actions, combined with integration with prevention and care services, is essential for improving the quality of information and the effectiveness of interventions (7,8).

In summary, the analysis of the AIDS epidemic among men in Paraíba highlights the centrality of transmission among MSM, the continued relevance of the heterosexual route, and the critical fragility represented by the ignored cases (3,7,8). This overview points to the need for prevention strategies that reconcile universal approaches with specific actions, in addition to an urgent improvement in the quality of epidemiological data, which is an indispensable condition for the planning and effectiveness of public policies on HIV/AIDS (1,3,7,8).

Keywords

Epidemiological Surveillance; Stigma and Silence

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Integrative Therapies For Anxiety: A Review Of Effectiveness And Applicability

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Introduction

Anxiety disorders represent one of the greatest challenges in mental health today, characterized by persistent feelings of apprehension and restlessness that negatively impact quality of life. These disorders include generalized anxiety, panic disorder, social anxiety, obsessive-compulsive disorder, post-traumatic stress disorder, agoraphobia, and specific phobias (3, 9). According to the World Mental Health Report by the World Health Organization (WHO, 2022), approximately one billion people experienced mental disorders in 2019. The same report estimated a loss of 12 billion workdays due to symptoms of anxiety and depression, highlighting the

economic burden of these conditions (6, 7).
Conventional treatment is primarily based on the use of psychotropic medications. Although effective, long-term use may lead to dependence and adverse effects, prompting interest in complementary therapeutic alternatives. In this context, Integrative and Complementary Health Practices (ICHP) have gained relevance, as they incorporate traditional knowledge to promote physical and emotional balance. The Brazilian Unified Health System (SUS) currently offers 29 such practices, including auriculotherapy, acupuncture, aromatherapy, Reiki, and herbal medicine. Considering the increasing prevalence of anxiety disorders and the need for safe, accessible, and low-cost strategies, it is relevant to evaluate the effectiveness and applicability of these practices as support for pharmacotherapy and as preventive strategies in mental health (11, 12, 13).

Aim

To evaluate the scientific evidence on the effectiveness of Integrative and Complementary Health Practices (ICHP) in the management of anxiety disorders, highlighting their role as a complementary approach to pharmacotherapy, as well as their applicability in promoting mental health, preventing complications, and improving individuals' quality of life.

Methods

In this context, with the aim of achieving the objectives previously outlined, an integrative literature review was conducted using previously published articles, organized to synthesize evidence on the topic. For the preparation of this study, the databases PubMed, Google Scholar, Scielo, and Scopus were consulted, using the keywords "anxiety" and "Integrative and Complementary Practices" to perform the search. A total of 14 articles published between 2020 and 2024 were selected from these databases based on the specified keywords.
The inclusion criteria were: studies addressing the application of integrative and complementary practices in the management of anxiety, studies employing systematic review or meta-analysis methodologies, articles published in English, Portuguese, or Spanish, and studies with full-text availability. Studies focusing on anxiety during narrow or specific periods—such as anxiety during or prior to pregnancy or before surgical procedures—were excluded.
To synthesize the data from the selected studies, a narrative and descriptive methodology was employed, aiming to integrate the findings and provide appropriate references for the development of this work.

Results

The analysis revealed consistent benefits from the use of Integrative and Complementary Health Practices (ICHP) in the management of anxiety. Auriculotherapy demonstrated a significant reduction in stress and anxiety levels, particularly among university populations, contributing to improved mental health. Acupuncture showed positive results in alleviating anxiety symptoms, promoting relaxation and physiological balance.
Aromatherapy, applied through essential oils via topical, inhalation, or olfactory methods, was effective in improving sleep, reducing stress, and enhancing physical and psychological well-being. Reiki was associated with decreased stress, improved sleep, greater self-awareness, and increased autonomy in coping with challenges, reinforcing its applicability as a complementary technique.
Herbal medicine showed satisfactory results in reducing anxiety symptoms, although professional supervision is required due to the risk of drug interactions and toxicity from improper use.

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Overall, the studies indicate that Integrative and Complementary Health Practices (ICHP) are low-cost, easy to implement, and have good potential for patient adherence, representing effective strategies to complement conventional therapy.

Discussion

The findings of this review support the relevance of Integrative and Complementary Health Practices (ICHP) as complementary resources to pharmacological treatment for anxiety. Techniques such as auriculotherapy, aromatherapy, Reiki, and herbal medicine contribute to stress reduction, promotion of relaxation, improved sleep, and emotional balance. This reinforces the notion that these practices can expand the available therapeutic options and assist patients who require less invasive and more accessible approaches.

Despite the reported benefits, there remains a scarcity of robust evidence, particularly in patients with severe conditions, which limits the scientific consolidation of these therapies. Another challenge concerns the insufficient training and qualification of healthcare professionals, as well as cultural and institutional resistance to adopting non-conventional practices in routine clinical care.

Among the methods reviewed, Reiki showed particular relevance in inducing relaxation and improving quality of life, functioning as a psychosocial support tool. Aromatherapy, which is low-cost and already integrated into the Brazilian Unified Health System (SUS), demonstrated positive outcomes and feasibility of use in different healthcare settings. Herbal medicine, on the other hand, requires greater scientific rigor and clinical monitoring to avoid risks, but presents a promising alternative.

Thus, the results underscore the importance of investment in multicenter studies with greater methodological rigor to consolidate ICHP as effective and safe strategies. From a public policy perspective, there is a clear need to expand the availability of these practices within SUS, ensuring broader access for the population to therapies that can contribute to improved mental health and reduced burden on the healthcare system.

In summary, ICHP constitute high-potential tools for the comprehensive management of anxiety, making it essential to encourage further research and professional training for the proper implementation of these practices.

Keywords

Integrative and Complementary, Anxiety Disorders

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Vertical Transmission Of Hiv And Exposed Children In Paraíba

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Introduction

Human Immunodeficiency Virus (HIV) emerged following zoonotic transmissions of the Simian Immunodeficiency Virus (SIV), which is present in African primates. In that region, hunting practices and the consumption of the meat of these animals likely led to hunters being the first group infected with HIV (1). In this context, the HIV epidemic remains a significant global public health challenge, with a particularly relevant impact during pregnancy (2). Vertical transmission (VT), from mother to child during gestation, delivery, or breastfeeding, is the primary route of HIV infection in the pediatric population. However, evidence-based strategies, such as universal prenatal screening, antiretroviral therapy (ART) for the pregnant woman, and prophylaxis for the infant, can drastically reduce this transmission rate to below 1% (2,3). Within this context, epidemiological surveillance plays a crucial

role. The continuous monitoring of HIV cases in pregnant women and exposed children is essential for evaluating the effectiveness of prevention policies, identifying gaps in the care cascade, and assertively redirecting resources. In Brazil, the Information System for Notifiable Diseases (SINAN) is the primary tool for consolidating this data, allowing for the analysis of the profile and trend of these diseases (4).
The state of Paraíba, situated within the regional reality of the Northeast, requires specific analyses that portray the local dynamics of the epidemic. Studying the detection of HIV in pregnant women and the profile of exposed children in the state provides valuable information for local policymakers and managers.

Aim

To evaluate the HIV detection rate in pregnant women and the notification profile of children exposed to the virus in Paraíba, during the period from 2013 to 2024, utilizing data available in the Information System for Notifiable Diseases (SINAN).

Methods

This is a descriptive, retrospective study based on the analysis of secondary data from the Information System for Notifiable Diseases (SINAN).
We investigated HIV cases in pregnant women in Paraíba, which were measured by the detection rate (per 1,000 live births, using data from the Mortality Information System - SIM), and the profile of children exposed to HIV that were reported in the system. For the exposed children, the distribution by age at diagnosis was analyzed, categorized as: under 7 days, 7 days to less than 2 years, and 2 to 12 years.
It is important to note that the data related to the quadrennium 2020–2024 are preliminary and subject to revision. As this analysis involves publicly available secondary data, submission to an ethics committee was not required, in accordance with CNS Resolution No. 674/2022.

Results

A rising trend was observed in the HIV detection rate in pregnant women, increasing from 1.6 per 1,000 live births (LB) in 2013 to 2.4 per 1,000 LB in 2023.
Between 2015 and 2024, 1,021 children exposed to HIV were reported in Paraíba. The majority of these notifications occurred in newborns diagnosed under 7 days of life, representing 81.5% of cases in 2017 and reaching 90.9% in 2024, which indicates an expansion of early screening during the perinatal period. Notifications in older age groups (2 to 12 years) were infrequent.

Discussion

The increase in the HIV detection rate in pregnant women can be interpreted as a positive reflection of the expanded access to diagnosis during prenatal care in Paraíba. This finding suggests that more women living with HIV are being identified, which allows for the early implementation of antiretroviral therapy (ART) and other interventions that reduce the risk of vertical transmission (5).
The prominent proportion of children diagnosed early, still in the neonatal period, demonstrates that the state's healthcare network has been successful in properly implementing the VT investigation protocol, ensuring the

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timely initiation of clinical and laboratory follow-up. This result reinforces the importance of early screening as a crucial strategy to prevent negative outcomes associated with diagnostic delays (6,7).
However, the increasing trend in the detection rate also indicates that HIV continues to be transmitted among women of childbearing age, highlighting the need to intensify primary prevention measures, especially within primary healthcare (8). Strategies such as strengthening health education efforts, expanding testing in key populations, and greater integration between sexual and reproductive health services should be prioritized (8,9). Thus, while there have been advances in the early diagnosis and follow-up of exposed children, the challenge remains to reduce the incidence of new cases among pregnant women in order to move the state closer to the global goal of eliminating mother-to-child transmission of HIV (9,10).

Keywords

Pregnant Women;Exposed Children; Detection Rate

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Exogenous Poisonings In A Brazilian Emergency Hospital: Epidemiological Characterization And The Role Of The Pharmacist

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Introduction

Exogenous intoxications are health problems that arise from the interaction between the human body and external substances, such as beverages, food, medicines, drugs of abuse, pesticides, plants and other chemical products. These interactions may represent a health risk, as they lead to changes in the normal functioning of the organism and can be aggravated depending on factors such as: type of toxicant, route of contact, quantity and duration of exposure (1).

In the global context, poisonings affect about 1.5% to 3% of the population, corresponding to approximately 4.8

million people in Brazil (2), the majority of which occur through the ingestion of medications, either accidentally or as a suicide attempt, reflecting the increase in indiscriminate use of medicines. In this context, the pharmacist can act in the dispensing of pharmaceuticals, providing guidance on their rational use, adverse reactions and the consequences of the abuse of such substances (3).

Aim

The present study aims to characterize the epidemiological profile of exogenous intoxications treated at an emergency hospital in the interior of Alagoas and correlate the role of the pharmacist in the prevention and management of this important public health issue.

Methods

This is an epidemiological study, with a descriptive and retrospective approach, carried out through data collection from the Notifiable Diseases Information System (SINAN) regarding exogenous intoxications treated at an emergency hospital in the interior of Alagoas, from the period of August 2024 to August 2025, which were requested from the hospital epidemiology sector. Statistical analyses were performed on the variables of age group, sex, toxic agent, route of exposure, type of contamination, need for hospitalization, outcome, and area of residence. Subsequently, lethality rates were determined using the formula: Lethality rate=(nº of deaths due to exogenous intoxication/ nº of exogenous intoxications) × 100.

Ethics: Submission to the research ethics committee was not necessary, as this is an epidemiological study using secondary data from public domain sources.

Results

In the period from August 2024 to August 2025, 1274 cases of exogenous intoxications were reported, of which were recorded among patients: under 1 year of age = 21 cases (1.65%), from 1 to 4 years = 158 (12.40%), from 5 to 9 years = 44 (3.45%), from 10 to 14 years = 79 (6.20%), from 15 to 19 years = 196 (15.38%), from 20 to 29 years = 329 (25.82%), from 30 to 39 years = 200 (15.70%), from 40 to 49 years = 140 (10.98%), from 50 to 59 years = 49 (3.85%), from 60 to 69 years = 35 (2.75%), from 70 to 79 years = 12 (0.94%), above 80 years = 11 (0.86%). Regarding stratification by sex: female = 809 (63.50%) and male = 465 (36.49%). In 83 cases (6.51%) there was a need for hospitalization, while 1243 (97.56%) patients recovered without sequelae and 10 (0.78%) died due to intoxication.
Regarding the area of residence of the victims: urban = 795 (62.40%), rural = 434 (34.06%), peri-urban = 7 (0.54%), unknown information = 38 (2.98%). Among the main agents causing intoxications: medications = 845 (66.32%), household products = 79 (6.20%), rodenticides = 49 (3.84%), agricultural pesticides = 47 (3.68%), food and beverages = 50 (3.32%), drugs of abuse = 24 (1.88%), other toxicants and missing information = 180 (14.12%). The most common routes of exposure were: oral = 1138 (89.32%), respiratory = 67 (5.25%), cutaneous = 28 (2.19%), ocular = 4 (0.31%), other routes or missing information = 37 (2.90%). Regarding the most frequent contamination circumstances: suicide attempt = 756 (59.34%), accidental = 261 (20.48%), environmental = 39 (3.06%), abuse = 37 (2.90%), therapeutic use = 26 (2.04%), other circumstances and missing information = 155 (12.16%).

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Discussion

It is observed that female individuals represent the majority of exogenous intoxication cases (63.50%), characterizing a significant prevalence, which may be related to the fact that women choose less violent methods when it comes to suicide attempts, with drug and medication ingestion being more frequent, while men use more lethal methods, such as hanging and firearms (4).

In addition, there is consistency regarding the main agents causing intoxications, the routes of exposure and the circumstances of contamination. Medications account for 66.32% of cases, oral route 89.32%, and suicide attempts 59.34%, respectively.

It is also noted that in the children's age range of 1 to 4 years, there is a higher number of cases (12.40%) when compared to other childhood age groups. This is an age group that is commonly exposed to accidental intoxications with household and chemical products and medication errors, which requires greater attention from legal guardians (5). In this context, it is observed that the main cause of exogenous intoxications, after medications, is the ingestion of household products, accounting for 6.20% of cases.

In general, the age group with the highest prevalence of cases is 20 to 29 years, equivalent to 25.82%, which correlates with previous studies that identify the 20 to 30 year age group as the most prevalent for suicide attempts (4). When analyzing internal data from the hospital in Alagoas, it is found that the highest percentage of cases are in the 15 to 39 year age group, corresponding to 57.32%, and, to some extent, the population’s easy access to medications and self-medication contributes to the increase in exogenous intoxication cases (3).

Thus, it is possible to characterize the epidemiological profile of exogenous intoxications in a hospital in the interior of Alagoas, which broadly resembles national poisoning data in terms of age and sex distribution; however, it is also possible to perceive local particularities and allow for direction toward future research, such as which medications and chemical and pharmaceutical products are frequently used and which populations require significant interventions.

Keywords

Exogenous poisoning; Epidemiology; Pharmacist.

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Sociodemographic Profile And Vulnerabilities In The Aids Epidemic In Paraíba

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Introduction

Since its emergence in the 1980s, the HIV/AIDS epidemic has revealed social markers of vulnerability that strongly influence the profile of the most affected populations. In Brazil, the response to HIV has brought significant advances, such as universal access to antiretroviral therapy (ART), yet structural inequalities persist, hindering the control of the epidemic. Among the most relevant social determinants are race/color, education level, income, and access to healthcare services, all of which interact in complex ways, widening health inequalities (1,2). Studies indicate that the highest burden of the epidemic falls on populations under conditions of greater social

vulnerability, especially Black and Brown individuals, those with low education levels, and key populations (3,4). This scenario highlights the need for regional analyses that reveal how these inequities manifest in different contexts. In the case of Paraíba, understanding the sociodemographic profile of AIDS cases can guide healthcare policies that are more equitable and sensitive to local inequalities.

Aim

To characterize the AIDS cases reported in Paraíba between 2013 and 2024 according to race/color and education level.

Methods

This was a descriptive, retrospective study based on secondary data derived from the Information System for Notifiable Diseases (SINAN). All AIDS cases reported in the state of Paraíba between 2013 and 2024 were included. The variables of interest were race/color (White, Black, Brown, Asian/Yellow, and Indigenous) and education level (illiterate, elementary school, high school, and higher education), categorized according to official records.

The analysis considered the proportion of cases within each stratum, stratified by year of diagnosis, in order to identify temporal trends. Data related to the period from 2020 to 2024 were classified as preliminary, as they are subject to revision after the consolidation of the official databases by the Ministry of Health. The results were presented in the form of relative and absolute frequencies, without the application of statistical tests, given the purely descriptive nature of the study. As this analysis involves publicly available secondary data, submission to an ethics committee was not required, in accordance with CNS Resolution No. 674/2022.

Results

The analysis revealed a marked predominance of Brown individuals among the reported AIDS cases in Paraíba, accounting for 80.7% in 2023. This was followed by White individuals (13.1%) and Black individuals (3.0%), while the percentages for Asian/Yellow and Indigenous people remained residual throughout the entire period.

Regarding education level, a higher concentration was observed in the lower educational strata. In 2024, 23.5% of cases had incomplete elementary education and 20.0% had completed high school. The proportion of people with completed higher education remained stable at approximately 11.3%. These findings indicate that the AIDS epidemic in the state maintains a strong association with social markers of vulnerability

Discussion

The results underscore that the AIDS epidemic in Paraíba is superimposed upon the social and racial inequalities historically established in Brazil. The predominance of cases among Brown and Black individuals reflects the impact of structural and institutional racism on access to health, as described in various national studies (1,5). This pattern suggests not only an inequality in exposure to HIV but also in access to prevention strategies, early diagnosis, and timely treatment.

The association between AIDS and low education levels reinforces the relevance of education as a critical social determinant. Individuals with lower education face greater barriers to understanding prevention information, in

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addition to difficulties accessing and remaining in healthcare services (2,6). This finding corroborates national literature, which points to education as one of the factors most strongly associated with vulnerability to HIV. Globally, the World Health Organization (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) emphasize the importance of intersectoral policies to confront the epidemic, including the fight against racial and socioeconomic inequalities (6,7). In Brazil, the HIV response needs to be strengthened at the local level with specific policies for vulnerable populations, especially in regions with lower coverage of specialized services (6). Thus, the data presented here reinforce the urgency for public policies aimed at reducing social and racial inequities, combined with the strengthening of primary healthcare, the expansion of testing and combined prevention, and educational strategies that empower the most affected populations.

Keywords

Sociodemographic Profile; Social Vulnerability

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Drug Interactions Associated With Tamoxifen In Cancer Patients: Analysis In A Hospital In The Central-West Region Of Rio Grande Do Sul

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Introduction

Introduction: In the last five years, Brazil has recorded approximately 600,000 new cancer cases annually. Among women, the most prevalent type was breast cancer, accounting for 59.7% of diagnoses, according to data from the National Cancer Institute (INCA) (1). In this context, hormone therapy with tamoxifen, an oral antineoplastic drug, is among the protocols used for breast cancer treatment (2). Therefore, the role of pharmacists is essential in pharmacotherapeutic monitoring, guidance on the correct use of medications, assessment of adherence, monitoring adverse reactions, and identification of possible drug interactions, aiming to ensure that patients achieve positive treatment results (3). Thus, the concept of drug interaction is highlighted, defined as a pharmacological or clinical response to the administration of a combination of medications. These interactions can occur between the use of drug versus drug, as well as drug versus food. These interactions can lead to a greater effect (additive or synergistic) or a diminished effect (antagonist), resulting in the occurrence of unpredictable effects in the treatment (4).

Aim

Objective: To investigate possible drug interactions between tamoxifen and medications for continuous use in patients with breast cancer, aiming to identify potential risks to the therapeutic efficacy and safety of the treatment.

Methods

Methods: A cross-sectional study was conducted at an Oncology Center in the city of Santiago, Rio Grande do Sul, Brazil, from February to July 2024. The inclusion criteria for participation in the research were: female patients, aged between 20 and 80 years, diagnosed with breast cancer (ICD C50) and using tamoxifen as hormone therapy, at any stage of treatment. The study included 26 female participants who were undergoing treatment with tamoxifen at the time of the study. The medication prescriptions of these 26 patients were evaluated to identify possible drug interactions between continuous-use medications and the oral antineoplastic drug tamoxifen. Epidemiological data were collected through a questionnaire. The search for the classification of possible drug interactions with tamoxifen were carried out using the Drugs.com® system. After data collection and analysis, the data were organized into tables and the results entered into Microsoft Excel® in the form of charts and graphs. The project was submitted for review by the University's Research Ethics Committee and approved under Certificate of Submission for Ethical Appraisal (CAAE) No. 77142824.6.0000.5353.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

Results: The patients' ages ranged from 20 to 80 years, with 61.4% between 20 and 50 years and 38.3% between 60 and 80 years. The most prevalent age was 35 to 50 years, with 57.6% of patients in this age group. Among the patients interviewed, 30.7% had heart problems, including hypertension and cardiac arrhythmia, 11.5% had depression and anxiety, and 11.4% had diabetes mellitus, hypothyroidism and dyslipidemia. The drug interactions found between tamoxifen and other drugs used by the patients, according to Drugs.com®, were with the pharmacological classes of antidepressants, anticonvulsants, and antipsychotics (5). The following antidepressants - citalopram; venlafaxine; amitriptyline and the second-generation antipsychotic quetiapine may increase the risk of cardiovascular effects with drugs that prolong the QT interval. Oxcarbazepine is an anticonvulsant that may decrease the plasma concentration of tamoxifen, and fluoxetine is an antidepressant that may decrease the effectiveness of the antineoplastic drug (5). Furthermore, 28% of participants, as prescribed by a physician, used medications to alleviate hot flashes caused by tamoxifen, such as venlafaxine and desvenlafaxine, since estrogens are the first-line drugs for treating hot flashes, and in this case, they cannot be prescribed due to contraindications in women with breast cancer (6). Therefore, the use of drugs such as anticonvulsants and antidepressants is an alternative (6). In the present study, none of the participants reported visible adverse effects attributed to drug interactions. However, the absence of visible clinical manifestations

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does not exclude the risk of long-term adverse reactions, since these interactions can occur silently, compromising the effectiveness of the treatment.

Discussion

Discussion: The study identified relevant interactions between tamoxifen and other medications, mainly antidepressants, antipsychotics, and anticonvulsants. This drug has a significant potential for drug-food interactions, requiring clinical monitoring (7). Among the antidepressants, fluoxetine stands out, a selective serotonin reuptake inhibitor (SSRI) and inhibitor of the CYP2D6 enzyme. This enzyme is essential for the conversion of tamoxifen to its active metabolite, endoxifen. Inhibition of CYP2D6 may compromise treatment efficacy, increasing the risk of breast cancer recurrence (7,8). Furthermore, the use of oxcarbazepine, an anticonvulsant with a potential CYP3A4 inducer, may reduce tamoxifen plasma concentrations (5). Other commonly used antidepressants, such as citalopram, venlafaxine, and amitriptyline, although with less impact on CYP2D6, are associated with QT interval prolongation (5,9). This risk is increased with a history of cardiovascular disease, as observed in 30.7% of study participants. The same applies to the use of quetiapine, an atypical antipsychotic, also associated with QT interval prolongation (9). The absence of reports of adverse effects among the patients evaluated does not eliminate the risks associated with these interactions. Many of these changes can compromise the efficacy of cancer treatment or increase the risk of adverse events, especially cardiovascular complications. Although soy consumption was not reported by the participants, the literature indicates that this food can interact with tamoxifen due to its estrogenic isoflavones. This finding reinforces the importance of pharmacist guidance on dietary habits during treatment. Caution is recommended when consuming soy and soy products in patients undergoing tamoxifen treatment (5). The use of antidepressants and anticonvulsants to control hot flashes, a common symptom associated with tamoxifen use, reinforces the complexity of pharmacotherapeutic management. The choice of these drugs should be evaluated considering not only their efficacy in relieving symptoms but also their interaction profile and adverse effects (6). In this study, 28% of patients reported hot flashes, of which 57% were taking antidepressants such as venlafaxine and desvenlafaxine, in line with clinical recommendations that contraindicate the use of estrogens for this purpose in breast cancer patients (6). In the clinical setting, it is essential that the multidisciplinary team, including the pharmacist, be aware of possible sources of interactions, both drug and dietary, that may affect the course of treatment (10). Pharmacotherapeutic monitoring aims to identify and prevent Medication-Related Problems (DRPs), which can interfere with the patient's clinical outcome. Thus, the pharmacist's intervention, integrated with the healthcare team, contributes significantly to promoting the rational use of medications, with a focus on therapeutic efficacy and patient safety (11). Therefore, the importance of constant monitoring of drug interactions during tamoxifen treatment is evident. Individualized therapy, combined with an interdisciplinary approach, is essential to maximize treatment benefits, prevent relapses, and ensure patient safety.

Keywords

Breast cancer; Tamoxifen; Drug interactions

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Temporal Trend And Gender Disparity Of Acquired Syphilis In Paraíba, Brazil (2010–2024)

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Introduction

Syphilis is a systemic infectious disease caused by the bacterium Treponema pallidum. Its transmission occurs primarily through sexual contact, characterizing acquired syphilis, or vertically, leading to congenital syphilis. Epidemiologically, syphilis is classified as a notifiable disease, representing a persistent and significant public health challenge in Brazil. Limited access to early diagnosis, underreporting, and inadequate treatment, including failure to treat sexual partners, remain major barriers to its control (1, 3, 4).
Individuals who acquire the infection sexually may progress through different clinical stages. Without appropriate treatment, the disease can advance to the tertiary stage, which may occur years after the initial infection and

result in severe cardiovascular complications and neurosyphilis (3).
Since 2010, Brazil has been facing a reemergence of syphilis. In the state of Paraíba, located in the Brazilian Northeast, this regional trend was not only mirrored but also marked by an explosive increase in the number of reported cases from the second half of the 2010s onward. Understanding the dynamics of this epidemic—particularly its temporal distribution and gender disparities—is crucial for guiding more targeted and effective public health policies for prevention, diagnosis, and treatment. This study aims to address this gap by providing a detailed analysis of the trajectory of acquired syphilis in Paraíba.

Aim

To analyze the temporal trend of the mortality rate and the occurrence of severe outcomes related to congenital syphilis in the state of Paraíba, from 2000 to 2023. The study characterizes the distribution of final outcomes, with particular focus on the proportion of miscarriages and stillbirths, and discusses these outcomes as sentinel events indicative of failures in prenatal and neonatal care.

Methods

This is an ecological, descriptive study with a time-series approach. The analysis was conducted using secondary data from compulsory notifications of acquired syphilis in the state of Paraíba. Information was extracted from consolidated tables of the Notifiable Diseases Information System (SINAN), made available by the Department of HIV/AIDS, Tuberculosis, Viral Hepatitis, and Sexually Transmitted Infections (DATHI/SVSA/MS), covering the period from 2010 to 2024 (partial data up to June 30). As this research is based on secondary public-domain data, submission to an ethics committee was not required, in accordance with CNS Resolution No. 674/2022.
Data processing involved descriptive analysis, including calculation of absolute and relative frequencies of the variables of interest. Temporal trends were assessed through the evolution of the number of cases and detection rates per 100,000 inhabitants, presented in historical series and graphical visualization. The comparison of disease distribution between sexes was carried out based on the proportion of cases and the calculation of the Male/Female detection rate ratio over the years, in order to highlight the magnitude of gender disparity in the occurrence of the infection.

Results

The time-series analysis (2010–2024) revealed a drastic shift in the epidemiological profile of acquired syphilis in Paraíba beginning in 2017. Between 2013 and 2016, the number of reported cases ranged from 145 to 290. In 2017, notifications surged, reaching 1,039 cases. The historical peak occurred in 2019, with 1,775 cases. Consequently, the detection rate, which was 7.4 per 100,000 inhabitants in 2015, rose sharply to 44.2 per 100,000 inhabitants in 2019. Although data from 2020 onward are preliminary, they indicate that the elevated levels persisted in Paraíba, with 1,658 cases and a detection rate of 40.8 per 100,000 inhabitants reported in 2023.
The sex-based distribution demonstrates a consistent and growing disparity across the entire series. Men accounted for the vast majority of cases in all years analyzed. This male predominance, which represented 65.1% of cases during the 2010–2012 period, intensified to 68.8% in 2021. In absolute numbers, 2023 registered 1,090 male cases compared to 568 female cases, resulting in a Male-to-Female detection rate ratio of approximately 1.9:1.

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Discussion

This study confirms an alarming scenario of emergence and substantial growth of acquired syphilis in Paraíba, with detection rates remaining at critically high levels after the 2019 peak.
The abrupt reversal of the trend in 2017, with the number of cases nearly quadrupling compared to previous years, suggests a combination of factors. While the increase in transmission is real, the accelerated growth is strongly linked to the expansion of diagnostic capacity within the healthcare network (4). The decentralization of testing—particularly the implementation of Rapid Tests (RT) in Primary Health Care (PHC) services—facilitated the identification of a previously underreported reservoir of cases. The current challenge, reflected in the persistently high rates after 2019, lies in the ongoing shortcomings of primary and secondary prevention strategies (5).
The main finding of this study is the gender disparity, with syphilis consistently affecting men more than women. This male predominance can be interpreted from both biobehavioral and systemic perspectives. From a behavioral standpoint, men are more likely to engage in high-risk practices, including multiple sexual partners, alcohol and drug use, and lower adherence to safe sex practices (3). However, the systemic perspective is crucial: mandatory prenatal care ensures routine screening and prioritized treatment for women of reproductive age, which reduces both underreporting and the detection rate of acquired syphilis outside pregnancy. Conversely, men face greater difficulty or show lower adherence to preventive healthcare services, meaning their cases are often identified through partner screening or at more advanced stages of the disease (5).

Keywords

Acquired syphilis, Epidemiology, Public health

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Micrornas As Emerging Biomarkers In The Diagnosis Of Breast Cancer

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Introduction

Breast cancer is the most common malignancy among women worldwide, representing a serious public health issue due to its high incidence and mortality rates. Early diagnosis is crucial for improving prognosis and increasing rates, as the chances of a full recovery are significantly higher in the initial stages of the disease. However, conventional diagnostic methods – such as mammography, ultrasound, and biopsy – have notable limitations, including high costs, patient discomfort, and reduced sensitivity in women with dense breast tissue (1, 2). Against this backdrop, microRNAs (miRNAs) – small non-coding RNA molecules that regulate gene expression – have emerged as a promising class of biomarkers, offering the potential for non-invasive, accessible, and accurate testing. These molecules are highly stable in blood and other body fluids, and exhibit specific expression profiles across different breast cancer types and stages, enabling not only early detection and screening but also therapeutic monitoring (3,4).

Aim

To evaluate the scientific evidence regarding the potential of microRNAs as early biomarkers in breast cancer, with a particular focus on their role in the early detection and clinical monitoring.

Methods

This study is a narrative literature review conducted using the SciELO and PubMed databases. The following descriptors were used: “microRNAs,” “breast cancer,” “diagnostic,” “diagnostic panel microRNA breast cancer,” “biomarkers,” and “non-coding RNA,” combined with Boolean operators (AND, OR). The inclusion criteria comprised original articles and clinical studies published between 2010 and 2024, in Portuguese or English, with open access and full-text availability, that demonstrated a direct relationship with the research topic. Exclusion criteria included duplicate publications; studies exclusively in vitro or animal model studies without clinical correlation; and articles lacking a defined methodology. After an initial screening of 17 publications, 12 met the established criteria and were selected for qualitative analysis.

Results

Several microRNAs (miRNAs) have shown specific expression profiles that are specific to breast cancer. Notably, miR-21, miR-155, and miR-200 are frequently overexpressed in patients, and are associated with cell proliferation, tumour invasion, and metastasis (3,4,5). In contrast, reduced expression of miR-16 and miR-145 suggests a tumour-suppressor (6,8). The detection of these miRNAs in blood samples has emerged as a promising alternative, as it is minimally invasive, allows for rapid analysis, and enables the longitudinal monitoring of clinical progression (4,9). A recent study showed that combining miRNAs with traditional tumour markers, such as CA15-3, increased diagnostic sensitivity to 92%, surpassing conventional methods used in isolation (10). Beyond diagnosis, miRNAs also have the potential to aid personalized treatment planning by helping to select targeted therapies and evaluate clinical response (4,11).

Discussion

The findings of this review highlight the increasing interest in using microRNAs (miRNAs) as biomarkers for breast cancer. The overexpression of miR-21 and miR-10b, demonstrated across diverse populations – including Egyptian women – reinforces their potential for early diagnosis, even in initial disease stages, with high accuracy (5). Notably, miR-21 has been associated with more aggressive tumors, a higher risk of metastasis, and poorer prognosis, whereas the downregulation of miR-145 and miR-16 supports their role as tumor suppressors, making them valuable as prognostic markers and candidates for the development of targeted therapies (6,8). Studies have shown that multi-marker panels combining different miRNAs significantly improve diagnostic accuracy, especially in early stages of the disease, where mammography has lower sensitivity (4,10). Detection through peripheral blood analysis represents a major advancement, as it is non-invasive, can be repeated at short intervals, and allows real-time monitoring of disease progression (3,4,9). However, the clinical implementation of these biomarkers still faces several challenges. Pre-analytical variability – including differences in sample collection, processing, and storage – can affect miRNA stability (3,11). Additionally, the lack of consensus on reference genes for data normalization makes inter-study comparisons difficult (3,11,12). Another critical limitation is the scarcity

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of multicenter clinical trials, which are essential for validating findings across different populations (7,10). Furthermore, single nucleotide polymorphisms (SNPs) can influence the expression or function of miRNAs, representing potential complementary biomarkers for assessing genetic risk and personalizing diagnostic strategies (6,7). Therefore, although miRNAs demonstrate strong potential to revolutionize early detection and clinical management of breast cancer, their widespread application depends on the development of standardized protocols and robust validation studies. Future research should explore the integration of miRNA panels with artificial intelligence, enabling personalized models that incorporate clinical, genetic, and molecular factors to enhance diagnostic and therapeutic precision (11,12).

Keywords

microRNAs; breast cancer; biomarkers; early

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The Role Of Integrative Therapies In The Management Of Chronic Pain: A Literature Review

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Introduction

Pain can be defined as an unpleasant sensory and emotional experience related to potential or actual tissue damage. Characterized by its persistence for more than three months, chronic pain can have various causes, including chronic diseases, musculoskeletal conditions, and neuropathic pain. It is associated with complaints of tingling, heaviness, pressure, and tension. These symptoms are associated with a high risk of developing physical and emotional limitations, significantly reducing the quality of life of individuals with this condition due to the generation of mechanical and/or inflammatory pain. (1,2)

Thus, a significant obstacle to achieving relief and recovery from these symptoms is the lack of personalized therapeutic interventions focused on a multidisciplinary approach to chronic pain management. Therefore, scientific evidence supporting the use of integrative modalities to treat chronic pain continues to grow. Integrative and complementary practices (ICPs) are characterized by natural stimuli for treatment, prevention, and health recovery. (3)

Integrative therapies with evidence supporting their use in chronic pain include acupuncture, auriculotherapy, massage therapy, and herbal medicine. Acupuncture involves inserting fine needles into the skin at precise

positions to achieve therapeutic effects. Auriculotherapy uses reflex points in the outer ear for stimulation, which transmits information to structures of the nervous system. Massage therapy is defined as the manual manipulation of soft tissues to promote a sense of well-being and relieve symptoms of disease. Herbal medicine refers to medications produced with active ingredients from natural products such as plants and plant derivatives for the treatment of diseases. (3,4,5,6)

Aim

Thus, the objective of this study is to analyze the Integrative and Complementary Practices (PICs) most used as a therapeutic alternative in people diagnosed with chronic pain and evaluate their role as aids in the management of this condition generated by adjacent causes, in order to improve the quality of life of patients.

Methods

To achieve the mentioned objectives, an integrative literature review was conducted using published articles using the descriptors "Chronic Pain" and "Integrative and Complementary Practices" in the PubMed, Scopus, and Google Scholar databases to synthesize evidence on the topic. Articles published between 2020 and 2025 in these databases were selected, and found for the aforementioned descriptors.
Therefore, the inclusion criteria used were: articles published up to August 2025, studies addressing the application of integrative and complementary practices in chronic pain management, articles applying systematic and integrative review methodologies, studies published in English, Portuguese, and Spanish, and articles with full text available. Articles that did not meet the inclusion criteria were excluded. In order to synthesize the data found, a narrative and descriptive approach was used to aggregate the results of the chosen studies and provide adequate materials for the creation of this work.

Results

Regarding acupuncture, many clinical studies have shown its effectiveness in the short term, with electroacupuncture being better than manual acupuncture for pain relief and improving overall well-being. Some studies suggest that acupuncture may be effective in treating conditions such as chronic low back pain and osteoarthritis. Regarding chronic pain caused by fibromyalgia, clinical studies have reported that acupuncture and electroacupuncture can relieve pain, as well as improve sleep disturbances and other associated symptoms. However, because its mechanism remains to be elucidated to some extent, there is still disagreement regarding the effectiveness of acupuncture in fibromyalgia. Sufficient evidence of acupuncture's long-term effectiveness has not been found. (2,4,5,11,12)
Auriculotherapy has been shown to play a significant role in relieving chronic pain and helping to improve physical and functional abilities. Improvements in sleep and personal well-being have also been reported, resulting in a decrease in medication use. Regarding chronic musculoskeletal pain, electrostimulation promoted a more significant pain reduction compared to the use of semi-permanent needles by increasing the effectiveness of local analgesia. (3)
Massage therapy was supported by low-strength evidence for short- and medium-term pain relief, with little long-term pain relief. Regarding herbal medicine, studies have shown that most herbal remedies were significantly effective when combined with physical therapy in improving osteoarthritis-related pain and mobility in these

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patients. However, caution is required when using herbal remedies in conjunction with pharmacological therapy due to the risk of drug interactions. Treatment with medicinal cannabis has been associated with improved outcomes, reducing the need for opioids. (5,7,8,9)

Discussion

The findings of this literature review demonstrate that combining different therapeutic strategies often produces better results. The choice of therapeutic practice for chronic pain depends on several factors, including the underlying cause of the pain, the patient's individual response, associated side effects, and the severity of reported symptoms. Therefore, although the effectiveness of these strategies may vary, it is important that patients have the opportunity to explore practices that align with their specific circumstances, emphasizing the need for a personalized approach for each patient, and understanding the available options is crucial. (2)
Phytocannabinoids may be a low-cost and well-tolerated therapy for reducing symptoms and improving quality of life in patients with fibromyalgia. Future studies are needed to evaluate long-term benefits and clarify general health and psychosocial issues. Furthermore, it is essential to analyze the effects of acupuncture compared with pharmacological interventions for neuropathic pain, as it can reduce pain intensity, alleviate symptoms, and result in a better quality of life. (9,10)
Further long-term studies are essential to analyze the long-term effects of different integrative practices and chronic pain management strategies. It is recommended that future research focus on more personalized treatment strategies, taking into account individual patient characteristics. Furthermore, a deeper understanding of the mechanisms underlying chronic pain is necessary to develop more effective interventions. (2,4)
Therefore, we conclude that integrative and complementary therapies are important for more effective treatment of patients with chronic pain due to their role as an adjunct to pharmacological treatments and in alleviating symptoms that affect people with this syndrome. We must continue to pay close attention and conduct long-term clinical observations on the therapeutic effects of these therapies in patients, aiming to improve the management of this challenging condition and improve their quality of life.

Keywords

Chronic pain; Integrative and complementary therapies

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Phytoestrogenic Action Of Lepidium Meyenii Walp. And Trifolium Pratense L. In The Management Of Climacteric And Menopausal Symptoms

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Introduction

The climacteric represents a transitional phase between the reproductive and non-reproductive stages of a woman's life, characterized by the progressive decline in estrogen and progesterone production. This stage is frequently associated with clinical manifestations such as hot flashes, sleep disturbances, emotional changes, cognitive impairments, and an increased risk of metabolic and cardiovascular diseases (1,2). Menopause, in turn,

marks the definitive end of fertility, defined by the absence of menstruation for 12 consecutive months and the establishment of hypergonadotropic hypogonadism, resulting from reduced ovarian sensitivity and a pronounced decline in estradiol levels (3). The estrogen deficiency associated with menopause has systemic effects, impacting bone health, the cardiovascular system, skin, and the central nervous system. Management should be individualized and may involve hormone therapy, lifestyle interventions, psychological support, and complementary therapeutic approaches (4). In this context, phytotherapy has gained prominence as an alternative or adjuvant strategy, particularly through the use of phytoestrogens—bioactive compounds capable of modulating hormonal and metabolic responses, alleviating climacteric symptoms, and promoting quality of life (5,6). Among the most extensively studied medicinal plants, Trifolium pratense (red clover) and Lepidium meyenii (maca) show promising evidence. Beyond the attenuation of characteristic climacteric and menopausal symptoms, studies suggest beneficial effects on conditions of the endocrine and female reproductive systems, such as premenstrual syndrome, polycystic ovary syndrome, endometriosis, sexual dysfunction, and uterine fibroids. These findings reinforce the therapeutic potential of these plants as lower-risk options, with the possibility of reducing the long-term dependence on conventional medications, which are often associated with adverse effects (6).

Aim

This study aims to review the therapeutic use of medicinal plants (Trifolium pratense and Lepidium meyenii) in the management of climacteric and menopausal symptoms, emphasizing phytoestrogens as bioactive compounds that partially mimic human estrogen. The review addresses their mechanisms of action, benefits, and potential risks, highlighting the therapeutic potential of these alternatives to improve quality of life during the hormonal transition.

Methods

A literature review was conducted in the following databases: PubMed, Scopus, SciELO (Scientific Electronic Library Online), Web of Science, Google Scholar, IEEE Xplore, and governmental platforms. Searches were performed using descriptors and keywords related to the topic, such as phytotherapy, medicinal plants, climacteric, menopause, women's health, Trifolium pratense, Lepidium meyenii, integrative and complementary therapies, and hormone therapy, applied individually or in combination. Studies directly addressing the research topic were included, comprising clinical trials, cohort studies, systematic reviews, full-text articles, official documents, theses, and dissertations, published in Portuguese, English, or Spanish. Publications with no direct relevance to the study, those with methodological weaknesses or inconsistent results, as well as conference abstracts, opinion pieces, letters to the editor, and duplicate studies across databases were excluded. The selection of articles followed methodological quality criteria, considering study design, sample size, internal and external validity, and potential biases. Extracted data from each included publication encompassed author, year, study type, methodology, main findings, and conclusions, organized in a standardized manner to allow comparison across analyzed data.

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Results

Lepidium meyenii Walp. (maca), da família Brassicaceae, é uma planta andina usada tradicionalmente como alimento e remédio (7). Estudos recentes indicam seu potencial em aliviar sintomas menopáusicos, sem alterar hormônios (8). Rica em macamides, macaenes, flavonoides e minerais, contribui para redução do estresse oxidativo, saúde óssea e metabólica (7,8). Modula o eixo hipotálamo-hipófise via vias serotoninérgicas, influenciando hormônios como T4 (9,10) e promove alívio do estresse, neurogênese hipocampal e transmissão serotoninérgica/noradrenérgica (11). Ensaios clínicos mostram redução de ondas de calor, sudorese noturna, ansiedade, fadiga, e melhora de humor, libido, função sexual, cognição e saúde cardiovascular (9–13). Disponível em pó, cápsulas ou extratos (1–3 g/dia); doses altas podem causar desconforto gastrointestinal, alterações de apetite ou toxicidade hepática. Evitar em condições hormonossensíveis como câncer de mama ou ovário (9,14). Trifolium pratense L. (trevo-vermelho), da família Fabaceae, contém isoflavonas fitoestrogênicas, genisteína, daidzeína, biochanina A e formononetina, que se ligam a receptores de estrogênio (15,16). Pode reduzir sintomas vasomotores, apoiar saúde óssea, prevenir osteoporose, e melhorar perfil lipídico, humor, sono e ansiedade (15–20). Em ensaio com 120 mulheres pós-menopáusicas, houve leve melhora em ondas de calor, sem efeito significativo global nos sintomas ou satisfação sexual (21). Disponível em extratos, cápsulas, comprimidos, chás ou formulações combinadas (40–80 mg/dia); excesso pode alterar hormônios (15,22). Evitar em cânceres hormonodependentes, gestação ou lactação; cautela com anticoagulantes devido ao cumarim (22,23).

Discussion

The search for safe and effective alternatives to manage climacteric and menopausal symptoms has increased interest in herbal therapies such as L. meyenii Walp. (maca) and T. pratense L. (red clover). Both species contain bioactive compounds that influence hormonal balance, bone metabolism, cardiovascular health, and psychological well-being, representing potential complementary strategies to conventional hormone therapy. Maca, traditionally consumed in the Andes as food and medicine (7), is rich in macamides, macaenes, alkaloids, sterols, flavonoids, polyphenols, and essential minerals, which support hypothalamic–pituitary regulation, antioxidant defenses, and bone health (8). Although it contains no hormones, maca appears to modulate serotonergic and noradrenergic pathways, the endocannabinoid system, and hippocampal neurogenesis, explaining its reported benefits on mood, cognition, and sexual function (10,11). Clinical studies support these effects: a pilot trial with 14 women (3.5 g/day, six weeks) showed reduced anxiety, depression, and sexual dysfunction without hormonal changes (12), while Dording et al. (13) reported improved sexual function in 45 women on antidepressants after 12 weeks (3 g/day). Despite promising findings, trials are limited by small sample sizes and short duration. Maca is generally well tolerated, though high doses may cause gastrointestinal discomfort or rare hepatotoxicity, and it should be avoided in hormone-dependent cancers (14). Red clover (T. pratense) contains isoflavones, genistein, daidzein, biochanin A, and formononetin that act as phytoestrogens by binding estrogen receptors (16). This activity suggests potential benefits for vasomotor symptom relief, lipid profile improvement, and bone health, supporting osteoporosis prevention (17,18). Additional reports indicate positive effects on mood, sleep, and anxiety (20). However, clinical outcomes are inconsistent. In a randomized trial with 120 women, Del Giorno et al. (21) found no significant overall improvement in menopausal symptoms with red clover extract (40 mg/day, 12 months), although hot flashes were reduced. Variability in response may relate to intestinal metabolism, genetic differences, and bioavailability. Excess phytoestrogen intake may disrupt hormonal

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balance, and use is contraindicated in hormone-dependent cancers, pregnancy, and lactation (22), with caution advised for anticoagulant interactions (23). In contrast, maca exerts primarily adaptogenic and psychotropic effects without direct estrogenic activity, while red clover mimics estrogen, potentially enhancing relief of vasomotor symptoms but increasing interaction risks. Integrating these herbs into clinical practice requires individualized assessment of medical history, comorbidities, and patient preferences. Both L. meyenii and T. pratense show promise as phytotherapeutic options for menopause, but heterogeneity of outcomes, risks of misuse, and lack of standardized extracts underscore the need for further research.

Keywords

Lepidium meyenii; Trifolium pratense; Menopausal

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Implementation Of Health Education In The Pediatric Clinic Of A High Complexity Hospital In Fortaleza (Ce).

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Introduction

Promoting patient safety is a major challenge for healthcare professionals, especially when it comes to the correct and rational use of medications (1). In pediatrics, this challenge is even greater, as parents do not always receive information on how to continue care at home. According to statistical data from the National Toxicological and Pharmacological Information System (SINITOX) of the Oswaldo Cruz Foundation (FIOCRUZ), children between the ages of 1 and 4 suffer the most from drug poisoning, with almost 130,000 cases per year, followed by those aged 5 to 9 (32,668 cases) and 10 to 14 (24,282) (2). These data highlight the urgent need to implement educational initiatives that promote the continued safe use of medications at home. Therefore, it is essential that pharmacists act as facilitators in promoting the correct use of medications and accident prevention. In view of this need, an academic initiation project entitled “Health Education on the Safe Use of Medications at Home” was developed at a High Complexity Teaching Hospital in Fortaleza(CE). There was a clear need to promote information on the

storage, administration, self-medication, and disposal of medications in light of frequent readmissions due to worsening of the disease or the emergence of new comorbidities. With this information, the health education project was developed to identify the information needs of parents/guardians and caregivers and to promote health education on medication management and patient safety in the home environment, as well as care for the environment during the disposal of medications.

Aim

Implement health education initiatives in the pediatric clinic of a high-complexity teaching hospital in Fortaleza (CE).

Methods

This is a descriptive action research study with a quantitative-qualitative approach, conducted at a high-complexity teaching hospital in Fortaleza(CE). The project was developed in partnership with the University, which provided two scholarship students to participate in the study. They joined the project under the guidance of two pediatric clinical pharmacists. The actions began in April 2025, and the data presented here refer to its development until the first half of September 2025. Among the stages under development, it began with a list of topics already observed by pharmacists, a survey of the need for explanation of topics/questions raised by parents/caregivers, as well as the use of questionnaires with these individuals, aged over 18, on a voluntary basis. The questionnaire had four objective questions and one subjective question addressing knowledge and practices regarding the safe use of medications at home. The approach to health education participation took place during visits by clinical pharmacists and scholarship recipients, at the bedside or in the playroom, always respecting the free will and convenience of the participants' schedules. The interaction and communication between professionals, scholarship recipients, and companions made it possible to identify topics that needed greater attention and to conceptualize new strategies to develop the research and reach new target audiences. Thus, the subsequent stages involved the construction of educational and recreational materials for children, aiming to introduce them to the subject, encourage their participation in conversations, and raise their awareness of care according to their age.

Results

After implementing the educational initiative and analyzing the pre-tests, we observed some challenges, such as low engagement in the group approach, which led the team to adapt the strategies for conversation circles, which encouraged active listening and the exchange of experiences. This change resulted in greater participation by companions, despite the hospital environment. Sixty-seven responses were analyzed, with the majority being women between the ages of 18 and 60. This analysis showed that companions aged 18 to 30 had a greater understanding of the topic and were more careful about the storage, use, and disposal of medications in their homes. Despite this understanding of the subject, a contradiction was identified between knowledge and practice. For example, most knew that they should not dispose of medicine bottles/packages (still containing medicine) in regular trash, but admitted to making this mistake due to difficulties in accessing appropriate collection points. Analysis of the questionnaires revealed good knowledge about the safe use of medications: (98.5%) recognized water as the appropriate liquid for taking medications, (88.1%) correctly indicated what to do if

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they forgot to take a dose at the prescribed time, (85.1%) said they stored medicines in places protected from light, moisture, and heat, and (53.7%) identified that there are several risks involved in taking medicine on their own.

Discussion

The development of the project shows that health education and promotion practices are fundamental for raising individuals' awareness about their health, enabling them to play an indispensable role in maintaining or improving their quality of life. It should be noted that despite a high level of knowledge on the subject, there is still a gap between knowing and doing. This finding reinforces the findings of previous studies, which indicate that knowledge about medication safety does not automatically translate into correct practice, requiring the implementation of continuous and contextualized educational strategies. In summary, this research corroborates that educational actions aimed at caregivers are fundamental to reinforce the idea of safe practices in the use of medications in their homes, especially with their children. The combination of interactive actions, accessible language, and frequent monitoring contributes significantly to the transformation of knowledge, ensuring not only patient safety but also strengthening the academic training of the scholarship recipients involved in terms of the importance of active listening and the use of accessible language for the population.

Keywords

Health Education; Patient Safety; Pharmacy

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Pharmaceutical Interventions In The Prevention Of Venous Thromboembolism In Hospitalized Patients

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Introduction

Venous thromboembolism (VTE), which includes deep vein thrombosis and pulmonary embolism, represents one of the leading causes of morbidity and mortality in hospitalized patients, particularly those undergoing surgery, prolonged immobilization, or presenting with associated chronic diseases. Despite its clinical impact, VTE is a largely preventable condition through pharmacological or mechanical measures (1).
National and international guidelines recommend the use of standardized tools for VTE risk stratification, which consider factors such as age, type of surgery, duration of immobilization, and presence of comorbidities, thereby

supporting the selection of the most appropriate prophylactic strategy. Evidence demonstrates that the systematic adoption of these measures significantly reduces the incidence of thromboembolic events in hospitalized patients (2,3).
Within this context, the clinical pharmacist plays an essential role, contributing to the early identification of eligible individuals, the proper adjustment of pharmacotherapy, the prevention of drug interactions, and the education of the multidisciplinary team, thereby strengthening patient safety practices (4).

Aim

To analyze the importance of pharmaceutical interventions in the prevention of venous thromboembolism in hospitalized patients, from the perspective of the clinical pharmacist's role in the intensive care unit.

Methods

An integrative literature review was conducted focusing on the role of the clinical pharmacist in the prevention venous thromboembolism (VTE) in intensive care units (ICUs). The search was performed in PubMed, LILACS and SciELO databases in September 2025, using the descriptors: "venous thromboembolism", "pharmacist", "intensive care unit", "clinical pharmacy" and "patient safety", combined with Boolean operators. Articles published between 2010 and 2025 in Portuguese, English or Spanish that addressed pharmaceutical interventions aimed at VTE prophylaxis in hospitalized adult patients, particularly in ICUs, were included. Regulatory documents, such as CFF Resolution No. 675/2019, which establishes the responsibilities of the clinical pharmacist in ICUs (5), as well as national and international guidelines on VTE prophylaxis (3,6) were also analyzed. Exclusion criteria included studies focused exclusively on VTE treatment, narrative reviews without methodological description, and publications lacking results on pharmaceutical interventions. Extracted data included study type, population profile, interventions performed, adherence to prophylaxis protocols, occurrence of thromboembolic events, and patient safety indicators. The findings were synthesized descriptively, seeking to identify trends and knowledge gaps regarding the impact of pharmacists on VTE prevention in critical settings.

Results

A total of 20 studies were selected for final analysis. The inclusion of clinical pharmacists in the ICU multidisciplinary team showed a significant impact on adherence to institutional venous thromboembolism (VTE) prophylaxis protocols. Brazilian studies reported adherence rates of 92.2% to proposed interventions, with approximately 82% acceptance of pharmaceutical recommendations (7,8). The main activities described included review anticoagulant prescriptions, dose adjustment in patients with renal dysfunction or hepatic impairment (9), identification and prevention of drug interactions, and detection prescribing errors. Additional contributions included guidance on timing, route and frequency of administration, correction of therapeutic duplications, and medication reconciliation at admissions and discharge, allowing the identification and resolution of clinically relevant therapeutic discrepancies (7,10).
International studies also indicated that the inclusion of the clinical pharmacist in ICUs was associated not only with increased adherence to prophylaxis guidelines but also with reduced thromboembolic events and hemorrhagic complications related to antticoagulant therapy (11). Beyond the clinical impact, pharmacist participation was linked to resource optimization, with reduced hospital stay and lower costs associated with

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medication use (12). Educational strategies and post-discharge follow-up were also highlighted as fundamental to ensuring continuity of prophylaxis in high-risk patients (10,13). Overall, the findings reinforce that pharmaceutical interventions are an essential for optimizing pharmacotherapy, preventing complications, and consolidating safe practices in intensive care settings.

Discussion

The results of this review demonstrate the significant impact of clinical pharmacist in ICUs on improving adherence to VTE prophylaxis protocols. The intensive care environment concentrates patients with multiple risk factors, making rigorous pharmacotherapy monitoring essential. Pharmacist involvement enables systematic assessment of prophylaxis needs, dosage adjustment of anticoagulants, prevention of drug interactions, and guidance on safe medication use, thereby reducing adverse events and optimizing clinical outcomes (14).

These findings are consistent with recent international evidence. Zhang et al. (11) demonstrated that the inclusion of clinical pharmacy services in ICUs increased compliance with VTE prophylaxis guidelines and significantly reduced both thromboembolic events and bleeding complications compared with the control group. Similarly, a systematic review and meta-analysis in critically ill patients showed that the appropriate use of low-molecular-weight heparins reduces the occurrence of deep vein thrombosis and confirms the effectiveness of prophylactic measures, especially when implemented through standardized protocols (15). Such evidence aligns with national data, which demonstrated adherence rates above 90% to pharmaceutical interventions in Brazilian hospitals (7,8), reinforcing the consistency of results across different contexts.

The positive impact of pharmaceutical interventions can be explained by mechanisms such as early risk stratification, identifying patients eligible for prophylaxis before complications arise, prescription review and dose adjustments that ensure appropriate dosing, preventing therapeutic failures and adverse events. Additionally, participation in multidisciplinary rounds enhances communication among team members and timely resolution of drug-related problems, contributing to safety and effectiveness of prophylaxis (16,17). Another relevant factor is medication reconciliation at admission and discharge, ensuring continuity of treatment and reducing therapeutic discrepancies (10).

From a practical standpoint, the integration of clinical pharmacist as active members of ICU teams has important implications, as it is considered both a patient safety and pharmacoeconomic strategy. Economic studies demonstrate that pharmaceutical interventions reduce hospital costs, primarily related to length of stay and inappropriate medication use (18).

Despite positive outcomes, this study presents limitations, as most available evidence comes from observational studies with small samples sizes, hindering generalization. Moreover, heterogeneity in prophylaxis evaluation criteria and the scarcity of data on post-discharge follow-up limit the conclusions. Therefore, future research should prioritize randomized clinical trials and longitudinal studies, as well as the development of standardized quality indicators and cost-effectiveness analyses applicable to different hospital settings.

In conclusion, this study reinforces that the integration of the clinical pharmacist into ICU multidisciplinary team is essential for optimizing pharmacotherapy, preventing thromboembolic complications, and consolidating safe practices, thereby representing a crucial strategy for improving care quality and patient safety.

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Keywords

Venous thromboembolism; Clinical pharmacists;

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The Importance Of The Pharmacist In The Management Of Solid Organ Transplants: An Integrative Review

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Introduction

Solid organ transplantation represents a remarkable advance in medicine, representing an indispensable therapeutic option for patients with end-stage organ failure. However, the success of the procedure depends on proper postoperative management and rigorous care regarding the use of immunosuppressants to prevent rejection of the transplanted organ and minimize adverse events related to drug therapy. In this scenario, the role of the clinical pharmacist has established itself as a fundamental component in ensuring the safety, efficacy, and continuity of treatment, as the pharmacotherapeutic management of these patients presents considerable challenges. To ensure the safety, efficacy, and continuity of treatment, pharmacists are part of multidisciplinary teams, contributing to individualized therapy, pharmacokinetic monitoring, the prevention and resolution of medication-related problems (DRPs), and the improvement of clinical outcomes. Collaboration between pharmacists and other healthcare professionals—physicians, nurses, and nutritionists—is essential for the

overall success of the transplant and for promoting patients' quality of life. Activities such as medication reconciliation, when performed systematically, enhance the quality of care and contribute to better clinical outcomes, regardless of the geographic and population context.

Aim

To evaluate, based on the current available literature, the role of pharmacists in the management of solid organ transplant patients, exploring their clinical contributions, intervention strategies, challenges faced, and perspectives for the consolidation of this practice within the scope of global health.

Methods

An integrative literature review was conducted using the inclusion criteria of various studies published in the last five years (2020 to 2025), available completely free of charge, relevant to the topic, and present in the Embase, LILACS (via BVS), and MEDLINE (via PubMed) databases. To locate the studies, a search term was developed for each database using the PICo strategy, considering the population as individuals who underwent solid organ transplants, the intervention as the role of the pharmacist, and the context as transplant units and tertiary hospitals worldwide. The search strategies used DesC's controlled vocabulary for MEDLINE and LILACS, where the former included only English terms and the latter included English terms and their equivalents in Spanish and Portuguese. For Embase, terms from Emtree were used. The articles found were organized into a table for joint analysis by the authors, who evaluated the titles and abstracts of the papers and excluded other reviews, incomplete or unavailable texts, and those outside the scope. The remaining articles were read in their entirety, paying closer attention to the results.

Results

After searching the databases, a total of 26 studies were found: 21 from Embase, 1 from LILACS, and 4 from MEDLINE. The titles and abstracts of the studies were analyzed, excluding those that were out of scope, duplicated, or non-original. Four studies were selected that presented perspectives on pharmaceutical practice on the proposed topic. Transplant patients require constant immunosuppression, which makes them polymedicated and susceptible to various DRPs. A retrospective study conducted in Ankara highlighted the role of pharmacists in identifying these problems in transplant recipients, the most frequent being related to safety, dose selection, and inappropriate combinations with medications, herbal remedies, or dietary supplements (1). Another highlighted role is medication reconciliation (MR). In Thailand, the impact of MR performed by pharmaceutical care in the post-liver transplant clinic was observed, where there was a reduction from 8.7% to 5.0% in medication errors (medication omission and incorrect dose/frequency). The number of DRPs increased from 66 to 111 after the service was implemented, attributed to the constant review of protocols. Furthermore, the physician acceptance rate increased from 86.4% to 91.3% (2), indicating greater trust and integration within the multidisciplinary team. Pharmacists also provide services through teleconsultations. Supko, E. et al. (3) evaluated remote clinical pharmacy services for post-heart transplant patients. In this study, the most common interventions included management of adverse effects (34%) and renal dose adjustment (17.8%). Challenges were also encountered, as shown by Yang, H. et al. (4), who found an average of 0.8 pharmacists per 100 transplant patients. In addition to the reduced workforce, challenges related to inconsistent services, limited patient

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coverage, and inadequate standardization or digitalization highlighted the difficulties of pharmacy services in China.

Discussion

The studies identified that medication reconciliation and DRP detection are essential for preventing medication-related errors and improving continuity of care. These processes help ensure that patients continue with the appropriate treatment regimen, which is vital for long-term transplant success. Collaboration between clinical pharmacists and prescribing physicians is crucial for effectively detecting and correcting problems, ensuring that patients receive the same care and support after transplant. Another important aspect is the management of drug interactions, especially with medications for other clinical conditions the patient may have, such as viral infections or transplant-associated illnesses. By monitoring potential interactions between these medications and immunosuppressants, pharmacists can prevent complications by adjusting dosages or suggesting safer therapeutic alternatives, even when conducting consultations remotely through technologies such as teleconsultation. This was particularly important during the pandemic or for patients who have difficulty accessing in-person care and can be adapted to future scenarios. However, this will only be possible if challenges such as overlapping roles and a low workforce are overcome. A national assessment is also necessary, given that none of the selected studies included Brazilian studies, indicating a significant research gap. In short, pharmacists play an indispensable role in the management of solid organ transplants, contributing to patient safety, treatment efficacy, and the prevention of complications. Continuity of pharmaceutical care, from admission to post-discharge follow-up, is essential to ensuring the quality of life of transplant patients. Despite advances in pharmaceutical practices in organ transplants, challenges remain, particularly in developing countries, where a lack of resources and specialized training hinders the implementation of effective pharmaceutical services. Investing in ongoing training for pharmacists, expanding access to pharmaceutical care, and adopting new monitoring technologies are essential steps to improving post-transplant care, but this will only be possible with the development of more national studies on the topic.

Keywords

Organ Transplantation; Pharmacists; Pharmaceutical Services

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Mortality And Severe Fetal Outcomes From Congenital Syphilis As Sentinel Events In Paraíba (2000-2023)

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Introduction

Congenital syphilis (CS) is a systemic infection caused by Treponema pallidum, transmitted vertically from mother to fetus, primarily through the placenta. This transmission can occur at any stage of pregnancy when not properly diagnosed and treated, resulting in a spectrum of consequences for the newborn. While some babies are asymptomatic, CS is, in its most severe cases, associated with spontaneous abortion, stillbirth, and neonatal death, constituting a crucial and preventable problem in the context of maternal and child health (1,2).
In Brazil, congenital syphilis has been a notifiable condition since the 1980s, with cases recorded in the Notifiable

Diseases Information System (SINAN). The magnitude of the problem is clear: between 1999 and June 2024, 344,978 cases of CS were documented in the country in children under one year of age, of which 3,554 resulted in death in this age group (3). Regionally, the state of Paraíba reported 302 cases of CS in 2023 alone (4).
Syphilis treatment in pregnant women is universal and free through the Unified Health System (SUS), with benzathine penicillin being the drug of choice. This therapy is highly effective in preventing vertical transmission and reducing serious outcomes. The persistent number of deaths and fetal outcomes, even with the availability of treatment, indicates that the problem does not lie in the effectiveness of the therapy, but rather in failures in its application and adherence throughout the care chain (5). Therefore, analyzing mortality trends and the proportion of severe fetal outcomes (miscarriage and stillbirth) in the state of Paraíba is essential to better understand the real and preventable impact of CS on public health. This study focuses on the most critical phase of the epidemic, seeking to direct intersectoral efforts to improve surveillance and care.

Aim

To analyze the temporal trend of the mortality rate and the occurrence of severe outcomes due to congenital syphilis in the state of Paraíba, from 2000 to 2023. The distribution of the final outcomes is characterized, especially the proportion of miscarriage and stillbirth, and these outcomes are discussed as sentinel events of failures in prenatal and neonatal care.

Methods

This is an ecological, descriptive, time-series study based on the analysis of secondary data. Information was obtained from the Mortality Information System (SIM) and the Notifiable Diseases Information System (SINAN). The data were compiled by the Department of Health Analysis and Surveillance of Noncommunicable Diseases (DATHI/SVSA/MS) and the Department of Strategic Programmatic Actions (DAENT). The data used refer to deaths and the Mortality Rate per 100,000 Live Births (LB) due to congenital syphilis, as well as the classification of the final diagnosis.
The analysis consisted of calculating the absolute and relative frequencies of the selected variables. The temporal evolution of the number of deaths and the mortality rate was represented in a time series and graphical visualization. The proportion of severe outcomes (miscarriage and stillbirth) was calculated relative to the total number of CS reports for the year, aiming to assess representativeness and changes in the profile of fetal outcomes.
Because this was an analysis of publicly available secondary data, submission to an ethics committee was not required, in accordance with CNS Resolution No. 674/2022.

Results

The analysis of the historical series (2000-2023) records a total of 58 deaths from CS in children under one year of age. The Congenital Syphilis Mortality Rate (CM/100,000 LB) fluctuated, with a peak in 2013 (5 deaths). After a period of relative decline (reaching 1.7/100,000 LB in 2015 and 2017), the CM has risen again dangerously in recent years. In 2023, 3 deaths were recorded, but the rate reached 5.8 per 100,000 live births, indicating a worsening situation and reinforcing the persistent lethality of the disease.
The distribution of reported CS cases demonstrates the high severity of the infection. In 2023, the majority of

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cases were classified as recent CS (84.1%). However, fetal fatalities accounted for 15.9% of all reports that year, with 8.7% classified as stillbirths and 7.2% as miscarriages due to syphilis. This means that for every 100 reported cases of congenital syphilis, approximately 16 resulted in total fetal loss, an alarming indicator of failure in prenatal screening and treatment.

Discussion

Analysis of data on Congenital Syphilis (CS) in Paraíba reveals a scenario of persistence and worsening. The return of the Mortality Rate (MC) to high levels (5.8/100,000 LB in 2023) and the high proportion of fetal fatalities (15.9% in 2023) indicate that CS is not only prevalent but also being poorly managed in the maternal-child care chain. Death from CS and fetal loss are classically defined as sentinel events in public health, as their occurrence denotes failures at multiple levels of the system and are entirely preventable(6).

The high incidence of miscarriages and stillbirths is intrinsically linked to poor prenatal care quality. This includes late initiation, insufficient number of appointments, failure in serological screening, or diagnosis made too late in pregnancy, when fetal damage is already irreversible. However, failure is not limited to diagnosis. The persistence of cases, even after screening, points to problems with treatment effectiveness, which may result from inadequate treatment or non-adherence/non-treatment of the sexual partner, leading to maternal reinfection during pregnancy (7,8).

Furthermore, socioeconomic and structural barriers limit access and adherence. Social vulnerability and low education levels often correlate with poor access to services and the difficulty in fully complying with the lengthy monitoring and treatment regimen for both the pregnant woman and the newborn. Therefore, to reverse this situation in Paraíba, the focus must shift from simple reporting to monitoring and improving care (9,10).

It is crucial to implement measures that include: rigorous training of Primary Health Care teams in the correct management of penicillin; increased surveillance and active search for non-responding pregnant women; and prioritized and effective tracking of sexual partners; and ensuring continuous outpatient monitoring of exposed newborns for up to 18 months, combating low postpartum adherence (1). Ultimately, the findings of this study should serve as a thermometer of the quality of maternal and child health in the state. The reduction in the mortality rate and severe fetal outcomes is the most tangible indicator that systemic failures in syphilis control are, in fact, being corrected.

Keywords

Congenital syphilis; Stillbirth; Neonatal death.

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The Role Of Pharmacists In Providing Palliative Care In Oncology

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Introduction

Cancer remains one of the leading causes of morbidity and mortality worldwide, often associated with severe pain, debilitating symptoms, and emotional distress, making palliative care an essential component of cancer treatment[1]. The World Health Organization defines palliative care as an approach that improves the quality of life of patients and their families facing life-threatening illnesses through the prevention and relief of suffering, with early identification and effective management of pain and other physical, psychosocial, and spiritual problems[2]. In this context, clinical pharmacists have taken on an increasingly important role, going beyond the dispensing of medications to include systematic review of pharmacotherapy, identification of interactions and adverse reactions, monitoring of clinical parameters, and education of patients and multidisciplinary teams[3–5]. In oncology, these skills are especially important due to the complexity of therapeutic regimens, high polypharmacy, and the frequent need for individualized adjustments[6].

Studies indicate that the role of the pharmacist contributes to better pain control, optimization of the use of opioid analgesics, reduction of adverse effects, and greater clinical documentation, in addition to strengthening the integration of the multidisciplinary team[3–7]. Strategies such as the use of pharmacogenomics, preparation of individualized hospital formulations, and training in documentation show promise for enhancing the benefits of pharmaceutical services[2–6].

Given this scenario, it is essential to understand, based on evidence, how pharmacists contribute to palliative care in oncology and to identify strategies that increase their impact on symptom control, patient safety, and quality of life.

Aim

Describe and summarize evidence on the role of pharmacists in palliative care in oncology, highlighting clinical interventions, impact on symptom control (especially pain), contribution to the management of hospital formulations, multidisciplinary perceptions, and effects of educational actions on pharmaceutical practice.

Methods

This is an integrative literature review conducted in September 2025. The guiding question was developed based on the PICO strategy, which encompasses the essential elements: Patient, Intervention, Comparison, and Outcomes. Respectively, the terms identified were: cancer patients in palliative care, clinical pharmacist interventions (pain management, pharmacogenomics, personalized formulations, education, documentation), absence of pharmaceutical intervention or standard care and pain control, medication safety, adherence to therapy, quality of life, and multidisciplinary integration. Thus, the guiding question established was: What is the impact of the pharmacist's role in the care of cancer patients in palliative care on pain, medication safety, and quality of life, compared to care without pharmaceutical intervention?

A bibliographic search was conducted over the last ten years (2015-2025), including the following criteria: original articles in Portuguese, English, or Spanish, with full text available, addressing pharmaceutical practice in oncology, including monitoring strategies. The searches were performed in the BVS, Embase, and Scopus databases, using the descriptors: “Clinical Pharmacy Services,” “Palliative Care,” “Oncology.” Boolean operators (AND/OR) were applied.
Narrative reviews, editorials, theses, conference abstracts, duplicates, publications outside the stipulated 10-year period, and articles not focused on cardiovascular outcomes were excluded.

Results

After applying filters, the following results were found: BVS (n=9), Embase (n=10), and Scopus (n=8). After screening (title, abstract, and full text reading), seven articles met the criteria and were included in this review [1–7]. The analysis of the seven selected studies highlighted multiple dimensions of the pharmacist's role in oncological palliative care.
Yamada et al.[1] showed that continuous interventions in patients using opioids improved pain control and reduced adverse effects, thanks to systematic review of pharmacotherapy, individualized dose adjustments, and toxicity monitoring, with high medical acceptance. Patel et al.[2] highlighted that pharmacogenomic testing increased the accuracy in the choice of opioids and adjuvants, reducing adverse events and pain intensity, although they still need validation in larger trials. Steen et al.[3] showed that optimizations in the flow of pharmaceutical services and structured recording expanded clinical use and allowed the impact of pharmacist activities to be measured. Ali et al.[4] reported that educational interventions and documentation of pharmacotherapeutic plans improved the quantity and quality of records, favoring continuity of care and multidisciplinary integration. Nagaoka[5] emphasized the importance of individualized formulations (oral, injectable, and subcutaneous), ensuring accurate doses, appropriate routes, and lower risk of errors.
Qualitative studies by Atkins et al.[6] pointed out that the multidisciplinary team recognizes the contribution of

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pharmacists in preventing interactions, managing adverse effects, and providing therapeutic counseling, although institutional barriers limit full integration. Crul et al.[7] demonstrated that the systematic presence of pharmacists in palliative care optimizes analgesic regimens, individualizes therapy, and strengthens team confidence, promoting adherence.

Discussion

The findings show that pharmacists play a multifaceted role in palliative cancer care, from pain management and monitoring of adverse effects to the production of individualized formulations. The use of pharmacogenomics appears to be a promising approach, but more robust clinical trials are needed[2]. Qualified documentation and workload capture reinforce the relevance of the service and facilitate resource allocation[4–5]. Furthermore, challenges remain, such as the standardization of protocols and the consolidation of the pharmacist as a permanent member of the palliative care team[6–7].

Thus, analysis of the selected studies shows that clinical pharmacists play an essential and multifaceted role in palliative cancer care. Continuous interventions aimed at pain management and adjustment of analgesic regimens have shown a consistent positive impact, reflecting reduced pain intensity, decreased adverse effects, and high acceptance of medical recommendations [1–3]. These findings corroborate the importance of systematic review of pharmacotherapy and individualization of doses, especially in patients with polypharmacy and high therapeutic complexity[1].

The use of pharmacogenomic tools, as described by Patel et al.[2], represents an innovative approach that allows for personalized therapy, adjusting doses and choosing drugs based on the patient's genetic profile. Although promising, this strategy still lacks validation in controlled clinical trials, but suggests potential for increasing analgesic efficacy and reducing adverse events[2].

In addition to direct clinical practice, the role of pharmacists in organizing services and documenting interventions has had a significant structural impact. Steen et al.[3] demonstrated that optimizing care flow and structured recording of interventions significantly increased clinical use of the service, enabling monitoring of the impact of pharmaceutical activities and strengthening multidisciplinary integration. Ali et al.[4] showed that educational programs focused on documenting pharmacotherapeutic care plans increased the quantity and quality of records, favoring continuity of care and the visibility of the pharmaceutical service.

The production of individualized hospital formulations emerged as another critical component. Nagaoka[5] showed that the preparation of oral, injectable, and subcutaneous solutions allows for precise adjustment of doses and routes of administration, especially for patients who cannot use standard commercial presentations, ensuring safety and therapeutic efficacy.

Qualitative studies on multidisciplinary perception have revealed that physicians, nurses, and other professionals recognize the contribution of pharmacists to the prevention of drug interactions, management of adverse effects, and therapeutic counseling.[6] Crul et al.[7] reinforced that the systematic presence of pharmacists on the team increases the team's confidence in therapeutic decisions, improves treatment adherence, and contributes to the education of patients and family members.

In summary, the findings demonstrate that the role of the pharmacist goes far beyond dispensing medications, encompassing clinical, educational, and organizational functions. This integrated role contributes to improved symptom control, reduction of adverse events, medication safety, individualization of therapy, and greater visibility of the service, consolidating the pharmacist as a central element of the oncology palliative care team[1–7].

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Keywords

Palliative care; oncology; clinical pharmacy

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The Importance Of The Pharmacist In The Management Of Solid Organ Transplants: An Integrative Review

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Introduction

Solid organ transplantation represents a remarkable advance in medicine, representing an indispensable therapeutic option for patients with end-stage organ failure. However, the success of the procedure depends on proper postoperative management and rigorous care regarding the use of immunosuppressants to prevent rejection of the transplanted organ and minimize adverse events related to drug therapy. In this scenario, the role of the clinical pharmacist has established itself as a fundamental component in ensuring the safety, efficacy, and continuity of treatment, as the pharmacotherapeutic management of these patients presents considerable challenges. To ensure the safety, efficacy, and continuity of treatment, pharmacists are part of multidisciplinary teams, contributing to individualized therapy, pharmacokinetic monitoring, the prevention and resolution of medication-related problems (DRPs), and the improvement of clinical outcomes. Collaboration between pharmacists and other healthcare professionals—physicians, nurses, and nutritionists—is essential for the

overall success of the transplant and for promoting patients' quality of life. Activities such as medication reconciliation, when performed systematically, enhance the quality of care and contribute to better clinical outcomes, regardless of the geographic and population context.

Aim

To evaluate, based on the current available literature, the role of pharmacists in the management of solid organ transplant patients, exploring their clinical contributions, intervention strategies, challenges faced, and perspectives for the consolidation of this practice within the scope of global health.

Methods

An integrative literature review was conducted using the inclusion criteria of various studies published in the last five years (2020 to 2025), available completely free of charge, relevant to the topic, and present in the Embase, LILACS (via BVS), and MEDLINE (via PubMed) databases. To locate the studies, a search term was developed for each database using the PICo strategy, considering the population as individuals who underwent solid organ transplants, the intervention as the role of the pharmacist, and the context as transplant units and tertiary hospitals worldwide. The search strategies used DesC's controlled vocabulary for MEDLINE and LILACS, where the former included only English terms and the latter included English terms and their equivalents in Spanish and Portuguese. For Embase, terms from Emtree were used. The articles found were organized into a table for joint analysis by the authors, who evaluated the titles and abstracts of the papers and excluded other reviews, incomplete or unavailable texts, and those outside the scope. The remaining articles were read in their entirety, paying closer attention to the results.

Results

After searching the databases, a total of 26 studies were found: 21 from Embase, 1 from LILACS, and 4 from MEDLINE. The titles and abstracts of the studies were analyzed, excluding those that were out of scope, duplicated, or non-original. Four studies were selected that presented perspectives on pharmaceutical practice on the proposed topic. Transplant patients require constant immunosuppression, which makes them polymedicated and susceptible to various DRPs. A retrospective study conducted in Ankara highlighted the role of pharmacists in identifying these problems in transplant recipients, the most frequent being related to safety, dose selection, and inappropriate combinations with medications, herbal remedies, or dietary supplements (1). Another highlighted role is medication reconciliation (MR). In Thailand, the impact of MR performed by pharmaceutical care in the post-liver transplant clinic was observed, where there was a reduction from 8.7% to 5.0% in medication errors (medication omission and incorrect dose/frequency). The number of DRPs increased from 66 to 111 after the service was implemented, attributed to the constant review of protocols. Furthermore, the physician acceptance rate increased from 86.4% to 91.3% (2), indicating greater trust and integration within the multidisciplinary team. Pharmacists also provide services through teleconsultations. Supko, E. et al. (3) evaluated remote clinical pharmacy services for post-heart transplant patients. In this study, the most common interventions included management of adverse effects (34%) and renal dose adjustment (17.8%). Challenges were also encountered, as shown by Yang, H. et al. (4), who found an average of 0.8 pharmacists per 100 transplant patients. In addition to the reduced workforce, challenges related to inconsistent services, limited patient

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coverage, and inadequate standardization or digitalization highlighted the difficulties of pharmacy services in China.

Discussion

The studies identified that medication reconciliation and DRP detection are essential for preventing medication-related errors and improving continuity of care. These processes help ensure that patients continue with the appropriate treatment regimen, which is vital for long-term transplant success. Collaboration between clinical pharmacists and prescribing physicians is crucial for effectively detecting and correcting problems, ensuring that patients receive the same care and support after transplant. Another important aspect is the management of drug interactions, especially with medications for other clinical conditions the patient may have, such as viral infections or transplant-associated illnesses. By monitoring potential interactions between these medications and immunosuppressants, pharmacists can prevent complications by adjusting dosages or suggesting safer therapeutic alternatives, even when conducting consultations remotely through technologies such as teleconsultation. This was particularly important during the pandemic or for patients who have difficulty accessing in-person care and can be adapted to future scenarios. However, this will only be possible if challenges such as overlapping roles and a low workforce are overcome. A national assessment is also necessary, given that none of the selected studies included Brazilian studies, indicating a significant research gap. In short, pharmacists play an indispensable role in the management of solid organ transplants, contributing to patient safety, treatment efficacy, and the prevention of complications. Continuity of pharmaceutical care, from admission to post-discharge follow-up, is essential to ensuring the quality of life of transplant patients. Despite advances in pharmaceutical practices in organ transplants, challenges remain, particularly in developing countries, where a lack of resources and specialized training hinders the implementation of effective pharmaceutical services. Investing in ongoing training for pharmacists, expanding access to pharmaceutical care, and adopting new monitoring technologies are essential steps to improving post-transplant care, but this will only be possible with the development of more national studies on the topic.

Keywords

Organ Transplantation; Pharmacists; Pharmaceutical Services;

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Profile Of Medication Use In Recently Transplanted Liver Patients

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Introduction

Liver transplantation is considered the only effective therapeutic option for patients with severe liver disease. This patient profile presents high therapeutic complexity due to the continuous use of immunosuppressive drugs in the postoperative period to avoid the risk of immune rejection. However, this causes adverse effects related to an increased risk of infections and nephrotoxicity. In addition, there is polypharmacy due to medications previously used for preexisting comorbidities and prophylactic or infection management therapies.
In this context, studying medication use patterns is essential to assess compliance with institutional protocols and guidelines, as well as contributing to pharmaceutical recommendations that promote patient safety and therapeutic effectiveness. Liver transplantation is considered the only effective therapeutic option for patients with severe liver disease. This patient profile presents high therapeutic complexity due to the continuous use of immunosuppressive drugs in the postoperative period to avoid the risk of immune rejection. However, this causes adverse effects related to an increased risk of infections and nephrotoxicity. In addition, there is polypharmacy

due to medications previously used for preexisting comorbidities and prophylactic or infection management therapies. In this context, studying the medication use profile is essential to assess compliance with institutional protocols and guidelines, as well as contributing to pharmaceutical recommendations that promote patient safety and therapeutic effectiveness.

Aim

To describe the medication use profile of patients who underwent liver transplantation in 2024 at a university hospital.

Methods

The study is observational, retrospective, and descriptive, conducted at a university hospital. All liver transplant patients discharged from the hospital between January 2024 and December 2024 were included. Data were collected from patient discharge records and the medication plan provided at hospital discharge.
The data were organized and analyzed in a spreadsheet. This study was approved by the institution's Research Ethics Committee under number 7,694,041, in accordance with the ethical principles of Resolution No. 466/2012 of the National Health Council.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

There were 47 hospital discharges from the liver transplant ward between January and December 2024. The average number of medications per patient is 8.5, with the patient with the lowest number of medications in use equal to 4 and the highest number of medications in use equal to 16. Of the 47 patients, 22 (46.8%) use only one immunosuppressant and 25 (53.2%) use a combination of two drugs in this category. Nineteen patients (40.4%) used only Tacrolimus, 22 (46.8%) used Tacrolimus in combination with Mycophenolate Sodium, 2 (4.2%) used only Mycophenolate Sodium, 2 (4.2%) used Tacrolimus in combination with Everolimus, 1 (2.1%) used Cyclosporine and Mycophenolate Sodium, and 1 (2.1%) used Tacrolimus and Azathioprine.
Regarding adjunctive immunosuppressive and prophylactic medications, 40 patients (85.1%) were discharged from the hospital using Prednisone, 37 (78.7%) use Omeprazole and 3 (6.4%) use Pantoprazole, 33 (70.2%) use Sulfamethoxazole + Trimethoprim, and 40 (85.1%) use Nystatin.
Regarding medications used for systemic arterial hypertension and diabetes, insulin was used by 17 patients (36.2%), amlodipine by 14 (29.8%), losartan by 10 (21.3%), furosemide by 8 (17.0%), Clonidine by 4 (8.5%), and Carvedilol by 2 (4.2%). Other medications used were Entecavir (4, 8.5%), Quetiapine (4, 8.5%), Gabapentin (3, 6.4%), Pregabalin (3, 6.4%), and Escitalopram (2, 4.2%).

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Discussion

Liver transplantation is a complex procedure, in which graft survival depends on the appropriate use of immunosuppressive drugs. The use of these drugs aims to achieve a balance between the immunosuppression necessary to reduce rejection of the grafted organ to acceptable levels and the maintenance of an immune response against potential infections (1). The most widely used immunosuppressant today is Tacrolimus, due to its intense immunosuppressive activity, although it is neurotoxic, nephrotoxic, and diabetogenic (2). In contrast, mycophenolate sodium, another common immunosuppressant used as a substitute for tacrolimus or as an adjunct to reduce its dose, has mainly gastrointestinal adverse effects, which tend to be mild, such as diarrhea and nausea (1,2).

The use of prednisone as an adjunctive therapy in immunosuppression is prevalent in 85.1% of post-transplant patients, aiming to reduce the risk of acute graft rejection, since it acts to suppress the inflammatory and immune response. Despite its benefits, prolonged use can lead to the onset of other diseases, such as hypertension and diabetes (3).

The use of proton pump inhibitors (omeprazole and pantoprazole) in this context is associated with the administration of high doses of immunosuppressants and corticosteroids, which increases the risk of developing gastric reflux and duodenal and gastric ulcers (4).

Hypertension and diabetes, in addition to being common comorbidities prior to transplantation that can aggravate the patient's condition, can also arise after liver transplantation, especially in the long term, caused by the use of immunosuppressants, particularly tacrolimus and corticosteroids, whose diabetogenic potential has been elucidated (5).

Some patients also used entecavir, a nucleoside analogue used in the treatment of hepatitis B. In post-liver transplantation caused by hepatitis B, entecavir acts by preventing further recurrence of the disease, given that chronic hepatitis B can lead to high serum levels and extrahepatic deposits of the virus, allowing the infection to persist even after transplantation, with the risk of recurrence if there is infection in the graft (6).

The use of psychotropic drugs was observed in transplant patients in the study. One of these is escitalopram, a selective serotonin reuptake inhibitor used as an antidepressant. The management of depression after transplantation has a positive impact on patient survival, with hypotheses for this phenomenon including improved adherence to drug treatment and patient rehabilitation and reduced resistance to corticosteroids and hypothalamic-pituitary-adrenal axis activity (7). Other psychotropic drugs observed in the study are gabapentin and pregabalin, anticonvulsant drugs useful in the control of neuropathic pain (8). Quetiapine is used to treat delirium and is the drug of choice because it has fewer extrapyramidal effects (9).

Keywords

Pharmacotherapy; Transplantation; Drug Utilization

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Pharmacotherapeutic Profile At Discharge From Hospital Of Patients Who Have Received A Recent Kidney Transplant

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Introduction

Among the modalities of renal replacement therapy (RRT), kidney transplantation (KT) stands out as the best option for patients with chronic kidney disease (CKD) because it offers a significant improvement in quality of life and reduces the risk of worsening cardiovascular disease, unlike other RRTs, such as hemodialysis(1). However, even after KT, most patients continue to use various medications due to the presence of previous multimorbidities and the inclusion of immunosuppressive drugs (ISDs) in their pharmacotherapy, which seek to ensure greater graft survival, in addition to the use of prophylactic drugs to prevent bacterial and fungal infectious complications (2,3). The commonly used ISDs maintenance regimen for kidney transplant recipients (KTRs) is a combination of a calcineurin inhibitor (such as tacrolimus or cyclosporine) and an antiproliferative agent (mycophenolate or azathioprine) or mTOR inhibitors (sirolimus or everolimus), with or without a corticosteroid (prednisone)(3). The high prevalence of chronic diseases such as hypertension (HTN), diabetes mellitus (DM), musculoskeletal

disorders, and cardiovascular diseases (CD) among patients requires the use of a variety of medications to treat these conditions. In general, the simultaneous use of five to nine medications is characterized as polypharmacy, while hyperpolypharmacy corresponds to the use of ten or more medications(4). In KTRs, polypharmacy can lead to additional risks, such as drug interactions (DI), adverse effects (AE), and low adherence, as these patients have reduced renal function and, in addition, need to maintain ISDs concentrations within narrow therapeutic limits, facilitating the occurrence of many DI (5). Thus, the pharmacotherapeutic profile at hospital discharge for KTRs tends to be complex, requiring rigorous monitoring, guidance for adherence, and adjustments according to clinical and laboratory evolution.

Aim

This study aims to evaluate the pharmacotherapeutic profile at hospital discharge of newly transplanted kidney recipients and identify the main pharmacological classes prescribed, with a view to improving pharmaceutical care in monitoring possible DI and AE, as well as facilitating the development of effective strategies to ensure adherence to therapeutic regimens by patients with polypharmacy or hyperpolypharmacy.

Methods

This is a retrospective study that included KTRs from a high-complexity University Hospital between January and December 2024. From a database of the Clinical Pharmacy Unit, containing the discharge progress of post-KT patients performed by clinical pharmacists, it was possible to collect some information, such as: gender, age, date of transplantation, underlying disease, comorbidities, number of medications prescribed at discharge, including prophylaxis and the selected immunosuppressive regimen, in addition to identifying the pharmacological classes of the prescribed medications. These data were entered into an Excel® spreadsheet for better visualization and analysis of the information, making it possible to quantify the average age of patients who underwent KT, the average number of medications prescribed at discharge, and the main pharmacological classes involved. Two patients who underwent transplantation in 2023 but who, upon readmission to the institution for some health problem or situation, requested new pharmaceutical guidance (being registered in the database) were excluded from the analysis, since the period of that patient's transplantation is outside the current period of interest analyzed. This study has been approved by the Research Ethics Committee under opinion number 7,694,041.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

Seventy-three KTs were performed in 2024, involving 47 men and 26 women aged between 18 and 78 years (mean age 50). Regarding the underlying disease, 12 patients (16%) underwent transplantation due to diabetic nephropathy, 8 (11%) due to hypertensive kidney disease, and 12 (16%) due to a combination of HTN+DM. Other causes accounted for 29% (polycystic kidney disease, recurrent nephrolithiasis, and others), while 19 KTRs (25%)

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had an undetermined etiology. The most prevalent comorbidities were: HTN (82%), DM (34%) with or without complications of the disease (diabetic retinopathy/neuropathy), and CD (11%), resulting in an average of two comorbidities per patient. Other conditions, such as dyslipidemia, thyroid/parathyroid disorders, benign prostatic hyperplasia, or systemic lupus erythematosus, occurred less frequently. At discharge, post-KT patients left with an average of 12 prescribed medications (min. 6; max. 25) and were classified as polypharmacy (18%) or hyperpolypharmacy (82%). All patients had a calcineurin inhibitor (CNI) as their ISDs regimen, mainly associated with an antimetabolite such as mycophenolic acid (62%) or an mTOR inhibitor (37%) and, in some cases, a corticosteroid (15%); only one patient (1%) was discharged with CNI and azathioprine (antimetabolite) prescribed. Prophylaxis included: antibacterial (sulfonamide + DHFR inhibitor), oral polyene antifungal, proton pump inhibitor, and, when indicated, antituberculostatic + vitamin B6. Most patients were treated for hypertension, with calcium channel blockers (CCBs) (61%) and cardioprotective beta-blockers (CPBBs) (48%) being the most commonly used agents, followed by direct vasodilator antihypertensives (39%). Loop diuretics (29%) and statins (40%) were also prescribed. About 40% of patients needed to continue or start treatment for DM or prediabetes, mainly with NPH and regular insulin. Patients taking more than 10 medications were generally men over 40 years of age.

Discussion

Adherence to medication regimens is essential for successful post-KT treatment, preventing graft rejection and other complications. In the present study, this situation becomes more challenging, as there is a high prevalence of polypharmacy among the 73 KTRs. In the study by Marienne et al. (6), which analyzed changes over time in medication burden before and after KT, the following comorbidities were also prevalent among patients: HTN (55%) and CD (52%); DM was less frequent (18%) when compared to the present study. An observational cohort study conducted in the United Kingdom with 978 patients with CKD or other renal dysfunction (2) found that the most prevalent comorbidity was also HTN (50.3%), with an average of 3.0 ± 1.7 comorbidities. At discharge, an average of 10 ± 3 medications were prescribed in the study cited above (6), meaning that 42% of the KTRs in the group were classified as hyperpolypharmacy, which is close to the results observed in the current study, considering the proportion of people involved. Regarding the etiology of the underlying disease, compared to the French study (6), the results differed because, although primary causes such as DM and HTN were similar between countries, other factors such as genetic predisposition/ethnicity, lifestyle, and diet tend to influence the development of CKD differently. While the French group had a higher rate of CKD/KT due to glomerulonephritis (31.6%), the Brazilian group in this study had a higher rate of CKD/KT due to diabetic nephropathy (16%) or HTN+DM (16%). In the same study (6), 68% of patients received a prescription for an ISDs regimen with CNIs + mycophenolic acid + corticosteroids upon discharge, differing from the approach taken in the present study, in which the combination of a third ISDs was less common (15%). The prescription of a CNI + mTOR inhibitor regimen was also less frequent. Mycophenolic acid remains the preferred antimetabolite in transplant centers, as the meta-analysis by Knight et al. (7) showed that its combination with CNIs reduces the risk of acute rejection compared to other regimens. Regarding medications used to treat other health conditions in patients, there was a prevalence in the prescription of CCBs (61%) and CCBPs (48%), followed by direct vasodilator antihypertensives (39%). This preference for CCBs is due to their nephroprotective effect, while CPBBs have beneficial effects in coronary artery disease and arrhythmias(8). In the present study, approximately 40% of patients needed to continue or start treatment for DM or prediabetes, whereas in the French study (6), antidiabetic drugs were only prescribed more frequently 12 months after KT. This difference can be explained by the increased incidence of

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hyperglycemia associated with the use of ISDs common after KT, especially corticosteroids and tacrolimus (9) among the French patient group (18%), while the current group of Brazilian patients already had high rates of hyperglycemia (34%) prior to KT, undergoing adjustments in antidiabetic doses over time. The high prevalence of polypharmacy, associated with ISDs regimens identified among our KTR patients, reinforces the importance of pharmacists in carefully monitoring and reviewing discharge prescriptions, identifying necessary medications that are not included or unnecessary, in assessing DI, in promoting treatment adherence, and in individualizing drug therapy, ensuring patient-centered care and better clinical outcomes.

Keywords

Pharmacotherapy; Transplantation; Polypharmacy

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Role Of Pharmaceutical Interventions In Preventing Adverse Reactions In Hospitals

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Introduction

Adverse drug reactions (ADRs) are a major cause of morbidity, prolonged hospital stays, and increased hospital costs worldwide, accounting for approximately 5 to 15% of hospitalizations and a significant proportion of adverse events during hospitalization. They are often associated with prescribing errors, communication failures between professionals, and lack of adequate monitoring (1–5). The complexity of hospital care, marked by polypharmacy and heterogeneous protocols, makes hospitals high-risk environments for ADRs (3,5).

In this context, pharmaceutical interventions emerge as essential strategies to prevent adverse events, improve patient safety, and optimize the use of medications, including systematic review of prescriptions, medication reconciliation, monitoring of high-risk therapies, and education of the multidisciplinary team (1–5). Studies show that the presence of a pharmacist alongside the healthcare team, especially in onward validation, increases the detection of errors and the acceptance of recommendations, directly reflecting on the prevention of ADRs (2,4). Structured medication reconciliation programs reduce discrepancies in the transition of care and contribute to more effective communication between professionals (1,3).

Pharmaceutical practice is also relevant in complex clinical situations, such as patients with COVID-19, in whom the standardization of antithrombotic prophylaxis has reduced thrombotic and hemorrhagic complications (5). Despite advances, the implementation of interventions faces challenges such as limited human resources and the need for systematic recording, making it essential to understand and synthesize evidence to guide patient safety policies and optimize care models (1–5).

Therefore, understanding the evidence on pharmaceutical interventions in the prevention of ADRs in hospitals is essential to guide patient safety policies, optimize resources, and structure care models that enhance clinical and benefits.

Aim

The objective of this study was to synthesize evidence on the role of pharmaceutical interventions in preventing adverse reactions in hospital settings, describing types of intervention, effectiveness, and factors that influence their outcomes.

Methods

This is an integrative literature review conducted in September 2025. The guiding question was developed based on the PICO strategy, which includes the essential elements: Patient, Intervention, Comparison, and Outcomes. For this review, the terms identified were: hospitalized patients, pharmaceutical interventions (prescription review, medication reconciliation, monitoring of high-risk therapies, multidisciplinary education, documentation of interventions), absence of pharmaceutical intervention or standard care, and outcomes related to the prevention of adverse drug reactions, patient safety, reduction of prescription errors, and organizational impact. Thus, the guiding question established was: What is the impact of the pharmacist's role in preventing adverse reactions in hospitalized patients, compared to care without pharmaceutical intervention?
The literature search covered the last ten years (2015–2025), including original articles published in Portuguese, English, or French, with full text available, that addressed pharmaceutical interventions in hospitals and outcomes related to the prevention of ADRs. The searches were performed in the PubMed, BVS, and Embase databases, using the descriptors: “Pharmaceutical interventions,” “Prevention,” “Adverse reactions,” “Hospitals,” combined with Boolean operators (AND/OR). Narrative reviews, editorials, theses, conference abstracts, duplicates, publications outside the stipulated period, and articles not focused on outcomes related to the prevention of ADRs were excluded.

Results

After applying filters, the following results were found: PubMed (n=2), BVS (n=2), Embase (n=4). After screening (title, abstract, and full text), five articles met the criteria and were included in this review [1–5]. The studies analyzed show that pharmaceutical interventions have a significant impact on the prevention of adverse reactions in hospitals. Baptista (1) demonstrated that structured intervention programs allow the identification and prevention of problems such as prescription errors, therapeutic duplication, and inappropriate dose adjustments, with greater clinical relevance when accompanied by systematic recording and feedback to prescribers. Lagreula et al. (2) observed that onward validation increased error detection by 35% and showed greater acceptance of medical recommendations, especially for high-risk medications, highlighting the benefit of the pharmacist's proximity to the healthcare team.
Yailian et al. (3) identified that more than 40% of PPI prescriptions were inappropriate or unnecessary, and the pharmacist's recommendations resulted in suspension or adjustment of doses, preventing gastrointestinal complications and hospital infections. Vieira (4) showed that medication reconciliation during admissions, transfers, and discharges reduced discrepancies in therapy, preventing adverse events and improving

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communication between staff and patients. Silber et al. (5) reported that interventions to standardize antithrombotic prophylaxis in patients with COVID-19 reduced thrombotic and hemorrhagic events.
In addition, joint analysis indicates that systematic documentation of interventions makes it possible to measure clinical and organizational impacts, including cost reduction, shorter hospital stays, and improved safety indicators. Combined strategies of onward review, reconciliation, and monitoring of high-risk therapies are more effective, while centralized approaches or those without structured records have limited impact (1,2).

Discussion

The findings reinforce that the integration of pharmacists into the healthcare team is a determining factor in the prevention of adverse reactions. Their presence onward allows not only for greater detection of prescription errors, but also for better acceptance of recommendations, which translates into effective therapeutic changes and prevention of ADRs (2,3). Interventions targeting high-risk therapeutic classes, such as PPIs, illustrate how careful prescription analysis can prevent potentially serious complications and reduce hospital costs associated with inappropriate medication use (3).
Medication reconciliation emerges as a central tool in preventing discrepancies during care transitions, when patients are most vulnerable to ADRs. Vieira (4) demonstrated that the implementation of structured processes not only reduces errors but also improves communication between professionals, promoting patient safety and continuity of care. In highly complex scenarios, such as the COVID-19 pandemic, Silber et al. (5) showed that the standardization of pharmaceutical protocols directly contributes to the prevention of serious adverse events, reinforcing the role of the pharmacist in emergency clinical situations and high-pressure care settings.
However, despite the consistency of the results, methodological limitations must be considered. Many studies are observational or experience reports, with heterogeneous metrics, short follow-up periods, and a lack of randomization, which limits the generalization of the findings (1,2). The scarcity of human resources and the need for adequate training also constitute barriers to the widespread implementation of these interventions. Despite this, the convergence of data indicates that care models that combine onward action, medication reconciliation, monitoring of high-risk therapies, and systematic recording of interventions are the most effective in preventing ADRs.
In summary, the evidence shows that structured pharmaceutical interventions integrated into the healthcare team promote patient safety, reduce potential adverse reactions, and have a positive impact on clinical and economic indicators. The adoption of standardized protocols, continuous recording of interventions, and training of the multidisciplinary team are recommended strategies to maximize clinical and organizational benefits.

Keywords

Pharmaceutical interventions; ADRs; Safety; Hospitalization

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Efficacy Of Tizerpatide For Mitigation Of Metabolic Dysfunction-Associated Steatotic Liver Disease: An Integrative Review

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Introduction

Several pathways are involved in the development of Metabolic dysfunction-associated steatotic liver disease (MASLD), formerly known as Non alcoholic fatty liver disease (NAFLD). The lipogenic pathway appears to be one of the most important for this condition, as insulin resistance may be present in many patients with Metabolic dysfunction-associated steatohepatitis (MASH) (non alcoholic steatohepatitis) [1,2]. The spectrum of MASLD also involves fatty liver (hepatic steatosis), steatosis with inflammation and necrosis, and cirrhosis.[3].
Resmetirom (sold under the brand name Rezdiffra) is a medication approved by the FDA (in March 2024) for adults with moderate to advanced liver scarring (fibrosis) (serious form of MASLD/MASH). It is the first drug to be

approved specifically for this condition and its properties involve reducing liver fat, inflammation, and scarring. In Brazil, effective treatments for MASLD/MASH include non pharmacological approaches such as dietary changes, weight loss, and exercise [5]. Some medications or supplements are used off label to treat MASLD, including vitamin E (400–800 IU/day), antidiabetic agents such as metformin, pioglitazone, and rosiglitazone for individuals with hyperglycemia. Orlistat is also used as therapy for weight management [6].
Investigating antidiabetic drugs is highly relevant for MASLD and MASH, as they target insulin resistance and offer advantages in terms of weight, lipid profile, and cardiovascular risk. In this context, tirzepatide — a dual GIP/GLP-1 receptor agonist — is notable for its powerful effects on weight loss, improved insulin sensitivity, and reduced liver fat, highlighting the importance of thorough reviews to inform future therapeutic strategies [7–10].

Aim

This narrative literature review aims to analyze the available scientific evidence on the efficacy of tirzepatide in treating MASLD/NAFLD and its more severe form, MASH/NASH.

Methods

This study is an integrative literature review aimed at synthesizing clinical evidence on the efficacy of tirzepatide in the treatment of patients with Non-Alcoholic Fatty Liver Disease (NAFLD), Non-Alcoholic Steatohepatitis (NASH), or the recently adopted nomenclature related to metabolic dysfunction (MASLD/MASH). To ensure comprehensive and high-quality coverage, searches were conducted across multiple international databases: PubMed, Scopus, Web of Science, and ClinicalTrials.gov, including publications available up to September 2025. No restrictions were applied regarding language or publication date. The search strategy employed descriptors and MeSH terms combined using the Boolean operators “OR” and “AND” to increase the sensitivity of the search. The terms used included: “tirzepatide” OR “GLP-1 receptor agonist” OR “dual agonist GLP-1 GIP” AND “non-alcoholic fatty liver disease”; OR “NAFLD” OR “non-alcoholic steatohepatitis” OR “NASH”; OR “fatty liver” OR “MASLD” OR “Metabolic Dysfunction-Associated Steatotic Liver Disease” OR “MASH” OR “metabolic dysfunction-associated steatohepatitis”. The following inclusion criteria were applied: clinical studies (randomized or non-randomized trials) conducted in humans; evaluation of tirzepatide efficacy in individuals diagnosed with NAFLD/NASH or MASLD/MASH, with or without associated comorbidities such as type 2 diabetes or obesity; and studies reporting relevant clinical or biochemical outcomes, such as liver fat reduction, improvement in liver inflammation, MASH resolution, changes in liver enzyme levels, weight loss, improvement in insulin resistance, or reduction in inflammatory markers. Exclusion criteria were: preclinical studies (animal or in vitro models); literature reviews, editorials, letters to the editor, case reports, and expert opinions; studies that did not provide specific data on patients with NAFLD/NASH or MASLD/MASH; and duplicate studies retrieved from more than one database. The selection of studi

Results

Initially, 30 articles were retrieved from the selected databases. After applying the eligibility criteria and conducting a thorough review, 22 clinical studies were included in this integrative analysis. The distribution of selected studies per database was as follows: PubMed (n=19) and Scopus (n=3). These studies provide growing evidence that tirzepatide, a dual agonist of GLP-1 and GIP receptors, may offer therapeutic benefits for individuals

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with metabolic dysfunction-associated liver conditions, particularly NAFLD/NASH or MASLD/MASH. Tirzepatide acts on multiple metabolic pathways, promoting weight loss, improved insulin sensitivity, and reduction of hepatic steatosis — key effects in the treatment of MASLD/MASH. Clinical trials and meta-analyses have shown results superior to those of GLP-1 receptor agonists, with additional benefits in quality of life. However, further studies are needed to assess its direct effects on the liver and long-term safety.

Discussion

Another promise to treat this condition is tirzepatide. The molecular mechanisms of tirzepatide, a novel dual agonist for both glucagon like peptide 1 (GLP 1) and glucose dependent insulinotropic polypeptide (GIP) receptors, promote activation of the incretin system. Tirzepatide showed excellent glucose lowering effects in preclinical studies and has been used to improve glycemic control in patients with type 2 diabetes. It is also under review for chronic weight management. Among persons with moderate to severe obstructive sleep apnea and obesity, tirzepatide reduced the apnea hypopnea index, body weight, hypoxic burden, high sensitivity C reactive protein, and systolic blood pressure, and improved patient reported sleep outcomes [10].

Rosenstock et al. [16] demonstrated significant improvements in glycemic control and weight reduction, with low risk of hypoglycemia and a safety profile similar to GLP 1 receptor agonists, suggesting potential as monotherapy for type 2 diabetes. Similarly, Nauck and D'Alessio [17] found that tirzepatide improves insulin sensitivity and secretion more effectively than semaglutide, associated with lower postprandial insulin and glucagon levels; although both reduce appetite similarly, tirzepatide produces greater weight loss. However, the exact mechanism of action, especially regarding GIP receptor agonism, still needs clarification, particularly in humans with type 2 diabetes. Tirzepatide renews interest in the therapeutic potential of GIP for diabetes, obesity, and related comorbidities.

In the systematic review and meta analysis by Tan et al. [18], it was concluded that tirzepatide is a promising therapeutic option for weight loss in individuals with overweight or obesity, showing a slight increase in adverse events and targeting multiple aspects of metabolic syndrome.

Based on the meta analysis of randomized clinical trials with treatment duration ≥ 20 weeks by Khawaji et al. [19], higher doses of tirzepatide demonstrated greater efficacy in reducing body weight compared to placebo and GLP 1 receptor agonists. However, further studies are needed to clarify its effects on lean mass preservation and long term treatment tolerability.

In addition to tirzepatide's well established effects on body weight reduction and glycemic control, recent studies have also indicated positive impacts on subjective aspects of health. In the phase 3 SURMOUNT 3 study, tirzepatide demonstrated significant improvements in health related quality of life (HRQoL) in adults with overweight or obesity, with notable benefits in physical and psychosocial domains [20]. These effects were more pronounced among participants who experienced greater weight loss during treatment and those with pre existing physical limitations. Thus, its use may represent an important advancement in integrated therapeutic approaches to obesity and its related comorbidities.

This review highlights current evidence suggesting that tirzepatide, through its effects on weight loss, glycemic control, and liver fat reduction, may represent a promising therapeutic option for NAFLD/MASLD. However, further research is required to confirm the efficacy of tizerpatide in treating MASLD/MASH.

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Keywords

Tirzepatide; Metabolic dysfunction-associated steatotic liver; Metabolic.

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Clinical Review Of Pharmacotherapy For Liver Transplant Patients: Focus On Pharmaceutical Recommendations

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Introduction

The Federal Pharmacy Council (CFF) defines pharmacotherapy review as a “service whereby the pharmacist analyzes the medications used by the patient in a structured manner, with the aim of resolving problems related to prescription, use, therapeutic results, among others,” an approach that aims, among other things, to prevent and reduce medication-related problems (MRPs) and improve the results of pharmacotherapy and adherence to drug treatment (1). When conducting a pharmacotherapy review, the pharmacist can identify points at which to intervene through pharmaceutical recommendations, which consist of planned, documented, and implemented interventions in the patient's pharmacotherapy with the aim of preventing or resolving problems that may affect the success of drug therapy (2). In the context of liver transplantation, this involves the use not only of immunosuppressive drugs, which are essential for maintaining the grafted organ, but also of adjunctive drugs, used as prophylactics or in the treatment of other comorbidities that patients may have (3).

Aim

To analyze the pharmaceutical recommendations made based on the clinical review of the pharmacotherapy of liver transplant recipients

Methods

This is a retrospective, cross-sectional study of pharmaceutical recommendations recorded in a database of the Clinical Pharmacy Unit, fed during the period from January 2024 to December 2024 by pharmacists working in the care of liver transplant patients in the transplant ward of a high-complexity University Hospital. Pharmaceutical recommendations were recorded according to the type of problem observed, the drug(s) involved, the course of action taken by the pharmacist, and acceptability. This study was approved by the HUWC/UFC Research Ethics Committee under number 7,694,041.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

A total of 681 recommendations were recorded in 2024, with 657 (96.6%) of these being accepted. The main categories of MRPs concern the lack of prescription of certain medications (142, 20.8%), overdose (77, 11.3%), prescription of unnecessary medications in the patient's context (64, 9.4%), the need to complete a drug treatment (58, 8.5%), and lack of information about infusion time (58, 8.5%) and dilution (51, 7.5%) of intravenous medications. The main recommendations made by pharmacists were the inclusion of non-prescribed medication (152, 22.3%), adjustment of medication dosage (114, 16.7%), suspension of some medication (90, 13.2%), and adjustment of infusion time (58, 8.5%) and dilution (50, 7.3%). The main drugs involved in recommendations were Vancomycin (68, 10.0%), Meropenem (49, 7.2%), Piperacillin + Tazobactam (42, 6.2%), Teicoplanin (27, 4.0%), Ivermectin (27, 4.0%), Albendazole (23, 3.4%), and Potassium Chloride (23, 3.4%).

Discussion

The presence of pharmacists in multidisciplinary patient care helps combat MRPs, benefiting patients by improving clinical outcomes (2, 4). This action forms part of the basis of clinical pharmacy, which values the rational use of medicines, focuses on patient care and the optimization of their pharmacotherapy, promotes their health and well-being, and aims to prevent diseases (1).

Most (96.6%) of the recommendations made by pharmacists were accepted, which is considered high according to the literature, which reports the acceptance of pharmaceutical interventions between 70% and 100% (5, 6, 7). This observation can be explained by the relationship between the pharmacist and the multidisciplinary team, as well as the team's view of the recommendations made by the pharmaceutical team, as explained in a Korean study that analyzed the acceptance of pharmaceutical interventions and the satisfaction of the multidisciplinary team with regard to practicing pharmacists (6).

Most of the problems observed were related to drug selection, in the form of unnecessary drugs prescribed or

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necessary drugs not prescribed, inadequate duration of treatment with a drug, and the dose of prescribed drugs, especially overdose. These results corroborate findings in the literature, which found that the main categories of MRPs detected and resolved by clinical pharmacists concern the drugs chosen and their doses (2, 4, 6).
Similarly, the main recommendations made were to include or suspend medications and adjust their dosage, corroborating studies in the literature, in which such adjustments in pharmacotherapy prevail (5, 6). In these situations, the review of pharmacotherapy and medication reconciliation are services performed by pharmacists, adapting pharmacotherapy to the patient and optimizing its results.
Among the main drugs mentioned in the recommendations are Vancomycin, Meropenem, and the combination of Piperacillin with Tazobactam. Due to the prevalence of multidrug-resistant microorganisms in the ward where the study was conducted, these drugs are commonly used to combat infections. Since the route of administration of these drugs is intravenous, they need to be reconstituted and diluted, and given the risk of adverse reactions and the pharmacokinetics of antimicrobials, it is necessary to properly adjust the dilution and infusion of these drugs (8, 9).
The role of pharmacists in providing guidance on the use of medicines is essential to ensuring improved clinical outcomes in terms of safety and therapeutic efficacy, thereby applying the concepts of rational use of medicines.

Keywords

Pharmacotherapy; Transplantation; Clinical Pharmacy

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Remote Pharmaceutical Consultation In Pharmacotherapy Follow-Up: Acceptance And Outcomes

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Introduction

One of the legacies of the COVID-19 pandemic was the popularization of teleconsultations, largely driven by the need for social distancing, with medical consultations being the most widespread in this modality (1,2). Telehealth has proven to be a valuable tool not only during pandemic contexts, but also in countries with large territorial extensions, where it enables access to specialized professionals in remote areas (1,3).
In this regard, pharmaceutical care may play a crucial role in telehealth, as it involves the responsible provision of pharmacotherapy with the purpose of achieving defined outcomes that improve the patient's quality of life, such

as disease cure, reduction or elimination of symptoms, delay of pathological process, or their prevention. This practice establishes a direct therapeutic relationship between pharmacist and patient, mediated by the rational use of medicines (4).

In a broader scope, pharmaceutical care encompasses activities such as dispensing, pharmacovigilance, health education, and pharmacotherapeutic follow-up, reflecting the pharmacist's role within an integrated set of healthcare practices. Moreover, pharmaceutical care aligns directly with the principles of the Brazilian Unified Health System (SUS), by emphasizing the comprehensive care and the sociocultural aspects of the patient, recognizing them as an active participant in the therapeutic process (4).

Considering these multiple dimensions, pharmaceutical care within remote consultations has gained increasing relevance, particularly in the contexto of teleconsultations. Adherence to pharmaceutical consultations may represent an alternative in the pursuit of comprehensive care, a central objective of both pharmaceutical practice and SUS. However, the implementation of remote pharmaceutical consultation pharmacotherapy follow-up still lacks sufficient evidence to guide this practice. In this context, studies aimed at gathering such information are increasingly necessary.

One

Aim

The aim of this study is to gather information available in the literature regarding the use of remote pharmaceutical consultations in the pharmacotherapy follow-up of patients.

Methods

A bibliographic search was conducted in different databases, including LILACS, PubMed, and BVS Brasil. The search strategy employed the following descriptors: "Remote Consultation," "Telepharmacy," and "Patient Satisfaction," obtained from the Health Sciences Descriptors (DeCS) of the Virtual Health Library. Boolean operators "AND" and "OR" were applied to combine terms across the databases, between July and August 2025. Study selection was supported by the Rayyan platform and performed in two stages. First, article titles and abstracts were screened; subsequently, full-texts of preselected studies were reviewed. Inclusion criteria comprised articles involving at least one pharmacist was part of the analyzed healthcare team, articles available in full, and those focusing on pharmaceutical consultation. Exclusion criteria were studies not addressing pharmaceutical consultations or those deviating from the proposed theme.

Results

Following the search strategy, a total of 1,111 articles were retrieved. After the first screening, 14 articles were included, which subsequent evaluation reduced the number to three eligible studies: two from LILACS and one from PubMed.

Of these three articles, one was published in 2023, another in 2024, and the third in 2025, demonstrating the topic of remote pharmaceutical consultation is relatively recent, with its dissemination strongly driven by the COVID-19 pandemic.

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Discussion

The analysis of selected articles revealed that Spain has made significant progress in advancing pharmaceutical teleconsultations. In 2022, the Spanish Society of Hospital Pharmacy (SEFH) published the “Telematic Interview Guide in Pharmaceutical Care”, which served as a methodological basis for the development of a consensus document entitled “Telematic Interview in Telepharmacy”, aimed at pharmacotherapeutic follow-up (5).
Teleconsultations, conducted remotely through information technologies such as electronic messages, video calls, or telephone calls, offer patients benefits such as saving time and resources previously spent on travel, access to pharmacists in remote areas, and greater flexibility to integrate healthcare into their daily lives. For healthcare institutions, this practice contributes to continuous health promotion, reduces healthcare costs, optimizes professional time for patient evaluation, strengthens the pharmacist’s role in care, and increases the visibility of Pharmaceutical services to society (5).
Pharmacists, using language adapted to the patient’s level of undertanding, are advised to initially conduct an in-person consultation to assess whether the patient has access to the necessary devices and basic knowledge required for teleconsultation. Based on this assessment, the most appropriate modality can be selected. Telephone-based consultations are the most widely used, given their lower technological and cognitive demands on patients (5).
This model has been successfully applied in Israel between October 2022 and June 2023, during a period of war when the country also faced a shortage of pharmacists. A call center system staffed with pharmacists was established to address medication-related queries from the Israeli population, mostly older adults. Questions were primarily related to appropriate medication use, drug interactions, and adverse drug reactions. According to a survey, 93.5% of users reported that their doubts were satisfactorily resolved (6).
In Spain, a specific vídeo consultation tool was evaluated in a rural population between 2021 and 2022. The study monitored 20 patients, mostly older adults undergoing polypharmacy. Over the course of the study, patient´s satisfaction with consultations improved progressively, indicating that adaptation to this new model fosters continuous improvement in practice (7).
Therefore, these findings demonstrate that remote pharmaceutical consultation is not only feasible but also highly effective in promoting and maintenance of health in the context of medication management, particularly in large countries, such as Brazil.

Keywords

REMOTE; PHARMACEUTICAL; CONSULTATION; CARE; TELEPHARMACY;

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Use Of Brexanolone And Zuranolone In Postpartum Depression: An Integrative Review

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Introduction

Depression is a prevalent mental disorder affecting millions worldwide, linked to social factors, age, marital status, and comorbidities such as hypertension and obesity, which impair quality of life [1,2]. Usual treatments combine pharmacological and psychotherapeutic approaches, but resistance may arise due to chronicity, symptom severity, and comorbidities [3,4].

Postpartum depression (PPD), a specific form after childbirth, is marked by sadness, sleep and appetite changes, guilt, and difficulties bonding with the baby [5,6]. Untreated, it compromises maternal well-being and child

development, with consequences for family and society [5,7].
Conventional antidepressants, like selective serotonin reuptake inhibitors (SSRIs), act slowly, do not target PPD-specific mechanisms, and show low remission rates [5–7]. This highlights the need for faster and more effective therapies.
Brexanolone, an intravenous allopregnanolone formulation, was FDA-approved in 2019 as the first therapy for PPD [5]. Acting through GABA-A receptor modulation, it reduces symptoms within 60 hours and maintains effects for a week [7]. However, it requires hospital infusion and may cause sedation, dizziness, or rarely, loss of consciousness [8].
Zuranolone, a synthetic oral analogue, was FDA-approved in 2023 as the first oral therapy for PPD [9]. Trials showed rapid, well-tolerated efficacy, with significant improvements within days [10]. Reviews reinforce its safety, effectiveness, and potential to broaden access and adherence [11]. Together, brexanolone and zuranolone mark a new era in PPD management.

Aim

To review and synthesize the current evidence on the efficacy, safety, and potential applications of brexanolone and Zuranolone in the treatment of postpartum depression.

Methods

A narrative review was conducted through a systematic search of PubMed and Google Scholar for studies published in the last ten years. The MeSH terms “Brexanolone” OR “Zuranolone” AND “Postpartum Depression” were used to identify relevant clinical trials
and meta-analyses involving human participants. Initial screening was performed by title and abstract, followed by full-text review for eligibility. The review was guided by a PICOS/T model: Population – women with postpartum depression; Intervention – brexanolone or zuranolone; Comparison – placebo; Outcomes – reduction in depressive symptoms, response, remission, and safety; Study design – randomized, double-blind, placebo-controlled trials and meta-analyses; Time – assessment during treatment and throughout the follow-up period reported by each study. Key findings were synthesized to provide a current overview of the therapeutic role of brexanolone and zuranolone in postpartum depression.

Results

Between 2017 and 2023, intravenous brexanolone was evaluated in randomized, double-blind, placebo-controlled trials for moderate to severe postpartum depression (PPD). In a phase 2 trial, significant reductions in HAM-D scores were observed after 60 hours of infusion, with effects lasting at least 30 days [12]. Phase 3 trials confirmed rapid response, often within 24 hours, sustained through day 30, with response rates above 80% and improvements in anxiety and insomnia [5,13]. Adverse events were generally mild to moderate, such as sedation, dizziness, dry mouth, and flushing, while serious cases were rare. Its continuous intravenous infusion restricted use to inpatient settings [5,12].
Oral zuranolone was assessed in randomized, double-blind, placebo-controlled trials, showing improvements in depression scores within days, sustained during follow-up [9,10]. Higher response and remission rates were observed versus placebo, with adverse events mostly mild to moderate, including somnolence, sedation, and

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dizziness [9,10]. A systematic review and meta-analysis (n=346) confirmed early symptom reduction, sustained improvement, and benefits for anxiety and insomnia [14]. In six trials (n=1,707), zuranolone reduced symptoms at 15 days compared to placebo, though effects in major depression were statistically but not clinically significant [15]. Limitations included short follow-up and restricted samples [9,10,14,15].

A systematic review and meta-analysis by Wilson et al. [16] evaluated both brexanolone and zuranolone, confirming favorable effects over placebo. Zuranolone showed early onset, and both treatments improved depression scores and response/remission rates, with low heterogeneity across studies. Findings indicate rapid, sustained effects and favorable safety profiles, though brexanolone remains limited by hospital delivery and zuranolone by study constraints, pointing to future research needs [16].

Discussion

Brexanolone has been investigated in randomized, double-blind, placebo-controlled trials in women with moderate to severe postpartum depression (PPD). Reductions in depressive symptoms were reported within hours of infusion and were generally maintained through follow-up periods of up to 30 days [5,12,13]. Some improvements in comorbid symptoms, such as anxiety and insomnia, were also described [5,13]. Adverse events were mostly mild to moderate, including sedation, dizziness, and dry mouth,
whereas serious events were uncommon [12,13]. The need for continuous intravenous infusion limited the use of brexanolone to inpatient settings [5].

Oral zuranolone has been evaluated in several phase 3 trials, with doses ranging from 30 to 50 mg/day over 14 days. Symptom improvement was generally observed within the first few days of treatment and maintained through follow-up, with higher response and remission rates reported compared with placebo [10,17]. Adverse events were mostly mild to moderate, including somnolence, dizziness, and sedation [10,17]. Systematic reviews and meta-analyses suggested reductions in depressive symptoms and some benefits for comorbid anxiety and insomnia, although findings were influenced by short follow-up periods, restricted populations, and small sample sizes[14,15].

Overall, these findings indicate that both brexanolone and zuranolone were associated with reductions in depressive symptoms in PPD, with generally acceptable tolerability [9,10,12,17]. While brexanolone was limited by the requirement for hospital-based administration [5], zuranolone represented a potential oral treatment option, although study design limitations and population characteristics should be considered [14,17]. These observations highlight the need for further research, particularly regarding long-term safety, broader population assessment, and comparative effectiveness with other treatments [15].

Keywords

Depression, Postpartum; Pharmacotherapy;Drug Safety; Clinical.

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Pharmaceutical Interventions In Oncology Patients With Cachexia: A Literature Review

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Introduction

Cancer cachexia is a multifactorial syndrome characterised by progressive loss of skeletal muscle mass, with or without fat loss, which cannot be reversed by nutritional support alone (1). It results from profound metabolic alterations such as systemic inflammation, anabolic resistance and exacerbated protein catabolism, leading to impairment of both energy and muscle homeostasis (2). Clinically, cachexia negatively affects cancer treatment by reducing adherence, hindering response to antineoplastic agents, increasing drug toxicity and compromising quality of life. It is also associated with reduced survival in patients treated with immunotherapy (3). Despite the

therapeutic complexity of these patients, the role of the clinical pharmacist in this context remains under-recognised, even in multimodal care provided by a multidisciplinary team. In this setting, pharmacists are responsible for optimising pharmacotherapy by ensuring the safe and effective use of medicines (4). From a pathophysiological perspective, it is essential to differentiate cachexia from simple malnutrition. While malnutrition results from inadequate intake or malabsorption and can be reversed, cachexia involves metabolic disturbances triggered by systemic inflammatory responses (5). These include the production of inflammatory cytokines such as TNF-α, IL-1β and IL-6, activation of catabolic pathways, insulin resistance and neuroendocrine alterations that sustain a hypercatabolic state even with adequate nutrition (6). Early identification through body composition assessment and inflammatory markers is therefore fundamental for effective therapeutic strategies. In this context, clinical pharmacists play a key role in monitoring drug interactions, adjusting doses in frail patients and managing symptoms associated with cachexia, thereby integrating into multimodal care.

Aim

This study the available literature regarding the role of clinical pharmacists in interventions for patients with cancer cachexia, highlighting their contribution to improving clinical outcomes and overall patient well-being.

Methods

This study is a narrative literature review aimed at identifying and analysing the role of pharmacists within multidisciplinary teams caring for patients with cancer cachexia. Searches were conducted in PubMed and Google Scholar databases. Inclusion criteria were: full-text articles published between 2012 and 2024, in English, addressing the definition, pathophysiology and clinical relevance of cachexia, as well as the role of clinical pharmacists in patient management. A combination of keywords was used: “Cachexia”, “Metabolic dysfunction”, “Systemic inflammation” and “Clinical pharmacy”. Studies included consensus statements, systematic reviews, book chapters and observational research. Monographs, dissertations, theses and articles unrelated to the topic were excluded.

Results

The literature synthesis shows that cancer cachexia affects 30–80% of oncology patients and up to 86% in the last weeks of life, being associated with morbidity, mortality, reduced chemotherapy efficacy and functional decline (7,8). At the molecular level, it involves activation of catabolic pathways such as the ubiquitin–proteasome system, autophagy and lipolysis, combined with secretion of inflammatory cytokines including IL-1, IL-6 and TNF-α, as well as altered energy metabolism and adipose tissue remodelling (9,11). Pharmacological options remain limited. Anamorelin, a ghrelin receptor agonist, improves appetite and lean body mass, but pharmacists are essential in monitoring glycaemic control, gastrointestinal adverse events and drug interactions (9,16). Megestrol acetate promotes weight gain, although mainly fat, requiring pharmacist vigilance regarding thromboembolic events and adrenal suppression (12). Corticosteroids such as dexamethasone provide temporary appetite improvement, but pharmacists must manage risks of long-term use, including hyperglycaemia and immunosuppression (13). Non-steroidal anti-inflammatory drugs may attenuate inflammation and muscle loss, yet pharmacists are needed to assess renal and gastrointestinal safety and adjust regimens in frail patients (14). Omega-3 fatty acids have shown modest improvements in quality of life, fatigue and lean body mass, but most

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trials report small effect sizes and adherence difficulties, requiring pharmacist involvement to optimise supplementation protocols and patient counselling (15). Overall, the reviewed studies highlight pharmacists as key professionals in tailoring regimens, preventing adverse outcomes, ensuring safe incorporation of emerging therapies and supporting multidisciplinary protocols for cancer cachexia (3,4,16,17).

Discussion

The evidence reviewed confirms that cancer cachexia is a multifactorial syndrome requiring therapeutic strategies that extend beyond nutritional support. Pharmacological interventions have shown heterogeneous efficacy and tolerability profiles, which reinforces the need for individualised approaches within multidisciplinary care. Anamorelin, a ghrelin receptor agonist, has been associated with significant improvements in appetite and lean body mass, representing an advance in targeted therapy for cachexia. However, clinical trials demonstrate only modest effects on physical function, and safety concerns remain regarding glycaemic control and gastrointestinal adverse events (9). Megestrol acetate is among the most studied appetite stimulants and consistently leads to weight gain, yet this effect is often due to increased fat rather than lean mass. Moreover, its use is limited by adverse outcomes such as thromboembolism and adrenal suppression (12). Corticosteroids such as dexamethasone provide transient appetite enhancement and improvements in well-being, but their long-term administration is contraindicated due to risks of muscle wasting, immunosuppression, hyperglycaemia and osteoporosis (13). Anti-inflammatory strategies using non-steroidal anti-inflammatory drugs have demonstrated potential to attenuate systemic inflammation and delay muscle catabolism. Despite these promising mechanisms, the clinical benefit is modest, and gastrointestinal or renal toxicities may compromise their applicability, particularly in frail oncology patients (14). Omega-3 fatty acids have been associated with improvements in body composition, fatigue and quality of life, yet most trials report small effect sizes and difficulties in maintaining adequate patient adherence to supplementation protocols (15). These findings indicate that no single pharmacological agent is sufficient to reverse the syndrome, underscoring the importance of combining therapies and integrating non-pharmacological approaches such as exercise, nutritional counselling and psychosocial support (10,14,15). Within this framework, clinical pharmacists contribute by tailoring drug regimens, mitigating adverse events, monitoring drug–drug interactions and ensuring safe integration of supportive agents into multimodal care (4,16,17). Their involvement is particularly relevant when balancing the benefits and risks of agents such as megestrol acetate or corticosteroids, and when guiding adherence to nutritional supplementation or novel therapies such as anamorelin.

Keywords

Pharmaceutical intervention; Cachexia; Multimodal care.

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Integration Of Artificial Intelligence In Primary Health Care (Phc)

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Introduction

Artificial intelligence (AI) systems have been increasingly used in healthcare, given the expectation that such systems can help develop and enhance human capacity in areas such as diagnosis, therapeutics, and patient care management (1). According to the World Health Organization (WHO), AI holds great promise for improving healthcare delivery worldwide, as it can be used to enhance the speed and accuracy of diagnoses, assist in care and clinical data integration, strengthen health research, and support drug development (2). Primary Health Care (PHC) is the dominant force at the base of the medical care pyramid, interconnected with all parts of the healthcare system and with a deep relationship with patients and communities. It is considered the most suitable level to lead the AI revolution (1). PHC is the first point of contact for users within Brazil's Unified Health System

(SUS), responsible for coordinating care, ensuring comprehensive attention, and monitoring chronic conditions (3). However, it faces significant challenges in its functioning, such as excessive demand, shortage of qualified professionals, fragmented information, and difficulties in continuously monitoring patients with chronic diseases (4). In this context, AI emerges as a strategic tool with the potential to support patient triage, aid clinical decision-making, assist in more accurate diagnoses, predict health outcomes, and optimize resource management (5). Studies indicate that the use of these technologies can promote interoperability between health information systems and support the analysis of large volumes of clinical data (big data) (1,5).The present study aims to examine the applicability of artificial intelligence to improve outcomes in Primary Health Care.

Aim

To analyze the incorporation of artificial intelligence into Primary Health Care, with an emphasis on its benefits, challenges, and future prospects.

Methods

This is a study conducted through an integrative literature review, guided by the research question: How can the incorporation of artificial intelligence contribute to improving outcomes in Primary Health Care? A bibliographic search was carried out in the PubMed, SciELO, and LILACS databases, in Portuguese and English. The searches used the following Health Sciences Descriptors (DeCS): Artificial Intelligence, Unified Health System, Intelligent Systems, and Primary Health Care, combined as follows: “artificial intelligence” AND “Unified Health System (SUS)”, “primary health care” AND “artificial intelligence”, AND “health information system” AND “intelligent systems” AND “Unified Health System” AND “intelligent systems.” Articles published between 2015 and 2025, in Portuguese and English, electronically available and free of charge, that addressed the guiding research question were considered. Studies covering clinical applications (triage, chronic disease monitoring, therapeutic decision support), operational applications (resource management, demand prediction), and educational applications (support for health education) were included. Excluded were studies restricted to strategic and specialized components, duplicate articles, and those not available in full. Additionally, national and international regulatory documents on digital health and technological innovation in public health systems were analyzed. After identifying the articles according to the database searches, a careful analysis was conducted, highlighting abstracts that met this study’s eligibility criteria. From this analysis, relevant data were collected regarding the application of artificial intelligence in Primary Health Care.

Results

After applying inclusion and exclusion criteria, 12 articles from the selected databases were used. The literature points to several applications of AI in PHC, including: risk prediction in chronic diseases, using machine learning models to identify patients at higher risk of complications in diabetes, hypertension, and asthma (6); triage and remote monitoring, consisting of chatbots and AI algorithms assisting in classifying symptom severity and referring urgent cases for immediate evaluation (7); support for prescription and rational use of medicines, including intelligent systems that alert to drug interactions, therapeutic duplications, and inadequate adherence (8); AI-mediated health education through adaptive platforms that personalize self-care recommendations and treatment adherence; and the use of artificial intelligence to optimize diagnoses, accelerating the process to help

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relieve the high demand in PHC (9). The application of AI in Primary Health Care must be guided by ethical, epidemiological, and demographic principles, as these factors can influence the adequacy of care for patients or communities. It is essential that AI engineers work alongside healthcare managers to ensure that solutions respect the principles of equity, justice, and inclusion set forth in the Brazilian Federal Constitution. For AI models to be fair, it is fundamental that they are trained with diverse and representative data (10). However, barriers can also be identified, such as low digital literacy among healthcare professionals, absence of standardized protocols, lack of patient adherence to digital tools (either due to lack of internet access or difficulty adapting to this new type of resource), and infrastructure limitations in PHC, making the implementation of health digitalization in Brazil a challenge even at its simplest level (11).

Discussion

Healthcare faces structural and organizational challenges that limit its ability to serve the population efficiently and equitably. Artificial intelligence (AI) emerges as a tool capable of analyzing large volumes of data at high speed, favoring pattern identification and supporting more precise clinical decision-making. In Primary Health Care (PHC), its integration represents an opportunity to enhance service effectiveness, support multiprofessional teamwork, and strengthen care coordination. In the pharmaceutical field, AI can promote safer medication use, optimize treatment adherence, and detect risks associated with polypharmacy. Furthermore, it enables personalized health education tailored to patient needs. However, the effectiveness of these solutions depends on the quality of collected data, interoperability between systems, and the willingness of professionals to adopt technological innovation. International experiences demonstrate that AI, when applied ethically and under regulation, reduces costs, improves resource allocation, and generates more favorable clinical outcomes (5,6,9). In Brazil, the National Digital Health Policy (2020–2028) establishes guidelines for incorporating AI into the SUS, including PHC. This highlights the need for investments in technological infrastructure, professional training, and clear regulation of health data use (12). Administratively, AI can optimize workflows in health units by automating bureaucratic and repetitive tasks such as scheduling appointments, inventory control, and report generation. This automation tends to save time and costs, increasing productivity and efficiency in health management (5,12). On the other hand, it is essential to consider ethical aspects associated with AI use, such as privacy protection, informed consent, and equity in access to technologies. Implementation must follow principles that ensure transparency, respect for individual autonomy, and mitigation of biases in decision systems. The involvement of the community and professionals in developing these solutions is essential to ensure sensitivity to local realities and the specific needs of the population (10,12). Updating healthcare professionals, especially pharmacists, will be decisive for the success of AI integration into PHC. These professionals play a strategic role in ensuring the safe and effective use of medications, and their continuous training will enable better use of digital tools (2,3). Thus, digital transformation must be allied with strong governance, consistent public policies, and a commitment to humanized care. It is concluded that AI applied to PHC has the potential to transform the care model but must be seen as a complementary instrument, not a substitute for human action. The role of pharmacists and other professionals remains central, with AI serving as support, enhancing efficiency, and contributing to safer decisions. By integrating technological innovation and human knowledge, it will be possible to achieve more effective, equitable, and people-centered PHC, promoting a sustainable health system prepared for current and future challenges (2,12).

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Keywords

IA; PHC; Digital Health;

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Harm And Consequences Of The Irrational Use Of Antibiotics In Children: A Literature Review

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Introduction

The irrational use of antibiotics in children is a growing public health problem due to adverse effects, increased antimicrobial resistance, and clinical complications. Antibiotics are essential drugs for the treatment of bacterial infections, but errors in prescribing, such as dosage, interval, incorrect choice of drug, and use without clinical indication, have significant consequences for children's health (1,2). Children and neonates are more vulnerable due to physiological differences, incomplete maturation of the immune system, and pharmacokinetic variations, which can amplify adverse effects and compromise therapeutic efficacy (2,3).

The main prescribing errors and adverse drug events (ADEs) in pediatric intensive care and neonatal units include underdosing, overdosing, administration failures, and delays in the first dose, which most often result in serious complications and even death (1,3). Multicenter studies indicate that factors such as disease severity, number of drugs prescribed, route of administration, and limitations in the knowledge of the healthcare team contribute to

the inappropriate use of antimicrobials and the development of adverse events (2,4). In addition, the lack of knowledge of legal guardians and easy access to prescription-only medications increase the likelihood of inappropriate use of antibiotics.
Therefore, understanding the practices of prescribing and using antibiotics in pediatric children is essential for various aspects of individual and collective health. This allows for the creation of strategies such as: clinical guidance and interventions, reformulation of health policies, minimization of risks to children, and preservation of the therapeutic efficacy of these drugs.

Aim

The objective of this review was to collect evidence from the literature on the harms and consequences associated with the irrational use of antibiotics in children.

Methods

This is an integrative review with searches conducted in the Embase and PubMed databases. To construct the search strategy, descriptors indexed in Medical Subject Headings (MeSH/DeCS) were used: ("Anti-Bacterial Agents" OR "Antimicrobial Agents" OR "Antibiotics") AND ("Infant" OR "Neonates" OR 'Newborns') AND ("Inappropriate Prescribing" OR "Drug Misuse" OR "Prescription Drug Misuse") AND ("Drug-Related Side Effects and Adverse Reactions" OR "Adverse Effects" OR "Toxicity").
Original articles available in Portuguese and English, published in the last ten years, were defined as inclusion criteria. These studies should address the inappropriate use of antibiotics in the pediatric population, including neonates, and their respective adverse events. Duplicate studies, literature reviews, editorials, letters to the editor, isolated case reports, and publications that, after reading the title and abstract, proved to be irrelevant to the topic under investigation were excluded. After applying the period and language filters, 49 articles were identified in Embase and 21 articles in PubMed. The final selection of these considered the complete reading of titles, abstracts, and full texts to ensure adherence to the eligibility criteria.

Results

Most episodes of bloodstream infection (BSI) sepsis in neonates were primary (58.4%), with Gram-negative pathogens predominating, especially Klebsiella and Serratia, followed by Gram-positive bacteria and fungi (1.9%) (1). More than half of the neonates required intensified respiratory support, 26% were admitted to the NICU, and mortality within 72 hours reached 30%. There were 525 antimicrobial prescriptions, with a median of three prescriptions per episode, presenting dose and interval errors in 15.6% and 16.4%, respectively, mainly for piperacillin-tazobactam and vancomycin. A delay in the first dose was observed in 64% of cases (1).
In hospitalized children, the incidence of prescription errors ranged from 46% to 68% of patients, with underdosing and incorrect dose calculation as the main types of error, affecting especially intravenous and anti-infective drugs (2,3). Factors associated with errors included disease severity, number of medications, and route of administration, with most errors being intercepted before reaching the patient (3).

In the community setting, 35.1% of children aged 0 to 6 years used antibiotics inappropriately, particularly for diarrhea without a prescription, with a higher prevalence in Central China. Risk factors included age between 1

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and 6 years, while protective factors were female gender, parental care, higher education and basic health knowledge of caregivers, and residence in an urban area (4).

Discussion

Analysis of studies shows that the irrational use of antibiotics in pediatrics is linked to clinical, administrative, and socioeconomic factors, with direct impacts on morbidity and mortality. In neonates with bacterial sepsis, episodes of bloodstream infection (BSI) were predominantly Gram-negative, such as Klebsiella and Serratia, followed by Gram-positive bacteria such as Staphylococcus aureus, with a mortality rate of 30% within 72 hours (1). The median of three prescriptions per episode and the need for respiratory support in 52% of cases reveal a higher risk in critically ill patients. Dose and interval errors in 15–16% of prescriptions and delays of more than 60 minutes in the first dose reinforce the importance of protocols and monitoring.

In general pediatric units, prescription errors affected up to 67.97% of hospitalized patients, with dosage errors (48.6%) and inappropriate drug selection (19%) predominating (2). Disease severity, route of administration, and number of drugs were consistent predictors of errors, confirming greater vulnerability in complex regimens. In pediatric ICUs, 46.3% of patients had at least one medication-related adverse event (mAEF), with incorrect dose calculation being the most common error, especially in intravenous fluids, cardiovascular agents, and antimicrobials (3). Early interception of most errors highlights the role of surveillance systems and medical record review, but also the need for more robust preventive measures.

In the community setting, antibiotic use without a prescription occurred in 35.12% of children with diarrhea, with the highest prevalence in Central China (40.61%) and the lowest in Eastern China (32.98%) (4). Among the associated factors, age, sex, region, income, caregivers' education level, parenting style, and health knowledge stand out. Children aged 1–3 years were at higher risk, while higher caregiver education, knowledge, and parental supervision were protective factors. These findings show that institutional failures and educational gaps contribute to self-medication and inappropriate use, increasing resistance, complications, and exposure to adverse effects.

The correlation between hospital and community data shows that rationalizing antibiotic use in pediatrics requires an integrated approach. Optimization includes training professionals, standardizing protocols, auditing doses and intervals, supervising the route of administration, and educating the population. Reducing unnecessary prescriptions, adjusting doses, and early intervention in errors can decrease adverse events and improve clinical outcomes. The adoption of these measures has the potential to reduce neonatal mortality, prevent complications in hospitalized patients, and limit inappropriate use in communities, promoting safety and therapeutic efficacy.

Keywords

Irrational use of antibiotics; Pediatrics.

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Impact Of Pharmaceutical Intervention On Medication Adherence In Patients With Chronic Non-Communicable Diseases

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Introduction

Non-communicable chronic diseases (NCDs) represent a global public health challenge, accounting for 74% of deaths worldwide [1]. In the Brazilian context, arterial hypertension affects approximately 38.1 million adults, with only half of them achieving adequate blood pressure control [2]. Low adherence to pharmacotherapy stands out as the main obstacle to therapeutic success, with estimates indicating that about 50% of patients with chronic conditions do not take their medications as prescribed [3]. Pharmaceutical care emerges as a promising strategy in this scenario, positioning the pharmacist as an essential professional in optimizing pharmacotherapy [4]. Studies have shown that structured pharmaceutical interventions can significantly improve medication adherence and clinical outcomes in patients with NCDs [5]. This study evaluates the impact of the Pharmaceutical Care Service of the Federal University of Paraíba on pharmacotherapy adherence in patients with chronic diseases.

Aim

To evaluate the impact of the Pharmaceutical Care Service on treatment adherence among patients with NCDs. Specifically, the study aims to analyze the evolution of adherence indicators using the ARMS and BMQ instruments, investigate the correlation between adherence behaviors and beliefs about medicines, and identify determining factors for the success of the pharmaceutical intervention.

Methods

This longitudinal study was approved by the Ethics Committee of UFPB (CAAE: 97906118.3.0000.5188) [6] and conducted at the Pharmaceutical Care Outpatient Clinic. Thirty-five patients with NCDs participated, predominantly individuals with hypertension (85.7%). The intervention followed a structured four-step clinical method [7]: welcoming and data collection; pharmacotherapy analysis; development of a care plan; and continuous monitoring. The SOAP method was used for recording information [8]. Evaluation was performed using the validated instruments ARMS (12 items, Likert scale) [9] and BMQ (11 items, Necessity and Concerns domains) [10]. Statistical analysis included paired t-tests, with significance set at $p<0.05$ [11].

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

The results showed a trend toward improved adherence to pharmacotherapy, with a reduction in mean ARMS scores from 18.71 to 17.00. Although this difference did not reach statistical significance ($p = 0.242$), the moderate effect size ($d = -0.49$) suggests clinical relevance. The proportion of patients classified as adherent (ARMS score ≤ 16) increased from 28.6% to 42.9%. Regarding beliefs about medicines, as assessed by the BMQ, no significant changes were observed in scores (21.71 vs. 22.00; $p = 0.760$). A positive correlation was identified between ARMS and BMQ in the post-intervention period ($r = 0.462$), suggesting alignment between adherence behavior and beliefs after the pharmaceutical intervention.

Discussion

The findings of this study indicate that the structured pharmaceutical intervention promoted a meaningful improvement in adherence behaviors to pharmacotherapy, although it did not substantially change patients' beliefs about medicines. The reduction in ARMS scores and the increase in the proportion of adherent patients support international evidence attributing a crucial role to pharmaceutical interventions in improving medication adherence [12]. The stability of BMQ scores suggests that beliefs about medicines represent dimensions more resistant to change, requiring prolonged interventions and specific educational approaches [13]. The positive correlation observed between adherence and beliefs in the post-intervention period indicates a promising alignment between practices and perceptions, although the absence of statistical significance warrants cautious interpretation. Study limitations, including the small sample size and reliance on self-reported data, highlight the need for future investigations with larger samples and complementary assessment methods. The successful

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experience at UFPB provides valuable insights for the implementation of similar services in other contexts, reinforcing the importance of multiprofessional work and the integration of teaching and healthcare [14,15].

Keywords

Pharmaceutical Care. Chronic Diseases. Clinical.

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Drug Repositioning For Modulation Of Tumor Immunotherapy In Cancer Patients: A Literature Review

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Introduction

Drug repurposing refers to the use of drugs that have already been approved for indications other than those for which they were initially developed. This approach has received increasing attention in oncology, as it reduces costs and development time, in addition to offering greater safety due to prior knowledge about the pharmacokinetics and toxicity profiles of these molecules. In recent years, studies have shown that compounds originally intended for other clinical conditions have relevant immunomodulatory properties in the tumor context. Drugs such as ospemifene, low-dose cyclophosphamide, clindamycin, and the derivative FASA (conjugated with

folate-PEG-NH 2) exemplify this potential, demonstrating not only antineoplastic effects but also the ability to interact with immune mechanisms that are fundamental for modulating the tumor microenvironment. This interaction can occur in different components of the immune system, including the modulation of effector and regulatory T lymphocytes, the control of pro- and anti-inflammatory cytokine secretion, and interference in metabolic pathways linked to the modulation of the immune response for improved therapeutic efficacy.

Aim

This review aimed to investigate how drug repositioning can modulate the tumor immune microenvironment and enhance the efficacy of immunotherapeutic strategies in patients with neoplasms.

Methods

This is a literature review with searches conducted in the Embase, PubMed, and Scopus databases. To construct the search strategy, descriptors indexed in Medical Subject Headings (Decs/MeSH) were used: ("Neoplasms") AND ("Immunotherapy" OR "Immune Checkpoint Inhibitors" OR "Antibodies, Monoclonal") AND ("Drug Repositioning") AND ('Immunomodulation' OR "Immunologic Factors"). The inclusion criteria were original articles available in Portuguese and English, published between 2018 and 2023. Duplicate studies, systematic reviews, case reports, and publications not relevant to the topic after reading the title and abstract were excluded from the analysis.

Results

Initially, 27 articles were found, but only four met the inclusion criteria. The integrated analysis of these studies shows that repurposed drugs exert distinct but complementary immunomodulatory effects in the tumor microenvironment. Ospemifene, a drug used to treat dyspareunia, has shown potential to alleviate naive T lymphocytes, increase cytotoxic activity, and stimulate Th1 cytokine production. Low-dose cyclophosphamide, in turn, has shown selective activity on regulatory T cells, favoring the expansion of effector and memory T lymphocytes. Clindamycin inhibited caspase-1 in tumor macrophages, reducing pyroptosis and the secretion of inflammatory cytokines. FASA acted to inhibit COX, promoting macrophage modulation and positive regulation of T cell function, in addition to enhancing the response to anti-PD-1 antibodies.

Comparing the mechanisms, ospemifene and FASA directly impacted T cell activation and proinflammatory cytokine secretion, albeit through different pathways, while cyclophosphamide and clindamycin showed more selective effects, targeting regulatory T cells and tumor macrophages, respectively. Combination strategies proved promising: ospemifene and FASA, when combined with vaccines or immunotherapies, significantly enhanced the immune response. In contrast, although evaluated in isolation, clindamycin showed potential for future combinations, especially in scenarios of macrophage-mediated tumor resistance. In summary, the four studies highlight that repurposed drugs can contribute at different levels, whether through T cell activation or proliferation (1,2), cytokine modulation (1,4), macrophage regulation (3), or increased responsiveness to immunotherapies (1,4), reinforcing their value as strategic allies to enhance cancer immunotherapy.

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Discussion

The studies included in this review demonstrate that repurposed drugs have significant potential as immune modulators in oncological contexts, acting both in the activation of the effector arm and in the suppression of the regulatory arm of the immune system. Ospemifene, originally approved to treat dyspareunia and vaginal dryness, has been shown to induce Th1 cytokines and modulate T cell activity in a treatment regimen-dependent manner, enhancing the efficacy of antigen-specific tumor vaccines that have previously failed (1). This effect suggests that estrogen receptor agonists/antagonists can be explored as adjuvants in personalized immunological strategies.
Cyclophosphamide, traditionally used as a chemotherapeutic agent, reaffirms the concept of drug repurposing, demonstrating that low doses can selectively deplete suppressor regulatory T cells while enhancing cytotoxic effector and memory T cells in the tumor microenvironment. This effect translates into tumor growth suppression and increased survival, showing that the reincarnation of cyclophosphamide as an immune modulator can complement new immunotherapies (2). Comparatively, ospemifene and cyclophosphamide act on T cells, but with different mechanisms: while the former stimulates the Th1 response and modulates cytokines, the latter reduces tumor immunosuppression via Treg depletion (1, 2).
Clindamycin demonstrated a different approach, acting on tumor-associated macrophages (TAMs) and inhibiting caspase-1, which reduced the secretion of IL-1β, IL-18, and pyroptosis, a type of proinflammatory cell death that promotes tumor progression (3). This mechanism suggests that antibiotic drugs can be repositioned to remodel the tumor microenvironment, increasing responsiveness to immune checkpoint inhibitors (3). In comparison, while ospemifene and cyclophosphamide focus on modulating T cells, clindamycin acts on cells of the innate immune system, showing that different levels of the microenvironment can be modulated by existing drugs (1, 2, 3).
FASA, in turn, acted on murine tumors with high COX expression, modulating the tumor microenvironment and increasing PD-1 expression in T cells, possibly via prostaglandin E2 suppression (4). The combination of FASA with doxorubicin and anti-PD-1 antibody demonstrated tumor regression even at suboptimal doses, evidencing synergy between repurposed drugs and immunotherapy (4). This approach complements the findings of ospemifene, in which combinations with vaccines also increased immunological efficacy (1, 4).
Together, the four studies demonstrate that different classes of repurposed drugs (hormonal modulators, chemotherapeutics, antibiotics, and COX inhibitors) can act at multiple levels of the tumor microenvironment, modulating T cells, macrophages, and inflammatory pathways. (1, 2, 3, 4).
Finally, although the results are promising, most findings are preclinical, and translation to humans still requires further investigation, especially in terms of safety, optimal doses, and interaction with established immunotherapies. These findings reinforce the potential of drug repositioning as an innovative approach in immuno-oncology, expanding the therapeutic arsenal in an efficient and targeted manner (1, 2, 3, 4).

Keywords

Drug repositioning; Tumor microenvironment.

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Analgesic Potential Of Tetrahydrocannabinol In The Management Of Chronic Pain.

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Introduction

Pain is an unpleasant sensory and emotional experience, and can have several causes, including tissue and neuronal injuries, as well as brain trauma and inflammatory processes resulting from infections and chronic conditions (1). Despite being an important manifestation of inflammatory processes, pain, when constant, becomes chronic, directly interfering with the quality of life of those affected, contributing to making it impossible for them to carry out their daily activities, in addition to also affecting their mental health (2).

Pain management involves both non-pharmacological and pharmacological approaches. The most commonly used medications are non-steroidal analgesics (NSAIDs), corticosteroids, and opioids, which act in various ways with the common goal of reducing pain perception. Non-pharmacological practices, such as acupuncture, physical therapy, or the simple use of local compresses, are also effective means of pain relief (3, 4).

The prevalence of chronic pain in older adults in Brazil is estimated to be approximately 36.9%, with a higher prevalence among females. Of the older adults who reported pain, 50.5% had moderate pain and 35.8% reported more severe pain, according to a longitudinal study of older adults' health (ELSI-Brazil). This demonstrates the significant impact of chronic pain on the older population and the need for new therapeutic alternatives to treat pain in its various clinical conditions (5).

In this scenario, over time, several studies have sought therapeutic alternatives that can reverse or alleviate chronic pain. Cannabis sativa is a promising plant very rich in metabolites capable of modulating the endocannabinoid system that regulates essential functions in the body, such as modulation of pain, mood and inflammatory response, which makes them therapeutic targets in research on this topic (6). Among these metabolites, Tetrahidrocanabinol (THC) has been highlighted in studies that relate it to promising analgesic properti

Aim

The present work aimed to analyze the evidence that indicates the possible application of tetrahidrocanabinol in the treatment of pain associated with chronic conditions.

Methods

This study is an integrative literature review, covering clinical trials whose purpose was to investigate the role of THC in the management of chronic pain. The descriptors ("THC" OR "Tetrahydrocannabinol") AND ("Treatment" OR "Management" OR "Intervention") AND "Chronic pain" to search for articles in the database PubMed. The inclusion criteria were articles published in the last five years (2020-2025), available in full text, in English, and with content consistent with the topic of interest. The papers were selected after three stages: reading the title, analyzing the abstract, and finally, analyzing the article in its entirety. After evaluation, six studies were included in this review.

Results

The analysis of the selected studies showed different results regarding the effectiveness of THC in managing chronic pain.
In patients with knee osteoarthritis, the combination of dronabinol (10 mg) with hydromorphone (4 mg) did not result in significant improvement in physical function or clinical pain, presenting only discreet effects in experimental induced pain tests. The adverse event profile was mild to moderate, with a higher incidence in the group that received the combination of both drugs (7).
In another study, chronic pain patients who used oral medicinal cannabis for a long time had detectable THC concentrations in their blood for up to 9 to 10 hours after administration, with no detection in saliva. This implies potential impairment of cognitive and psychomotor skills, such as driving ability, despite the reported clinical efficacy in pain management (8).
In a clinical trial with fibromyalgia patients, the use of THC-rich oil (24.4 mg/mL) for eight weeks resulted in significant improvement in the scores of the Fibromyalgia Impact Questionnaire (FIQ), with reduced pain, fatigue and impact on quality of life, compared to placebo. The reported adverse effects were mild, such as drowsiness

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and dizziness, with no treatment abandonment (9).
Finally, the SPIRAL study protocol proposes to evaluate whether the combination of inhaled cannabis (Bediol, containing 6.3% THC and 8% CBD) with oral oxycodone can reduce adverse effects and opioid consumption in patients with fibromyalgia, compared to the use of each drug alone. The study predicts that 60 participants followed for 12 weeks will have the primary outcome of a reduction in adverse events (10).
In summary, the findings suggest that THC may offer benefits in specific subgroups of patients with chronic pain, particularly fibromyalgia. However, there are still gaps regarding its efficacy in different clinical settings, cognitive safety, and potential drug interactions.

Discussion

The findings of this review show that the role of THC in the treatment of chronic pain remains controversial. In cases of osteoarthritis, the combination of dronabinol and hydromorphone did not provide significant clinical benefit, reinforcing that the synergy described in preclinical studies does not translate easily into practice. Furthermore, the combined use of these substances increased the occurrence of adverse effects, indicating the need for caution in their combination (7).
The pharmacokinetic study demonstrated that orally administered THC remains in the blood for up to 10 hours, even without being detected in saliva. Despite the reported analgesic efficacy, this pharmacokinetics may compromise cognitive and motor functions, raising concerns about safety in everyday activities such as driving (8).
On the other hand, evidence related to fibromyalgia is more promising. The use of THC-rich oil reduced pain, fatigue, and functional impact, with a favorable safety profile and mild adverse effects, suggesting potential application in patients refractory to conventional therapies (9).
The SPIRAL study aims to evaluate whether the combination of inhaled cannabis (Bediol®) with oxycodone can reduce adverse events and opioid consumption in patients with fibromyalgia. Although still ongoing, this protocol represents a relevant strategy to minimize the dangers of dependence and toxicity associated with prolonged opioid use (10).
In general, THC shows therapeutic potential for conditions such as fibromyalgia; however, results are inconsistent for other chronic diseases. Issues such as dosage, product formulation, and patient profile strongly influence clinical outcomes. Thus, although cannabinoids are an alternative for refractory pain, their use must be carefully individualized, seeking a balance between analgesic benefits and cognitive and dependence risks (4-7).

Keywords

Tetrahidrocanabinol; Chronic Pain; Treatment; Analgesic

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Risk Of Gh-Induced Insulin Resistance In Bodybuilders: Review And Clinical Perspectives

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Introduction

GH, commonly known as growth hormone, is essential for the growth and homeostasis of the human body, acting directly on the regulation of carbohydrate, protein, and lipid metabolism. The indiscriminate use of GH in the fitness world can cause various metabolic changes, mainly related to changes in blood glucose levels, such as insulin resistance and type 2 diabetes mellitus. These changes are of great clinical relevance due to their association with cardiovascular and metabolic complications (1).

Aim

The objective of this study is to conduct a critical review of the indiscriminate use of GH and its relationship with changes in blood glucose levels, highlighting the pathophysiological mechanisms involved, the clinical risks, and the prospects for the clinical management of affected patients.

Methods

A narrative review of academic articles on the use of GH in a clinical context and its repercussions or changes in metabolism was conducted. The search was conducted in the PubMed, SciELO, and Google Scholar academic article databases between 2023 and 2025. The following descriptors were used: “growth hormone,” “insulin resistance,” and “GH therapy.” The inclusion criteria covered recently published articles, available in English or Portuguese, that specifically addressed topics such as: the relationship between GH and insulin resistance, and strategies for monitoring and clinical management of metabolic changes. Duplicate studies, conference abstracts, and publications that did not present results related to the topic were excluded.

Results

GH, in high doses or without adequate clinical indication, promotes increased insulin resistance and stimulates high hepatic and renal glucose production, leading to hyperglycemia in patients. Patients with excess GH, such as those with acromegaly and athletes who take GH supplements for aesthetic purposes, have a higher incidence of glucose intolerance and type 2 diabetes mellitus. GH increases lipolysis, raising levels of free fatty acids, which also impair insulin resistance. In addition, GH increases insulin coordination in response to hyperglycemia, but this increase is not sufficient to compensate for peripheral resistance. Controlled and monitored use of GH in patients with proven deficiency has no significant negative impact on glycemic homeostasis and may even improve metabolic parameters and reduce cardiovascular risk. In contrast, supraphysiological or inappropriate use increases metabolic risks, highlighting the importance of careful guidance and clinical monitoring (2).

Discussion

GH has a direct impact on glycemic metabolism through different interconnected mechanisms. Its action antagonizes insulin, reducing glucose uptake in muscle and adipose tissue, which favors the development of insulin resistance and can progress to glucose intolerance or even type 2 diabetes. In addition, GH stimulates hepatic glucose production and intensifies lipolysis, increasing the concentration of free fatty acids, which also contribute to aggravating insulin resistance. This imbalance generates greater functional overload on pancreatic beta cells, which can culminate in their failure and the onset of diabetes (3). Given this, the therapeutic use of GH must be carefully controlled, with regular monitoring of blood glucose levels before and during treatment. The dosage needs to be individualized, avoiding high doses that intensify adverse effects. The adoption of well-defined clinical protocols is essential to properly select patients, adjust doses, monitor metabolic parameters, and intervene early in cases of decompensation. Similarly, educating patients and healthcare professionals about the risks and importance of clinical follow-up is essential to reduce complications and maximize benefits, ensuring that GH treatment is carried out safely, effectively, and with a positive impact on quality of life (2).

Keywords

Growth Hormone; Diabetes Mellitus; Skeletal

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Combined Immunotherapy And Neuroprotection Strategies In Alzheimer'S Disease: Emerging Approaches

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Introduction

Alzheimer's disease (AD) is the leading cause of dementia worldwide and represents one of the greatest challenges in modern medicine (1). Characterized by progressive decline in memory, cognition, and functional autonomy, the disease has as its pathophysiological basis the abnormal accumulation of proteins in the central nervous system, especially beta-amyloid peptide and hyperphosphorylated tau protein (1,2). These processes lead to neurodegeneration, chronic inflammation, and synaptic loss. Although conventional therapies, such as cholinesterase inhibitors and glutamate modulators, provide some symptomatic relief, their effects are limited and do not significantly alter the course of the disease. More recently, immunotherapies targeting beta-amyloid and, to a lesser extent, tau protein have emerged as innovative alternatives. However, despite demonstrating a reduction in neuropathological lesions, these treatments have shown modest clinical benefits and considerable adverse effects, which limits their widespread application (1,2,3). While immunotherapy acts directly on the main pathological targets, neuroprotective agents, such as antioxidants and inflammatory modulators, can preserve neuronal integrity, improve synaptic plasticity, and reduce the deleterious effects of chronic stress.

Aim

This review aimed to gather information from the literature on how combined immunotherapy strategies and neuroprotective approaches can overcome the limitations of conventional therapies and offer clinical benefits in Alzheimer's disease.

Methods

This is a literature review with searches conducted in the Embase and PubMed databases. To construct the search strategy, descriptors indexed in Medical Subject Headings (Decs/MeSH) were used: Alzheimer Disease AND (“Immunotherapy” OR “passive immunization” OR “Antibodies, Monoclonal”) AND (“Neuroprotection” OR “Neuroprotective Agents”) AND (“Drug Therapy” OR “Drug Therapy, Combination” OR ‘Therapeutics’ OR “Translational Medical Research”). Original articles available in Portuguese and English, published in the last five years, were defined as inclusion criteria. Duplicate studies, literature reviews, case reports, and publications that, after reading the title and abstract, were not relevant to the topic under investigation were excluded from the analysis.

Results

Of the 80 articles initially found, only three met the inclusion criteria. Among the excluded studies, 22 (27.5%) were literature reviews, 18 (22.5%) were outside the pre-established publication period, and the rest were discarded in smaller numbers because they did not meet other eligibility criteria, such as duplication, thematic irrelevance, or language.

The evidence analyzed indicates that the integration of immunotherapeutic strategies and neuroprotective agents may overcome the limitations of conventional therapies in Alzheimer's disease (AD). Immunotherapy targeting acetylated tau (ac-tauK174) has demonstrated the ability to reduce neurodegeneration, preserve cognitive functions, and modulate the inflammatory response in animal models, acting more broadly in controlling the disease (1). These findings complement discussions about approved anti-amyloid immunotherapies, such as aducanumab, lecanemab, and donanemab, which, although they promote a significant reduction in beta-amyloid burden, have modest clinical efficacy and are associated with relevant adverse events (2). The combination of approaches targeting both tau and beta-amyloid therefore emerges as a promising strategy for expanding clinical benefits (1,2).

Additionally, quercetin supplementation has demonstrated relevant neuroprotective effects, including improvement in memory deficits, reduction in stress-induced anxiety, modulation of inflammatory cytokine levels (IL-6 and TNF-α), and decreased beta-amyloid expression in the hippocampus. These effects have been attributed to the induction of non-amyloidogenic pathways, favoring the reduction of Aβ accumulation and promoting the preservation of neuronal function (3). When compared to the results of tau immunotherapy, it is observed that both approaches converge to attenuate neuroinflammation and preserve synaptic plasticity, suggesting that the association between immunotherapy and neuroprotective agents such as quercetin could enhance therapeutic

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Discussion

The results gathered in this review indicate that combining immunotherapy with neuroprotection strategies may open up new possibilities for the treatment of Alzheimer's disease (AD). To date, available treatments still have significant limitations: they partially control the progression of the disease, but do not prevent its evolution or significantly restore cognitive functions. Although they reduce neuropathological lesions, these therapies offer only modest clinical gains, as improvements in biomarkers do not translate proportionally into memory preservation or autonomy. In addition, adverse effects, such as edema and cerebral microhemorrhages, require constant monitoring, restricting their widespread use. In this scenario, combining different approaches may be a way to act on more than one aspect of the disease and achieve more consistent results.

Immunotherapy targeting acetylated tau protein has shown promising effects. In animal models, it reduced neurodegeneration, preserved memory and learning, and even modulated inflammatory processes in the brain (1). These data reinforce the idea that tau protein is one of the main targets of the disease and that treating it may be as important as or even more important than focusing solely on beta-amyloid. In fact, antibodies already approved against beta-amyloid (such as aducanumab, lecanemab, and donanemab) have been able to reduce amyloid plaques in the brain, but the clinical gains have been modest and accompanied by significant side effects, such as swelling and minor cerebral bleeding (2). Therefore, strategies that combine the two targets, tau and beta-amyloid, may increase protection and reduce the need for very high doses of antibodies.

In addition, compounds with neuroprotective action, such as quercetin, have shown encouraging results. This flavonoid, found in various foods, has been shown to improve memory in animals, reduce anxiety-related behaviors, regulate inflammatory molecules such as IL-6 and TNF-α, and even decrease beta-amyloid levels in the brain, favoring less toxic metabolic pathways (3). In other words, quercetin protects nerve cells and helps balance processes that contribute to the progression of the disease.

When we analyze the effects of immunotherapy and quercetin together, we see that there is an important convergence: both approaches act to preserve cognitive function, reduce inflammation in the nervous system, and limit the accumulation of toxic proteins such as tau and beta-amyloid (1,3). This combination of mechanisms is essential, since AD is complex and results not only from protein accumulation, but also from oxidative stress, chronic inflammation, and changes in communication between neurons.

Thus, the combination of immunotherapy with neuroprotection may provide a broader and more balanced response, overcoming the limitations of current therapies. This integration may not only offer more clinical benefits but also reduce side effects, as it paves the way for the use of lower doses and safer combinations (2,3). Together, the studies evaluated (1,2,3) indicate that the synergy between immunotherapy and neuroprotective agents is a promising strategy, capable of changing the way we think about the treatment of AD. However, it is essential that these findings advance to clinical trials in humans in order to confirm their efficacy and safety in real-world situations, considering the complexity of the disease and the diversity of patients.

Keywords

Alzheimer’s disease; neuroprotection; immunotherapy;

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Impact Of Serotonergic Gene Variants On Response In Treatment-Resistant Depression

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Introduction

Treatment-resistant depression (TRD) is a complex psychiatric condition with high global prevalence, associated with functional and social impairment, reduced quality of life, increased risk of comorbidities, substance use, and suicide (1). Beyond its individual impact, TRD imposes significant socioeconomic burdens, including unemployment and higher healthcare costs (2). Multiple factors may contribute to its development, including female sex, neurotransmitter alterations, inflammatory processes, interpersonal stress, and genetic susceptibility (3). It is estimated that 35% to 40% of cases of nonresponse are related to genetic variants (4). In this context, genetic factors play a key role in explaining variability in therapeutic response, facilitating individualized pharmacotherapy and improved outcomes (5). Among relevant genes, TPH1 and TPH2 encode isoforms of tryptophan hydroxylase, the enzyme involved in serotonin synthesis (6). Given the central role of the serotonergic system in mood regulation and the pathophysiology of depression, as well as the mechanism of most

antidepressants in enhancing serotonergic neurotransmission (7), variants in these genes may influence treatment response. However, evidence on the association between TPH1 and TPH2 variants and treatment response in TRD remains limited.

Aim

To evaluate the impact of TPH1 and TPH2 gene variants on treatment response in TRD.

Methods

A literature search was conducted in PubMed, LILACS, PsycINFO, and Scopus (January 2025) to address the guiding question: “What is the impact of TPH1 and TPH2 gene variants on treatment response in TRD?”. Primary studies were eligible for inclusion. Reviews, theses, dissertations, conference abstracts, and articles published in non-Roman scripts (e.g., Chinese) were excluded. No restrictions were applied regarding publication date, country, or level of care. Screening and eligibility assessment were performed independently and in duplicate by two researchers (B.C.B. and A.L.S.S.). Data extracted included country, year, study design, inclusion and exclusion criteria, sample size, participant characteristics, pharmacotherapy, genetic variants, and reported outcomes.

Results

Two studies, reported across four publications, were included. The combined sample comprised 892 participants, predominantly women (n = 515). Three reports were case-control analyses (8–10) and one was a clinical trial (11). All participants were of Caucasian ancestry. Sample sizes ranged from 205 participants (11) to 615 participants (9). The studies were conducted in Finland and the United States and were published between 2007 and 2012. In the clinical trial, 205 participants were randomized to fluoxetine, fluoxetine plus olanzapine, or olanzapine monotherapy (11). Variants evaluated included rs1800532 (A>C) in TPH1 and rs1386494 (A>G), rs7305115 (G>A), and rs4290270 (T>A) in TPH2. Treatments assessed included electroconvulsive therapy (ECT) (8, 9, 10), fluoxetine, fluoxetine plus olanzapine, olanzapine (11), and selective serotonin reuptake inhibitors (SSRIs) (9). All studies evaluated treatment response using the Montgomery-Åsberg Depression Rating Scale (MADRS). In one study, the rs1800532 (A>C) variant was associated with poorer response to ECT, with C/C homozygotes more frequent among individuals with TRD compared with healthy blood donor controls (53.1% vs 23.3%; P = 0.049) (9). Another study found no significant association between rs1800532 and ECT response (P = 0.350) (8). Variants rs1386494, rs7305115, and rs4290270 in TPH2 were not associated with treatment response, although rs7305115 and rs4290270 were linked to differences in depressive symptom profiles (11).

Discussion

Only the rs1800532 variant in the TPH1 gene was associated with poorer response to ECT, a finding that may be related to reduced serotonin synthesis and lower cerebrospinal fluid levels in carriers of the A allele (10). However, this association was not consistently replicated (8,9). Differences in study design, including variation in treatment comparison groups and outcome definitions, may account for inconsistent findings. One study compared patients receiving ECT with those treated with SSRIs (9), whereas the other included only ECT-treated patients and

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contrasted responders with nonresponders (8). No significant associations were observed for TPH2 variants across treatment modalities (8–11). Although TPH encodes the rate-limiting enzyme in serotonin synthesis (11), current evidence does not support the role of TPH2 variants in modulating therapeutic response in TRD (8,11). All studies included only Caucasian ancestry, which may limit generalizability (12). Additional research examining SSRI response and evaluating more diverse populations is warranted, as this pharmacological class acts directly on the serotonergic pathway (13). The TPH1 rs1800532 variant remains a candidate of interest, and its potential clinical utility requires confirmation in larger, well-designed, multiethnic studies. Future investigations integrating genomic, transcriptomic, and clinical data may help clarify its value as a biomarker for treatment stratification in TRD.

Keywords

Pharmacogenetics; Refractory Depression;

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Clinical Uses Of The Hormone Human Chorinic Gonadotropin In Men

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Introduction

Human Chorionic Gonadotropin (hCG) is a glycoprotein produced primarily by syncytiotrophoblast cells located in the placenta during pregnancy. During the first trimester of pregnancy, this hormone binds to the LH/hCG membrane receptor on Leydig cells, mimicking the effects of luteinizing hormone (LH), which is primarily involved in stimulating testosterone production. Subsequently, a second activation called "minipuberty" occurs during the first weeks of life. Over time, the gonadotropic axis enters a long latency period, returning around age 10, with LH and FSH released by the pituitary gland. Thus, hCG plays a direct role in the maintenance of sexual characteristics (1,2). It is now known that several causes can alter normal testosterone levels, potentially increasing the risk of infertility, such as anabolic steroid use and hypogonadism (3,4). In these cases, hCG may be a therapeutic alternative. Therefore, it is important to analyze its effects on the male population and its benefits when used as a pharmaceutical.

Aim

This study aims to review the literature on the clinical uses of hCG in men, demonstrating its beneficial effects.

Methods

This is an integrative literature review (ILR) of a descriptive and documentary nature, consisting of an evidence-based research method supported by scientific knowledge, aiming to achieve high-quality results. To conduct this ILR, a guiding question was formulated to enhance the research specificity and define the problem: "What are the clinical uses of hCG as a therapeutic pharmaceutical in men?" To this end, a literature search was conducted using materials published in the following databases and journals: Scientific Electronic Library Online (SciELO), NCBI/PubMed, and CAPES. The inclusion criteria used to select articles were: articles published in Portuguese or English; articles addressing the theme defined for the integrative review; and published and indexed in the aforementioned databases within the last five years. Duplicate articles and those not specifically addressing the chosen topic were excluded from the study. The keywords used in both languages and their combinations were as follows: "hCG," "fertility," "hypogonadism," "man," and "male".

Results

Based on the literature, a small number of scientific articles focused on the use of exogenous hCG in men were identified. Of the studies found, eight specifically addressed this topic. Regarding its use in men, most results indicated its use in cases of low testosterone levels, infertility, hypogonadism, and association with cryptorchidism.

Discussion

Testosterone plays a key role in spermatogenesis. When levels of this hormone are low, sperm quantity and quality decrease, directly implying possible infertility. Therefore, hormones of the hypothalamic-pituitary-gonadal axis are directly related to testosterone production by Leydig cells, with LH being its main signal (5). Studies indicate that injectable testosterone replacement therapy (TRT) yields satisfactory results in maintaining secondary sexual characteristics and sexual function. It is also important to highlight the high rate of anabolic steroid use today, which directly impacts the balance of testosterone levels (4). It is also noteworthy that the use of this therapy can affect spermatogenesis through negative feedback, suppressing this pathway. Therefore, injectable hCG therapy in men has shown positive results in increasing testosterone and stimulating spermatogenesis, thus reducing the risk of infertility. Combined with follicle-stimulating hormone (FSH), hCG therapy yielded the best results. Furthermore, this type of therapy demonstrated better results regarding patients' mental health when compared to TRT (3,6). Despite therapeutic success, gynecomastia was the most common undesirable effect due to increased estradiol secretion (2). It is noteworthy that the use of anabolic steroids, often indiscriminately, has become common. This leads to functional dysfunction of the hypothalamic-pituitary-gonadal axis, resulting in low endogenous testosterone levels. Therefore, the use of hCG has proven to be a post-cycle alternative (7). Another potential clinical use for hCG is in cryptorchidism, a condition in which one or both testicles fail to descend into the scrotum, the sac of skin below the penis. Intramuscular injections of hCG have been used. This practice is based on the concept that androgens are crucial for testicular descent in fetal life, and

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the testosterone surge during minipuberty plays a role in the transformation of gonocytes into Ad spermatogonia, which are stem cells for future spermatogenesis. Notably, testosterone levels increase significantly after administration of hCG or Gonadotropin-Releasing Hormone (GnRH). Although there may be some potential for hormonal treatment in the treatment of cryptorchidism, studies have shown low success rates and a high rate of testicular reascension. Therefore, medical associations do not recommend hormonal treatment to induce testicular descent in patients with cryptorchidism. This is due to the low efficacy of hormonal treatments, the lack of long-term data, the low quality of studies, varied treatment protocols and different study populations (8). This integrative review demonstrated the use of hCG therapy in the treatment of male infertility caused by low testosterone levels and hypogonadism, as well as its potential use in cryptorchidism. However, it is important to emphasize that its use should be monitored by a qualified professional, respecting the ideal dosage and duration of use for each case. HCG stimulates testosterone production and, consequently, spermatogenesis. This method proved to be a superior alternative to TRT for men wishing to maintain fertility. The main adverse effect observed was gynecomastia, due to increased estradiol, reinforcing the need for clinical monitoring. Thus, hCG is a valuable therapeutic option in andrology, but further research is needed to optimize protocols and better control adverse effects.

Keywords

hCG; Fertility; Hypogonadism; Man; Male.

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The Strategic Role Of The Clinical Pharmacist In Kidneytransplantation: Recommendations And Multiprofessionalacceptance

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Introduction

The role of the clinical pharmacist has transformed significantly in recent decades, keeping pace with the evolution of patient-centered care and the increasing complexity of therapeutic regimens. Particularly in the kidney transplant setting, pharmacotherapy is characterized by high complexity due to the use of multiple immunosuppressive drugs in combination with several other medications intended to treat comorbidities or

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prevent opportunistic infections. This reality substantially increases the risk of drug interactions, adverse events, and treatment failures, factors that can compromise graft and patient survival. In this context, the clinical pharmacist plays a strategic role by systematically reviewing prescriptions, identifying potential medication-related problems, and proposing interventions with the multidisciplinary team. Several studies have demonstrated the positive impact of pharmaceutical recommendations on clinical practice, whether in adjusting doses, discontinuing unnecessary therapies, including essential treatments, or even promoting therapeutic adherence (1,2).

Aim

To evaluate pharmaceutical recommendations related to medication use in kidney transplant patients admitted to the transplant ward of a highly complex university hospital during 2024.

Methods

This is a retrospective, cross-sectional, descriptive study based on the analysis of pharmaceutical recommendations
recorded between January and December 2024. Data were extracted from the database of the Clinical Pharmacy Unit of a leading university transplant hospital, which has a dedicated 22-bed ward for the follow-up of kidney and liver patients. All recommendations recorded by clinical pharmacists regarding kidney transplant patients were included in the study, regardless of age, sex, or time since transplantation. Interventions were subsequently categorized according to their type (inclusion of medication, discontinuation, dose adjustment, among others), the medication or pharmacological group involved, and the time point in which they occurred (admission, hospitalization, or hospital discharge). The acceptability of the recommendations by the medical team was also assessed, defined by the proportion of accepted interventions in relation to the total recommendations made.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

During the analyzed period, 343 pharmaceutical recommendations were recorded in kidney transplant patients. The most
prevalent interventions were medication inclusion (n=80; 23.32%), medication discontinuation (n=60; 17.49%), and dose adjustment (n=43; 12.54%). Infusion time adjustments (n=20; 5.83%), treatment adherence strategies (n=20; 5.83%), scheduling adjustment (n=17; 4.96%), and dosage form adjustment (n=17; 4.96%) were also observed. Other interventions, such as dosage adjustment, modification of treatment duration, change of administration route, medication dilution, drug substitution, request for laboratory tests, use of non-pharmacological measures, definition of therapeutic regimen and suspension of tests, totaled 86 recommendations (25.07%). Regarding the most involved medications, meropenem (6.41%; n=22), omeprazole (5.25%; n=18), albendazole (4.66%; n=16), piperacillin + tazobactam (4.37%; n=15) and epoetin alfa (3.5%; n=12)

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stood out. Regarding therapeutic classes, the recommendations focused on systemic anti-infectives (39%; n=133), alimentary tract and metabolism (23.5%; n=81), nervous system (14.9%; n=51), cardiovascular system (10.4%; n=36), blood and hematopoietic organs (8.75%; n=30), and immunosuppressants (3.5%; n=12). Regarding the time of implementation, it was found that most interventions occurred during hospitalization and clinical review of pharmacotherapy (n=267; 77.84%), followed by recommendations made at hospital discharge (n=53; 15.45%) and hospital admission (n=23; 6.71%). Regarding acceptability, it was observed that 315 recommendations (91.84%) were accepted by the multidisciplinary team, while 28 (8.16%) were not accepted.

Discussion

The results demonstrate the broad role of clinical pharmacists in different aspects of pharmacotherapeutic care in kidney transplantation. The most frequent interventions—inclusion, discontinuation, and dose adjustment—reflect the constant need for prescription review and adaptation, considering the narrow therapeutic index of several medications used by immunosuppressed patients. The high acceptability rate (91.8%) reinforces the multidisciplinary team's confidence in the clinicalpharmacist role and highlights their integration into the decision-making process. These findings are similar to those of studies conducted in Lebanon (2021) and Qatar (2023), which also showed acceptability rates above 80% and the predominance of medication inclusion as the main pharmaceutical intervention (1,2). In addition to their clinical relevance, the potential economic impact of these recommendations is also noteworthy, whether through the prevention of preventable adverse events, reduced hospital stays, or rational use of antimicrobials and immunosuppressants, although these outcomes were not directly assessed in the present study. In conclusion, the role of the clinical pharmacist in the kidney transplant ward contributes to the optimization of pharmacotherapy, prevention of risks associated with polypharmacy and improvement of patient safety, constituting an essential element in the multidisciplinary health team.

Keywords

Pharmacists, Kidney Transplantation, Drug Therapy

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Use Of Bifidobacterium Animalis As A Drug To Prevent Colic In Infants

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Introduction

Colic in infants is one of the most common problems after birth, characterized by prolonged, inconsolable crying in healthy babies, usually in the first four months of life. Colic is identified by the "rule of three": inconsolable crying for more than three hours a day, more than three days a week, and for more than three weeks. Colic is not considered pathological, but it significantly impacts the newborn's quality of life, generating parental stress and increased demand for medical care (1, 2). The pathophysiology of colic is multifactorial and involves gastrointestinal immaturity, motility alterations, gas, neurobehavioral factors, and aspects related to the composition of the intestinal microbiota (3). Early intestinal colonization influences digestion, immunological maturation, and resistance to pathogens. Infants have a greater abundance of bifidobacteria, which have protective effects against gastrointestinal disorders. Bifidobacterium animalis subsp. lactis (strain BB-12®) has

been extensively studied (4). Although Lactobacillus reuteri DSM 17938 is a widely studied probiotic for colic, researchers have been exploring the potential of B. animalis for this purpose.

Aim

To review the scientific literature on the use of B. animalis in infants and its applicability in colic prevention.

Methods

This work consists of an integrative review of the evidence-based literature, supported by scientific knowledge, aiming to select scientifically rigorous studies that address a specific problem. According to the rules for an integrative literature review, the problem formulated was: "What are the therapeutic aspects involved in the use of B. animalis as a preventive drug for colic in infants?" Based on this premise, searches were conducted in the PubMed and CAPES Periodicals databases, using the descriptors: "Bifidobacterium animalis", "BB-12," "colic," "infant colic," "prevention," and "probiotics," as well as their combinations. Furthermore, priority was given to studies published between 2020 and 2025 in English, in journals recognized by the scientific community. Inclusion criteria included studies addressing the use of B. animalis in healthy infants, regardless of whether they were breastfed or using infant formulas that partially or completely replace breast milk. Studies involving at risk populations, such as premature, immunocompromised, and/or hospitalized infants, using multicomponent formulas with probiotics and prebiotics without isolated analysis of B. animalis, were excluded.

Results

Eight articles were found in PubMed and six in CAPES Journals, totaling 14 articles in English. Three of these were duplicates, and five were selected for this study.

Discussion

The studies found suggest that B. animalis plays a role in the treatment of colic, bringing benefits both clinically and in biological parameters, associated with reduced crying time, as well as improvements in immunological and inflammatory markers (4, 5). This action can be explained by the strain's ability to balance the intestinal microbiota, attenuate inflammatory processes, and stimulate the production of short-chain fatty acids, compounds associated with improved gastrointestinal tract function (4, 6). However, despite these promising results, there is still no proof of the effectiveness of B. animalis in preventing colic. Therefore, Lactobacillus reuteri DSM 17938 is the bacterium that has been widely studied for this purpose, with the effect of B. animalis remaining speculative (5). Therefore, international guidelines also reinforce this limitation: there is no recommendation for the routine use of probiotics to prevent colic (6, 7). However, when indicated, it is based on the most consistent evidence obtained with L. reuteri DSM 17938. Therefore, B. animalis is a possible therapeutic alternative for infants with persistent colic, especially in situations where L. reuteri is not available (4). Regarding safety, B. animalis is considered safe in healthy infants, and reports of adverse effects are rare (6). Furthermore, its studied applications also include the relief of constipation and some symptoms of irritable bowel syndrome, as well as improved immune function (8). There is also research suggesting a possible benefit in reducing the severity of allergic diseases, such as atopic dermatitis, as well as effects on metabolism and obesity. However, these results

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are still preliminary and require further clinical proof (6, 9). Even so, special care is recommended in more vulnerable populations, such as extremely premature infants and immunocompromised children, due to the theoretical risk of bacterial translocation. However, there is still no evidence demonstrating success with the use of B. animalis in preventing colic, despite it being considered safe in healthy infants, with rare reports of adverse effects, although use in at-risk populations still requires caution.

Keywords

Bifidobacterium animalis; BB-12; Colic; Probiotics

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Use Of Quetiapine In The Treatment Of Insomnia And Discontinuation Syndrome: A Literature Review

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Introduction

Insomnia is a common health problem. Poor sleep can be a symptom, harbinger, or comorbid problem of psychiatric disorders, especially depression, anxiety disorders, and substance use disorders. Several classes of drugs, with different mechanisms, are used to treat insomnia, including benzodiazepine receptor agonists, melatonin receptor agonists, tricyclic antidepressants, orexin receptor antagonists, and histamine receptor antagonists. Despite the benefits, serious undesirable effects are observed in many hypnotic users, such as daytime drowsiness, rapid tolerance, rebound insomnia after abrupt discontinuation, and cognitive impairment (1). Furthermore, the risk of misuse and abuse is high among these sleep-inducing medications (2). Among these risks, it is important to consider discontinuation syndrome, a common effect when stopping some medications, including those with a hypnotic effect used to induce sleep. Discontinuation syndrome, commonly referred to as withdrawal, is a term used to describe a set of symptoms that occur as a result of the abrupt withdrawal of a

substance from the body. Symptoms depend on the substance and the duration and intensity of use (3). In this context, the use of quetiapine for the treatment of insomnia and its potential discontinuation syndrome associated with its sleep-inducing effect is relevant. This study aims to gather the most current information on this drug and withdrawal symptoms during withdrawal.

Aim

To review scientific literature articles describing quetiapine for the treatment of insomnia and the discontinuation syndrome associated with its use as a sleep-inducing drug.

Methods

This study is an integrative review of the scientific literature. The following steps were followed: 1) Development of guiding questions; 2) Literature search or sampling; 3) Data collection; 4) Critical analysis of the included studies; 5) Discussion of results; and 6) Presentation of the integrative review (4). The following databases were used to collect the material: CAPES Portal, PubMed, and Google Scholar, prioritizing articles published in the last 5 years. The following descriptors were used in these sources: "Quetiapine"; "Withdrawal syndrome"; "Discontinuation syndrome"; "Abstinence," and their combinations. The following questions were used to guide the study: "What are the characteristics of the sleep-inducing effect of quetiapine?" and "What are the symptoms of quetiapine discontinuation syndrome?". The articles were collected in September 2025. This review included articles that were freely available; and articles published in Portuguese and English in journals of recognized scientific rigor. Exclusion criteria included studies that did not answer the guiding questions, as well as those published repeatedly in the databases. After selecting suitable materials, the information was analyzed, and the results were discussed to achieve the study's objective.

Results

Initially, 70 studies were found in the databases consulted. After screening, 22 articles did not advance to the next stage due to duplication. Of the remaining 48, 24 were selected based on title and abstract. Of these, 17 were read in full, and 14 articles were selected to answer the guiding question. According to the articles, quetiapine is used off-label to induce sleep and can cause discontinuation syndrome, causing some symptoms.

Discussion

Quetiapine is a second-generation antipsychotic used in the treatment of schizophrenia with similar efficacy to first-generation drugs. This drug reduces both the positive and negative symptoms of schizophrenia, with a lower frequency of adverse effects (5). Chemically, it is a dibenzothiazepine-derived molecule with moderate affinity for 5-HT2A, α1, M1, and H1 receptors, lower affinity for D2 and 5-HT1A receptors, and even lower affinity for 5-HT2C, α2, and D receptors (6). Although classified as an antipsychotic, indicated for the treatment of psychoses such as schizophrenia and bipolar disorder, its off-label use for the treatment of insomnia has been increasing, as sedation and somnolence are side effects of this drug. The target dose for this purpose is low, 25 to 100 mg/day, differing from the standard dose used for major disorders of up to 800 mg/day. Even so, the general consensus is that the use of quetiapine for monitoring insomnia is associated with symptoms of psychiatric disorders and not

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solely for the treatment of primary insomnia, with the efficacy and safety of this prescription poorly documented in clinical trials (7,8). The sedative effect of quetiapine, resulting from its action on H1 histaminergic receptors (9), represents one of the most prevalent side effects. In the elderly, excessive sedation compromises alertness and increases the risk of falls and fractures, especially in domestic environments, where factors such as reduced vision and changes in balance make this population even more susceptible to accidents (10,11). Quetiapine at a dose of 25 mg at night improves total sleep time and reduces sleep latency in primary insomnia, with few adverse effects (12). There is limited evidence on the use of quetiapine in insomnia, and prescribers should be aware of its significant abuse potential (13). Continued treatment is neither necessary nor desirable (14). Discontinuation symptoms are an uncommon side effect of quetiapine discontinuation, but may have clinical implications. In a recent review of 13 articles, an association was found between rapid discontinuation of quetiapine and the onset of somatic symptoms such as nausea, vomiting, agitation, restlessness, diaphoresis, irritability, anxiety, dysphoria, sleep disturbances, insomnia, tachycardia, hypertension, and dizziness (6). Furthermore, the onset of withdrawal dyskinesia characterized by abnormal choreiform movements, as well as confusion and speech disturbances in some cases, has also been reported. However, these findings were limited by the number and quality of case reports identified (15). Therefore, it is important to use quetiapine cautiously off-label in the treatment of insomnia, as its effects due to discontinuation are not frequent, however, it is interesting not to stop use suddenly, preferring a gradual withdrawal, in order to avoid any withdrawal symptoms.

Keywords

Quetiapine; Withdrawal syndrome; Abstinence

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Development And Characterization Of Zif-8 Nanocarrier For An Antimonial Compound

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Introduction

Metal-Organic Frameworks (MOFs) have emerged as versatile systems for the controlled release of bioactive molecules, with Zeolitic Imidazolate Framework-8 (ZIF-8) standing out as one of the most promising representatives of this class (1). This material is a coordination polymer formed by the coordination bond between zinc ions (Zn^{2+}) and the 2-methylimidazole ligand, resulting in a highly porous three-dimensional structure, chemically stable, and with a large surface area. These features give ZIF-8 biocompatibility and potential biomedical applications, including the loading of active substances and their release modulated by internal

stimuli, such as the acidic pH of pathological microenvironments (2,3).
Among pharmacologically relevant compounds, potassium hexahydroxoantimonate(V) [$KSb(OH)_6$] stands out as a source of pentavalent antimony (Sb^{5+}). Sb^{5+} presents greater safety compared to Sb^{3+}, making it promising for therapeutic formulations with a better therapeutic index (4,5). Historically, antimony has played an essential role in the treatment of parasitic diseases, but its toxicity can cause pneumoconiosis, cardiac alterations, gastrointestinal lesions, and immunological disorders (6,7).
In this context, the incorporation of Sb^{5+} into nanocarriers such as ZIF-8 arises as a strategy to reduce systemic side effects and direct the drug to the therapeutic site. This approach allows greater formulation stability, reduced premature interaction with healthy tissues, improved bioavailability, and enhanced clinical efficacy (8,9).
Therefore, synthesizing this nanocarrier using ZIF-8 as a controlled-release platform for pentavalent antimoniate represents an innovative alternative in the development of more effective and safer therapies against neglected parasitic diseases (10).

Aim

This study aimed to synthesize and characterize ZIF-8 as a potential controlled-release system, evaluating its structural, morphological, and thermal properties, as well as the loading of antimony (Sb) derived from $KSb(OH)_6$. Techniques such as XRD, FTIR, SEM, TGA, EDX, and HG-AFS were employed to investigate the incorporation and performance of the nanocarrier.

Methods

ZIF-8 synthesis was initially performed using 0.8120 g of 2-methylimidazole (9.87 mmol) dissolved in 50 mL of methanol under stirring for 10 minutes. In parallel, a solution containing 0.750 g of $Zn(NO_3)_2{\cdot}6H_2O$ in 50 mL of methanol was prepared under stirring. The ligand solution was then added to the metal solution, kept under stirring for 10 minutes, sealed, and left to stand for 24 h at room temperature, resulting in precipitate formation. The material was recovered by centrifugation at 10,000 rpm for 10 min, washed three times with methanol, and centrifuged again. Drying was carried out in a centrifuge tube sealed with perforated paraffin to allow solvent evaporation (11).
ZIF-8-Sb obtained by physical mixing (ZIF-8-Sb PM) was prepared using 0.1 g of dried ZIF-8 and 0.15 g of $KSb(OH)_6$. The reagents were weighed, transferred to a mortar, and homogenized until a uniform mixture was obtained. The final solid was stored in an Eppendorf tube under dry conditions.
For the heating method (ZIF-8-Sb HT), 0.1 g of ZIF-8 and 0.15 g of $KSb(OH)_6$ were used. In a beaker, 25 mL of deionized water was heated to 80 °C under magnetic stirring. Next, macerated ZIF-8 and $KSb(OH)_6$ were added, and stirring was maintained until complete water evaporation. The resulting solid was scraped from the beaker walls, transferred to an Eppendorf tube, and stored under clean, dry conditions.

Results

X-ray diffraction (XRD) confirmed the formation of ZIF-8, with peaks at 2θ = 7.3°, 10.4°, 12.7°, 14.7°, 16.4°, 18.0°, 22.7°, and 29.7°, corresponding to the (110), (200), (211), (220), (311), (222), (411), (332), (510), and (440) planes (12–14). Pure ZIF-8 exhibited crystallinity of 81%, d(110) spacing = 11.67 nm, average crystallite size = 315.41 nm, and FWHM = 0.22. In ZIF-8-Sb PM, crystallinity was 80%, d(110) = 12.10 nm, crystallite size = 339.40 nm, and

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FWHM = 0.21. ZIF-8-Sb HT presented crystallinity of 77%, d(110) = 11.94 nm, crystallite size = 296.74 nm, and FWHM = 0.30 (15–17).
FTIR revealed ZIF-8 bands at 1146 cm^{-1} (C–N), 995 cm^{-1} (C–N), 423 cm^{-1} (Zn–N), and 1585 cm^{-1} (C=N) [18,19]. For $KSb(OH)_6$, bands were detected at 3169 cm^{-1} (OH), 578 cm^{-1} (Sb–O), and 1115 cm^{-1} (δSb–OH) (20,21). These signals also appeared in ZIF-8-Sb PM and HT, confirming the presence of Sb.
Thermogravimetric analysis (TGA) showed an initial 2% weight loss up to 100 °C (solvents), followed by 20% up to 300 °C (guest molecules), and ~45% between 350–700 °C (decomposition and ZnO formation) (22). ZIF-8-Sb HT exhibited higher final residue compared to PM (23,24).
Sb quantification indicated 3.30 ± 1.11 mg/20 mg sample in ZIF-8-Sb PM and 2.89 ± 0.43 mg/20 mg in ZIF-8-Sb HT (25). The drug loading content (DLC) was 16.5% for PM and 14.45% for HT (26).
SEM micrographs showed particle sizes of 52 ± 7 nm in ZIF-8 (27,28), increasing to 81 ± 12 nm in ZIF-8-Sb PM (29) and remaining at 52 ± 7 nm in ZIF-8-Sb HT (30). The size range of 52–81 nm falls within the favorable 10–150 nm range for the EPR effect (31).

Discussion

ZIF-8 exhibited crystallinity of 81%, with an average crystallite size of 315.41 nm and d(110) spacing of 11.67 nm, confirming an ordered and stable structure (12–14). After Sb incorporation, crystallinity slightly decreased to 80% in PM and 77% in HT, with d(110) values of 12.10 nm (PM) and 11.94 nm (HT). Crystallite size increased to 339.40 nm in physical mixing and decreased to 296.74 nm after thermal treatment, indicating a stronger impact of heating on the crystalline network. The increased FWHM to 0.30 in HT suggests internal rearrangements that may favor Sb diffusion (15–17).
FTIR confirmed structural integrity, with preserved ZIF-8 bands (423, 995, 1146, and 1585 cm^{-1}) (18,19), in addition to Sb signals (3169, 1115, and 578 cm^{-1}), confirming its incorporation (20,21).
In TGA, pure ZIF-8 showed weight losses of 2% up to 100 °C and 20% up to 300 °C, as well as 45% between 350–700 °C, consistent with framework decomposition (22). The higher final residue in HT suggests greater Sb retention and better thermal stability (23,24).
The incorporated Sb mass was 3.30 ± 1.11 mg (PM) versus 2.89 ± 0.43 mg (HT). Although physical mixing provided higher absolute loading, the higher variation suggests heterogeneity, while HT showed more uniform incorporation (25). The DLC followed this trend, with 16.5% (PM) and 14.45% (HT) (26), indicating that the thermal method favors internal diffusion and potential controlled release, despite the lower initial amount.
SEM revealed particle sizes of 52 ± 7 nm for ZIF-8 (27,28), increasing to 81 ± 12 nm after physical mixing (29), and remaining at 52 ± 7 nm after thermal treatment (30). This morphological difference suggests that PM promotes amorphous surface coating, while HT leads to partial collapse of contours and Sb diffusion inside the matrix. The observed 52–81 nm range lies within the optimal 10–150 nm range for the EPR effect, favoring tumor accumulation and prolonged circulation time (31). Thus, both methods demonstrated viability: PM with higher Sb loading, and HT with greater uniformity and stability.

Keywords

Biomedical ; Antimony; Nanocarriers; Porous.

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Pharmacists' Role In Urgent And Emergency Situations In The Pharmacy Environment: An Integrative Review

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Introduction

Medical emergencies and urgencies are critical situations that require rapid recognition and immediate intervention. Pharmacists working in community and hospital pharmacies are increasingly involved in treating situations that require rapid intervention, such as anaphylactic reactions, hypertensive crises, severe hypoglycemia, drug poisoning, and even seizures. Pharmacists, as healthcare professionals easily accessible to the population, occupy a strategic position to identify early signs of risk, implement initial support measures, and ensure appropriate referral to the emergency department (1). Furthermore, professional qualifications for

recognizing and appropriately referring these emergencies are essential for patient safety. Studies show that structured rapid response protocols, referred to in some countries as "Code Red" protocols, contribute to reduced response times and patient safety, promoting a standardized flow of care in emergencies (2). This summary presents evidence-based guidelines for implementing a rapid response protocol, the "Code Red," in these situations. Evidence shows that standardized protocols dramatically reduce complications; a pharmaceutical protocol for glycemic control (RxGCP), for example, reduced the rate of severe hypoglycemia in high-risk patients by up to 81% (3). Key pharmaceutical actions include early identification of warning signs, immediate intervention (such as administering glucose or self-injectable epinephrine, as per protocol), and activating emergency services such as the Mobile Emergency Care Service (SAMU). Despite this, in Brazil, pharmaceutical intervention in critical situations still faces barriers, such as the lack of specific national regulations, infrastructure disparities between community and hospital pharmacies, and a lack of ongoing training in basic life support.

Aim

Considering the above, the objective of this study is to analyze the role of pharmacists in urgent and emergency situations in the pharmacy environment, focusing on their technical preparation, standardization of clinical and conduct protocols, legal limits on their practice, and the use of digital technologies to support decision-making.

Methods

This study is an integrative literature review conducted in the SciELO, LILACS, PubMed, and Google Scholar databases, using the descriptors "pharmacist," "urgency," "emergency," and "pharmaceutical care." Original articles, reviews, guidelines, and official documents published between 2007 and 2025, in Portuguese, English, and Spanish, addressing the role of pharmacists in emergencies, were included. Studies addressing the role of other healthcare professionals without mentioning the role of pharmacists were excluded. Data analysis was organized into four topics: 1. rapid response pharmaceutical protocols in emergencies; 2. most relevant clinical interventions performed by pharmacists; 3. impact of pharmaceutical practice on patient safety; and 4. challenges and future perspectives for the consolidation of clinical pharmaceutical practice in urgent and emergency situations.

Results

In general, the results indicated that standardizing rapid response protocols (such as "Code Red") significantly reduces emergency response times, especially in cases of anaphylaxis and hypoglycemia. The pharmacist's role was highlighted in three stages: early identification of signs and symptoms, implementation of initial support measures, and immediate referral to the emergency room (2,4). In these cases, the most common interventions include administering oral glucose or glucagon in cases of hypoglycemia, use of auto-injectable epinephrine in cases of anaphylaxis, basic life support, and appropriate referral to the emergency room. Integration with services such as SAMU (Mobile Emergency Care Service) helped reduce complications and avoidable hospitalizations.

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Discussion

The findings reinforce that pharmacists play an essential role in responding to emergencies, being able to act as active members of multidisciplinary teams. In community pharmacies, this role is crucial in preventing the worsening of critical situations until specialized care arrives. In the hospital setting, pharmacists contribute to preventing medication errors, managing serious adverse reactions, and providing clinical support to critically ill patients. However, several obstacles still limit the development of this practice in Brazil (5). Among these obstacles, we can emphasize the absence of national clinical reference protocols, the lack of ongoing training in basic and advanced life support, regional inequalities in the availability of essential medications, and the lack of infrastructure in smaller pharmacies are factors that reduce the effectiveness of pharmaceutical services. Furthermore, there is a need for public policies that formally recognize pharmacists as essential agents in emergency situations. Continued training is consolidated as an essential pillar to enhance the effectiveness of this action. Research indicates that in-person training and practical simulations significantly increase self-confidence and confidence in decision-making (6,7). Structuring the "Code Red" strategy in Brazilian pharmacies requires integrating professional training, care protocols, appropriate infrastructure, and the adoption of technological resources. In this scenario, the pharmacy transcends its traditional role of dispensing medications and assumes a relevant position as a unit of immediate public health care. This consolidates evidence-based clinical pharmacy, increases the resolution capacity of the Unified Health System (SUS), and ensures greater patient protection in times of emergency. Therefore, the role of pharmacists in urgent and emergency situations is an increasingly common reality, but it still requires ongoing training, well-defined protocols, and legal support to ensure safe and effective patient care.

Keywords

Emergencies; Clinical pharmacy; Pharmaceutical Care.

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Optimization Of Outcomes In Type 2 Diabetes Mellitus Through Early Laboratory Screening

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Introduction

Diabetes mellitus is the leading cause of chronic kidney disease (CKD), accounting for approximately one-third of dialysis cases worldwide, with 32% of patients undergoing dialysis being diabetic (1). The growing prevalence of type 2 diabetes, driven by population aging, sedentary lifestyles, and poor dietary habits, has made CKD a major global public health problem due to its high morbidity, mortality, and economic burden on healthcare systems. According to the American Diabetes Association (ADA), it is essential to regularly assess renal function in all patients with type 2 diabetes, particularly through the urinary albumin-to-creatinine ratio (UACR), an early marker

of renal and endothelial dysfunction associated with diabetes and cardiovascular disease. The use of the CKD-EPI calculator, integrating cystatin C and serum creatinine values, provides greater diagnostic accuracy and supports better therapeutic decisions (2,3). The diagnosis of type 2 diabetes, predominating in adults, is primarily established through fasting plasma glucose (FPG) and glycated hemoglobin (A1c) measurements, both also used for ongoing glycemic monitoring (4). However, hemoglobinopathies, such as thalassemias or structural hemoglobin variants, can alter hemoglobin glycation, leading to falsely reduced A1c values and, consequently, inadequate treatment decisions (5,6). This reinforces the need for complementary biomarkers and a multidisciplinary follow-up approach. In this context, Pharmaceutical Care emerges as a patient-centered model that guides the provision of pharmaceutical services to identify and resolve drug-related problems, promote rational drug use, and contribute to disease prevention, health promotion, and improved quality of life (7). The inclusion of pharmacists in the healthcare team is particularly relevant for optimizing therapeutic outcomes, ensuring patient safety, and preventing the progression of diabetes-related complications such as CKD.

Aim

To perform early screening of kidney function, hemoglobinopathies and metabolic alterations in patients with type 2 diabetes, focusing on pharmacotherapeutic management and optimization of health outcomes through Pharmaceutical Care.

Methods

A cross-sectional and descriptive study was conducted to evaluate the clinical and laboratory profile of patients with type 2 diabetes. The study population included individuals over 18 years of age, of both sexes, with up to 10 years of disease progression and under exclusive oral pharmacological treatment. Eligibility also required the presence of a reference A1c value in their records and the ability to travel to the laboratory for blood and urine collection. Patients using insulin, pregnant women, and individuals with incomplete medical records were excluded to avoid confounding factors. The study protocol was approved by the Human Research Ethics Committee of the State University of Ponta Grossa (number 5,778,614/2022), and all participants signed informed consent forms prior to enrollment. Recruitment occurred in four Primary Health Care Units (UBS) in Ponta Grossa – Parana, using different strategies tailored to each unit: review of physical medical charts (UBS 1), verification of medication dispensing records and insulin use (UBS 2), analysis of electronic medical records (UBS 3), and direct invitation by the pharmacist during medication dispensing (UBS 4). This diversified approach aimed to ensure a representative sample and minimize selection bias. Laboratory collections were performed at the Hospital Vicentino Laboratory, following standardized protocols to guarantee analytical reliability. The tests included fasting plasma glucose (FPG), glycated hemoglobin (A1c), serum creatinine, cystatin C, albumin-to-creatinine ratio in spot urine samples, lipid profile, and calculation of estimated glomerular filtration rate (eGFR) using the CKD-EPI equation. The interpretation of results adhered to established clinical guidelines and reference values reported in the literature (8–11). Data were systematized for subsequent descriptive analysis, seeking to correlate laboratory findings with patients' clinical and therapeutic profiles.

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Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

A total of 16 patients were included, averaging 58 years (SD = 10), ranging from 41 to 78 years, with most being female (10 patients; 62.5%). The sample consisted of adults with different disease durations, majority presenting comorbidities like systemic arterial hypertension and dyslipidemia, common conditions in this population contributing to increased cardiovascular risk. Laboratory analyses revealed 11 participants (68.8%) had glycemic markers (FPG and A1c) above recommended targets, even considering individualized, flexible parameters for elderly patients to minimize hypoglycemia risk (8). Regarding renal function, assessed through cystatin C, serum creatinine, UACR, and eGFR, 3 patients (18.8%) showed alterations compatible with initial stages of kidney impairment, reinforcing the need for continuous monitoring to prevent progression to advanced CKD. The lipid profile was also unfavorable in most samples. Only one patient (6.3%) had values within the recommended range, while most exhibited significant alterations. The most frequent findings were elevated triglycerides and non-HDL cholesterol (11 patients; 68.8%), with LDL cholesterol being the most altered parameter, elevated in 14 patients (87.5%). These results highlight the high prevalence of dyslipidemia in type 2 diabetes individuals and the consequent increase in cardiovascular risk. No hemoglobinopathies were detected, confirming A1c reliability as a monitoring marker in this population. For recruitment, electronic medical records search proved most efficient, offering faster access, updated information, and identifying 107 type 2 diabetes patients. However, only 3 agreed to participate, showing low adherence. Overall, patient contact and engagement represented the main difficulty across all recruitment modalities, limiting sample size and highlighting a challenge for primary care studies.

Discussion

The pharmacological profile showed most patients (62.5%) were treated exclusively with metformin, consistent with guidelines recommending it as first-line therapy for type 2 diabetes (12). Although often sufficient initially, persistent hyperglycemia in most patients suggests the need for treatment intensification with combinations like SGLT2 inhibitors or GLP-1 receptor agonists, which reduce cardiovascular and renal risks. However, the unavailability of these drugs free of charge limits their use. The absence of hemoglobinopathies in the sample confirms the reliability of A1c, avoiding misinterpretations. Observed hyperglycemia was accompanied by significant lipid metabolism alterations. Only one patient had a normal lipid profile, while the vast majority presented dyslipidemia, especially elevated LDL cholesterol, directly associated with atherosclerosis progression in diabetics. The underlying mechanism involves increased lipolysis and free fatty acids, promoting insulin resistance and dyslipidemia (13). These findings are consistent with the literature linking poor glycemic control, lipid abnormalities, and higher cardiovascular risk. Renal evaluation revealed alterations suggestive of kidney impairment in nearly one-fifth of participants. Although lower than dyslipidemia prevalence, these findings highlight the importance of early detection and continuous monitoring using cystatin C, creatinine, UACR, and eGFR. Early identification allows timely intervention, delaying progression and reducing the burden of dialysis. This reinforces recommendations for routine renal monitoring in all diabetic patients. Beyond pharmacology, patients received lifestyle counseling on physical activity and nutrition. Integrating these non-pharmacological strategies

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with drug therapy is essential for comprehensive care, improving glycemic control, lipid profile, and cardiovascular health (14,15). The pharmacist's role was fundamental in recruitment and health education, highlighting the importance of pharmaceutical care within a multidisciplinary team. By guiding rational medication use and promoting adherence, the pharmacist directly helps prevent complications and optimize quality of life. A main challenge was patient recruitment. Despite identifying over 100 individuals in records, only a small proportion agreed to participate. This limited adherence may reflect barriers like lack of time, transportation difficulties, low perception of disease severity, or limited engagement. These obstacles are common in primary care research and underscore the need for strategies to increase participation, such as better communication, family support, and community-based interventions. This study revealed high rates of inadequate glycemic and lipid control, plus early signs of renal impairment. The findings highlight the urgent need for rigorous monitoring and timely therapeutic adjustments. They reinforce integrating lifestyle interventions with pharmacology, and the central role of pharmaceutical care in supporting adherence. Despite the small sample size limitation, the study contributes to understanding diabetes management challenges and underscores the need for broader strategies to improve engagement and prevent complications.

Keywords

Diabetes; Kidney Disease; Pharmaceutical Care

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Benzodiazepine Dispensing Profile At The Central Public Pharmacy Of A Municipality In Midwestern Santa Catarina, Brazil: A Record-Based Cross-Sectional Study

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Introduction

Benzodiazepines (BZDs) are among the most prescribed psychotropic agents worldwide, and remain a key therapeutic class in the management of anxiety, insomnia and seizure disorders (1). In Brazil, BZD consumption ranks among the highest globally, raising concerns about prolonged or inappropriate use and its public health repercussions (2). Despite their recognized clinical efficacy, chronic use is associated with tolerance,

dependence, cognitive impairment, and clinically relevant drug–drug interactions (3,4). These risks are further compounded by easy access and insufficient therapeutic monitoring in public health services (5). In this context, characterizing dispensing patterns is essential to identify trends in use, guide rational prescribing, and support the clinical role of pharmacists.

Aim

To characterize BZDs dispensing patterns at a central public pharmacy in the Midwest region of Santa Catarina, Brazil, based on electronic dispensing records.

Methods

This observational, retrospective, cross-sectional, record-based study analyzed BZDs dispensing from the G-mus electronic system of a central public pharmacy in a midwestern municipality of Santa Catarina. Records were included if they had at least one BZD dispensing between January 1, 2015, and March 30, 2019. Collected variables were patient sex, age group, name of BZD dispensed, duration of use, and concomitant dispensing of two BZDs. Data were tabulated and analyzed as absolute and relative frequencies using Microsoft Excel®. The study was approved by the local Research Ethics Committee (approval No. 3.042.799), in accordance with Brazilian regulations for research involving human data.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

A total of 152 electronic patient records were included. Most patients were female (n=109; 71.7%), with the predominant age group being 36-50 years (n=59; 38.8%). Based on average monthly dispensings, Clonazepam was the most frequently dispensed BZD (n=75; 49.3%), followed by Alprazolam (n=45; 29.6%), Diazepam (n=22; 14.5%), Bromazepam (n=16; 10.5%), and Clobazam (n=5; 3.3%). More than half of the patients (n=80; 52.6%) used BZDs for less than one year, while 9 patients (5.9%) maintained use for four years or longer. Concomitant use of two BZDs was identified in 11 records (7.2%), resulting in a total dispensing count higher than the number of unique patients.

Discussion

This study found a predominance of BZDs dispensing to female patients and the highest frequency within the 36–50-year age group, a finding consistent with literature indicating a higher prevalence of anxiety disorders, insomnia, and greater health-seeking behavior among women (1,6). Stressful life events, occupational demands, and sleep disturbances - more frequently reported by women - may contribute to this pattern (7). Clonazepam was the most frequently dispensed BZD, possibly due to its wide availability, multiple formulations, and long half-life, factors that favor prescribing and treatment maintenance (5,8).
The patterns observed are consistent with findings from the Brazilian National Health Survey, which reported a

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growing prevalence of BZD use among adults -particularly women - with clonazepam emerging as the most frequently used agent nationwide (9). International studies also reveal a similar trend, indicating that this phenomenon is global and not restricted to the Brazilian context (10).
The identification of prolonged use and concomitant BZDs dispensing raises concern given the increased risk of tolerance, dependence, and cognitive deficits, including impairments in memory and executive function (3,11). Recent studies indicate that up to 20% of chronic users may present measurable cognitive impairment (11). These findings reinforce the importance of clinical pharmacists in monitoring pharmacotherapy, identifying drug-related problems, promoting deprescribing strategies when appropriate, and implementing educational interventions to reduce unnecessary use and associated risks.

Keywords

Anxiolytics drugs; Clinical pharmacist; Psychotropic

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Applications Of Artificial Intelligence (Ai) In The Discovery And Optimization Of New Drugs: Advances And Challenges For Public Health

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Introduction

The discovery of new drugs is complex, with development estimated to take around a decade and costing up to US$ 2.6 billion, and a 90% failure rate in clinical trials (1). This innovation is extremely important for science, one reason being antimicrobial resistance, which renders existing drugs ineffective, making it necessary for researchers to constantly innovate (2). Another example would be cancer, a disease that is difficult to treat.

Currently, there are no fully effective drugs, and there are few options on the market, as 97% of these drugs reach preclinical trials and fail, meaning the success rate is low (3). Artificial Intelligence promises to reduce the development time for new drugs and even cut costs by 30%. It has the ability to predict the physicochemical properties of drugs, drug-target interactions, binding affinity, protein structures, and toxicity (1,2, 3). Examples include Halicin, an antibiotic identified by AI that is effective against multidrug-resistant bacteria; DSP-1181, a compound created by AI that reached clinical trials in just one year; and the Drugnome AI platform, which has achieved high accuracy in target identification (2,3). Despite promising advances, the implementation of AI in public health faces significant challenges. The quality and availability of high-quality data remain major barriers (1,2,3). Overcoming these obstacles is crucial for AI to fulfill its promise of accelerating the development of innovative and affordable therapies, contributing to safety and effectiveness in public health (1,2,3,4,5).

Aim

The objective of this article was to discuss and analyze the use of Artificial Intelligence in the field of pharmaceutical sciences, with a primary focus on the use of Artificial Intelligence as a facilitator in the development of drugs and medicines.

Methods

This study was developed as an exploratory literature review. The main objective is to understand how Artificial Intelligence (AI) has been applied in the process of discovering and developing new drugs, providing a critical view of the advances achieved, the limitations that still exist, and the future prospects of this technology that is transforming the field of health and pharmaceutical innovation. To achieve this goal, we conducted a systematic search of widely recognized scientific databases, such as PubMed and ScienceDirect, thus ensuring greater reliability and diversity of information. The search strategy used combinations of keywords related to Artificial Intelligence and drug development, associated by Boolean operators (AND, OR, and NOT). Among the main terms used were “Artificial Intelligence,” “Drug Discovery,” “Drug Development,” and “Pharmaceutical Innovation,” adapted according to the specificity of each database consulted. We defined inclusion criteria that considered articles published between 2024 and 2025, available in full, in English or Portuguese, and that clearly addressed the application of AI at any stage of the drug discovery or development process. On the other hand, studies that did not have the direct application of AI as their central focus were excluded. The selection process was carried out in stages, ensuring greater rigor and reliability of the results. Initially, about 10 relevant records were identified. After reading the titles and abstracts, seven articles were selected for complete reading and in-depth analysis, in order to compose the final set that formed the basis of this review.

Results

Analysis of the seven selected articles, published over the last five years, provides a broad and diverse overview of the use of Artificial Intelligence (AI) in the discovery and development of new drugs. The research covered different therapeutic areas, such as oncology, neurodegenerative diseases, microbial infections, and obesity, as well as general reviews on AI-mediated pharmaceutical innovation. In general, the studies indicate that AI, especially through Machine Learning (ML) and Deep Learning (DL), has been reshaping traditional practices, offering solutions to historical problems in the field, such as high costs, delays in processes, and low success rates (1,6).

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Other resources, such as Natural Language Processing (NLP) and the use of Big Data, also stand out (1,7,6).The methodologies described were diverse, tailored to each stage of drug development. Machine learning appears to be one of the most widely used approaches for predicting molecular properties, optimizing compounds, and recognizing patterns in large databases (1,2,3,7). Deep learning, which uses multi-layered artificial neural networks, has been applied in different contexts. These techniques have excelled in generating new molecular structures and predicting complex interactions between drugs and targets (1,3,6,7). Despite these advances, studies highlight challenges that need to be addressed. Among them are data quality and accessibility, the difficulty of interpreting complex AI models, and the need for clearer regulations on the use of these technologies (1,3,6,7). The integration of different types of data and collaboration between specialists from different fields appear to be fundamental ways to overcome these barriers (1). Even with such limitations, the future looks promising. AI has the potential to accelerate the development of more effective and personalized therapies (3).

Discussion

The objective of this article was to discuss and analyze the use of Artificial Intelligence in the field of pharmaceutical sciences, with a primary focus on the use of Artificial Intelligence as a facilitator in the development of drugs and medicines. Machine Learning, Deep Learning, Natural Language Processing, and the use of Big Data were some of the methodologies studied in the articles chosen for this review. These platforms address different ways of assisting researchers in the development and research of new drugs. Machine Learning stands out as one of the main approaches for predicting molecular properties, optimizing compounds, and recognizing patterns in large databases (1,2,3,7). In contrast, Deep Learning uses multi-layered artificial neural networks, a technique that stands out especially in the generation of new molecular structures and the prediction of complex interactions between drugs and their biological targets (1,3,6,7). Despite all the technological innovations and advances in Artificial Intelligence in recent decades, there are still several challenges ahead, such as the difficulty of interpreting complex Artificial Intelligence models by healthcare professionals and the need for more specific regulations on the use of these technologies in Brazil (1,3,6,7). The data and quality of results must also be more reliable. In any case, even with some limitations, the use of Artificial Intelligence in medical fields shows promising results, as this technology allows for the integration of different types of data and collaboration between specialists from different fields (1). Thus, artificial intelligence can accelerate the development of more effective and personalized therapies (3), thereby improving the quality of life of the population.

Keywords

Optimization; drug discovery; artificial intelligence

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Optimization Of Pharmacotherapy In Elderly Patients With Polypharmacy

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Introduction

The increase in polypharmacy, defined as the simultaneous use of five or more medications, results from an aging population combined with multimorbidity. This practice is associated with an increased risk of adverse reactions, drug interactions, avoidable hospitalizations, and functional decline. Studies also demonstrate the recurrent use of potentially inappropriate medications (PIMs) among the elderly, in pharmacies, and even in clinics and hospitals, reinforcing the importance of strategies to optimize pharmacotherapy (1, 2). These PIMs are identified using tools that support clinical practice, known as inappropriate prescribing criteria. The main ones are the

Beers, STOPP/START, and EU(7)-PIM criteria, which help healthcare professionals detect medications whose risks generally outweigh their benefits in elderly patients (3). Studies conducted in Latin America have shown a high prevalence of inappropriate prescriptions and highlighted the role of community pharmacies in the rapid detection of these problems (4). Complementarily, in geriatric institutions, collaboration between geriatric and pharmacy teams has shown positive results, with a reduction in PIMs, greater acceptance of the proposed recommendations, and relevant economic benefits (5). In this context, multifaceted pharmaceutical interventions have proven to be more effective in preventing adverse events and hospital readmissions than isolated strategies. They combine pharmacotherapy review, medication reconciliation, post-discharge follow-up, and education of patients and caregivers to reduce risks in the elderly (6,7). Thus, interprofessional integration, combined with clinical tools and prescribing criteria, is essential for patient safety. Given this, this study will address the main strategies for optimizing pharmacotherapy in polymedicated elderly patients, based on evidence, practical applicability, and clinical relevance.

Aim

The objective of this study was to evaluate and discuss strategies aimed at optimizing pharmacotherapy in elderly patients with polypharmacy, including the identification of potentially inappropriate prescriptions (PIMs), the use of clinical support tools, and the relevance of pharmaceutical intervention integrated with interprofessional practice, aiming at greater effectiveness and safety in treatment.

Methods

This study consists of an integrative literature review, whose objective was to synthesize findings on elderly patients who use polypharmacy. The search was conducted in the electronic databases ScienceDirect, PubMed, and SciELO, in Portuguese, Spanish, and English, covering the period from 2021 to 2025. To conduct the research, the descriptors “Polypharmacy,” “Geriatrics,” and “Optimizing Pharmacotherapy” were selected and combined with the Boolean operator “AND.” A total of 15 original articles were found, of which 13 were indexed on the ScienceDirect platform, 2 on PubMed, and none on SciElo. After reading the titles and abstracts, 8 articles were excluded because they did not address the central theme. Thus, this review consisted of 7 of the selected articles, as they met the previously established methodological criteria.

Results

According to the selected articles, a higher prevalence of use of Potentially Inappropriate Medications (PIMs) by the elderly was observed. According to Meng (1), the increase was significant in individuals over 85 years of age, corroborating the study developed by Jungo (2), which identified that 69% of multimorbid patients on polypharmacy used at least one potentially inappropriate medication, although age was associated with a lower probability of PIM use. In another study, the prevalence of PIM use was 91.32% among 20,629 hospitalized elderly patients, with the most commonly prescribed drugs being omeprazole (44.50%), metoclopramide (25.42%), and diazepam (19.83%) (8). In addition, it was observed that 93.7% of patients used at least one medication that should be discontinued, while 53.8% did not receive a medication that should be started, a situation aggravated by the presence of polypharmacy (4). This problem reinforces the need for more structured care models. In this regard, a comprehensive geriatric care model was developed that includes the pharmacist's role in medication

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reconciliation, periodic review of prescriptions, and patient education. The application of this model resulted in a reduction in adverse drug events, greater adherence to treatment, and lower costs (7). Similarly, an intervention conducted by students, focused on medication review, also proved effective in improving safety and pharmacotherapeutic management (3).

Discussion

The results of the selected articles highlight the complexity of polypharmacy in older adults and reinforce the need for strategies aimed at optimizing pharmacotherapy (9). In this context, the high prevalence of potentially inappropriate medication (PIM) use in different settings stands out. One of the studies analyzed pointed out that the use of PIMs increases significantly in individuals over 85 years of age (1), while another investigation identified that 69% of multimorbid and polypharmacy patients used at least one inappropriate medication, although, in this case, age was associated with a lower probability of PIM use (2). These findings suggest that clinical and contextual factors, such as multimorbidity and prescribing practices, have a more significant influence than age alone. In the hospital setting, the magnitude of polypharmacy is reinforced by a study that identified a prevalence of 91.32% of potentially inappropriate medication (PIM) use among 20,629 hospitalized elderly patients, the most frequent being omeprazole (44.50%), metoclopramide (25.42%), and diazepam (19.83%) (8). These widely prescribed drugs are associated with significant adverse events, including gastrointestinal disorders, cognitive impairment, and increased risk of falls (10). In addition to excessive use, underuse of medications was also observed. Bazán-Vásquez (4) demonstrated that 93.7% of patients were using drugs that should have been discontinued, while 53.8% were not receiving medications that should have been initiated, a situation aggravated by polypharmacy. These findings reinforce the need for a systematic review of pharmacotherapy, aiming not only to reduce inappropriate use but also to adjust prescriptions safely and effectively. Given this scenario, different intervention models have proven effective. Kittipak Jenghua (8) presented a comprehensive model of geriatric care involving pharmacists, who are responsible for reconciliation, periodic review, and patient education, which led to a reduction in adverse events, improved adherence, and lower costs. Complementarily, Carrión Madroñal (5) demonstrated that even student-led interventions, when structured, contribute to improving medication safety and management. Thus, in light of this study, the optimization of pharmacotherapy should not be understood merely as a reduction in the number of medications, but rather as a continuous process of aligning prescriptions with the real needs of the elderly, seeking a balance between risks, benefits, and care objectives, as also emphasized by (11).

Keywords

Population aging; Beers criteria; drug

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Congenital Syphilis And Its Challenges For Brazilian Public Health In The Monitoring Of Pregnant Women

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Introduction

According to data from the World Health Organization (WHO), in 2022, approximately 8 million cases of syphilis were reported in adults aged 15 to 49 years and 700,000 cases of congenital syphilis worldwide (1). In Brazil, in 2023, 242,826 cases of acquired syphilis were cataloged, 86,111 of which were in pregnant women, and 25,002 cases of congenital syphilis were reported, remaining an important challenge for the Ministry of Health (2). It is a sexually transmitted infection (STI) caused by the bacterium Treponema pallidum, which, despite therapeutic advances that promote its cure, still represents a preventive public health challenge, especially when it is

transmitted vertically from mother to fetus during pregnancy (1,2). Its consequences include malformations and neonatal mortality (2,3). Thus, early diagnosis, neonatal screening, and adequate treatment with benzathine penicillin (Benzetacil) are effective measures in the prevention and advancement of this STI, classified as a notifiable disease in the Unified Health System (SUS) (1,3). Despite the efforts of the public health system to mitigate the increase in the number of cases, there are gaps in the coverage and quality of prenatal care (1,2,4). The main causes include medical errors in the interpretation of laboratory tests, underreporting of cases, insufficient treatment of third parties, maternal reinfection, and unfavorable socioeconomic conditions, which expose the fragility of surveillance systems(5,6). In this sense, it is important to analyze the structural and operational gaps that favor vertical transmission of syphilis, identifying points of intervention and practical strategies that strengthen surveillance and monitoring of pregnant women within the unified health system.

Aim

To analyze the structural and operational failures of Brazilian public health in addressing congenital syphilis, identifying the factors that contribute to the persistence of the disease and the obstacles in monitoring pregnant women and their repercussions on vertical transmission.

Methods

This study is an integrative literature review of scientific evidence regarding the failures and challenges of eradicating congenital syphilis. Bibliographic searches were conducted in the following databases: Scientific Electronic Library Online (SciELO), Science Direct, and PubMed, using a combination of the descriptors “Syphilis,” “Congenital,” “public health,” and “Brazil,” accompanied by the Boolean operator “AND.” The inclusion criteria were original articles with open access, between 2021 and 2025, in Portuguese, Spanish, and English, and the exclusion criteria were review articles and articles older than 5 years. The initial search found 67 articles, and after reading the titles and abstracts, nine scientific papers were selected to be read in full.

Results

Between 2009 and 2016, approximately 376.4 million cases of curable STIs were reported, of which 6.3 million were cases of syphilis, with a prevalence of 0.5% for both sexes(9), totaling 214,891 cases of congenital syphilis and 324,321 cases of syphilis in pregnant women, with brown/black, indigenous, and low-educated women being the most affected by lack of treatment or inadequate treatment (2,5,8). (9) highlight problems of underreporting, delays, duplication, and inconsistencies in data, hindering planning and the provision of health system supplies and priority actions for vulnerable populations. Clinical failures in diagnosis, hospital infrastructure, and treatment and hospitalization costs also hinder the management of treatment opportunities. Studies in Ceará and Paraná pointed to failures in identifying congenital syphilis in children under 1 year of age due to late onset of symptoms and limitations in diagnosing neurosyphilis and congenital syphilis (5,6). Other factors that contributed to the more severe progression of the disease and mortality were late diagnoses and interruption of treatment, with the need for monitoring women through prenatal care, non-treponemal tests, and sex education (3). In the area of health management, according to (8), Brazil lacks integration and coordination, weakening syphilis investigation committees in the management of vertical transmission cases. Thus, the challenges for the

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diagnosis and treatment of congenital syphilis in Brazil lack investigation and management criteria, with data traceability, specialized services and professionals, prenatal actions, and infrastructure being fundamental.

Discussion

Brazil has a large number of people living with STIs, largely due to syphilis, a disease with a growing number of cases that affects pregnant women in the pre- and post-natal periods, transmitting congenital syphilis to children exposed in utero, highlighting a substantial perinatal burden. Despite the high prevalence and detection of cases, underreporting of syphilis cases, as well as registration failures and duplications, reduce the sensitivity of program planning and make it difficult to forecast supplies for vulnerable populations(3,5). The impact of these failures translates into hospital overload, generating high costs for hospitalizations due to congenital syphilis in children under 1 year of age, representing an average cost of R$ 234.73 per child, an amount that could be avoided through effective primary prevention. When standard treatment with Benzetacil was evaluated, only 31.8% of partners were treated, leading to ineffectiveness and an increase in the occurrence of congenital syphilis due to reinfection of the mother (10). Thus, the distribution of syphilis cases in Brazil is closely related to social and ethnic-racial determinants, being prevalent among low-income, black women with low levels of education (7). This scenario reflects not only the limited reach of equity policies and actions aimed at this population, but also the guidance, timely treatment, and modernization of surveillance, reducing structural barriers to access to care (6,9,11). Studies show that the elimination of congenital syphilis requires more than guidelines and drugs; it demands operational improvements, modernization of surveillance, and expansion of professional roles that are aligned with public policies that address social determinants. In this way, the rates that are currently marked by high prevalence and high costs can be reduced in a sustainable manner (7).

Keywords

Syphilis; Congenital; public health.

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Self-Medication During Pandemics: The Importance Of The Role Of The Community Pharmacist

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Introduction

According to the World Health Organization (WHO), a pandemic is defined as the worldwide spread of a new disease (1). COVID-19 is characterized primarily by an infection that manifests in an asymptomatic form or with only mild symptoms. However, several individuals develop more severe forms, leading to acute respiratory distress syndrome (2). One of the alternatives pursued by health authorities and the scientific community to treat more severe cases of COVID-19 was drug repurposing, which involves reusing medications that are already approved for other therapeutic purposes, given the absence of a specific chemotherapeutic agent indicated for this infection(3). Several drug classes have shown potential therapeutic effects against SARS-CoV-2, including antitumor agents, anticoagulants, anti-inflammatories, antimalarials, and antimicrobials. Antivirals, especially antiretrovirals, were studied against SARS-CoV-2, accounting for 30% of the research. Other drugs with potential therapeutic effects include chloroquine (CQ), hydroxychloroquine (HCQ), ivermectin, dexamethasone, nitazoxanide, and azithromycin (4). As research findings were released, many people began seeking these drugs in pharmacies and drugstores to self-medicate. This practice led to shortages of these medications in some regions of Brazil (2). Given the high demand for off-label medications for the treatment of COVID-19, the role of the pharmacist in the dispensing of these drugs becomes extremely important (5).

Aim

To evaluate the practices and interventions of pharmacists in community pharmacies amid the COVID-19 pandemic.

Methods

The research was conducted in the municipality of Itumbiara, located in the southern region of the state of Goiás, Brazil. This is a descriptive study carried out with pharmacists working in medicine dispensing establishments. To identify potential participants, all compounding pharmacies and drugstores in the municipality were mapped using the Google Maps application in 2021. A total of 96 drugstores and eight compounding pharmacies were identified. To determine the number of drugstores to be included in the study, a sample size calculation was performed, with a 90% confidence level and a 10% margin of error. As a result, 31 drugstores were invited to participate. As for the compounding pharmacies, all eight were invited to take part in the research. The following data were collected for this study: General information about the pharmacist – gender, place and year of graduation, type of employment relationship, job position and responsibilities, length of professional experience, and whether they receive commissions on product sales; Pharmacist's conduct during the dispensing of prescription medications; Pharmacist's conduct during pharmaceutical counseling (non-prescription recommendations); Pharmacist's conduct when patients request medications for the prevention or treatment of COVID-19 without a medical prescription. To ensure more accurate data collection, the adapted version of the instrument developed by Reis (6) was applied to the pharmacists.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

In the present study, 9 (52.95%) of the pharmacists were female, 13 (76.47%) were under the age of 40, and 12 (70.59%) graduated after the year 2010. Seven (41.18%) were pharmacy owners, and 7 (41.18%) had more than 10 years of experience in the community pharmacy sector. Regarding educational background, 9 (52.95%) graduated from private higher education institutions. As for receiving commissions on sales, only 4 (23.53%) pharmacists reported receiving them.All pharmacists reported that patients often do not accept guidance on the correct use of medications. Additionally, 14 (82.35%) stated that patients tend to feel uncertain and are likely to purchase the medication from another establishment, while 3 (17.65%) reported that patients do not trust the guidance provided but still purchase and use the medication at the same location. Regarding the pharmacists' conduct when faced with requests for COVID kit medications without a prescription, the most common responses included providing guidance on the risks of inappropriate use (11 pharmacists, 64.70%) and highlighting the lack of scientific evidence for the off-label use of such medications (9 pharmacists, 52.95%). In this study, ivermectin, hydroxychloroquine, azithromycin, nitazoxanide, and dexamethasone showed significant increases in sales 161.3%, 85.3%, 72.3%, and 58.3%, respectively. When asked about recommending medications, 13 pharmacists (76.47%) reported suggesting over-the-counter drugs in cases where patients presented with minor ailments.

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Regarding conduct during prescription validation, 8 (47.05%) pharmacists reported analyzing prescriptions before dispensing, while 9 (52.95%) dispensed medications while noting the dosage. All pharmacists reported providing dosage instructions; 13 (76.47%) provided information on drug interactions and product storage; and only 10 (58.82%) addressed the main adverse reactions.

Discussion

The lack of public trust in pharmaceutical care represents a major obstacle to the rational use of medicines(7). Although off-label drug use is an accepted practice in many countries, it should always be carried out under prescription and justified by strong clinical and scientific evidence that demonstrates the safety and effectiveness of the drug for the intended indication(8).

One notable issue during the COVID-19 pandemic in Brazil was the indiscriminate use of medications. In some cases, terms such as "COVID kit" and "early treatment" were used. According to data from the National System for the Management of Controlled Products (SNGPC), sales of azithromycin increased by 30.8% during the pandemic period—rising from just over 12 million boxes sold in 2019 to more than 16 million in 2020(9).

Oliveira et al.(10) reported increases of 113.0% in hydroxychloroquine sales, 557.0% for ivermectin, and 10.0% for nitazoxanide when comparing 2019 and 2020. The act of self-medication is particularly concerning in this context, not only due to the use of a single medication, but because it involved a cocktail of drugs without scientific evidence for either treatment or prevention of COVID-19(9).

Over-the-counter medications are often associated with self-medication practices. The pharmacist's guidance at the time of dispensing—regarding correct dosage, duration of treatment, risks and benefits, and, in some cases, referral to a physician is essential(11). Prescription validation, which involves thoroughly reviewing all prescription details to minimize errors, is another key responsibility. In the study by Reis(6), 56 pharmacists (50.9%) reported analyzing prescriptions before dispensing, 46 (41.8%) dispensed the medication while recording the dosage, and 8 (7.3%) simply handed over the medication. By providing such information, pharmacists contribute significantly to patient safety and rational pharmacotherapy(12).

Regarding the provision of information on dosage and drug interactions, similar results were observed by Reis(6): 56 pharmacists (96.4%) stated they inform patients about dosage, and 80 (71.4%) provide information on drug interactions. However, the studies differ with respect to information about product storage and potential adverse drug reactions.

When it comes to adverse drug reactions, the low number of professionals in the present study who provide such guidance is concerning. It is important to note that adverse drug reactions, when they occur, can lead to treatment abandonment, worsening of the clinical condition, and may even cause serious health damage, hospitalizations, or death(13). Therefore, it is essential that pharmacists inform patients about the main adverse reactions that may occur during treatment, and instruct them on how to proceed if such events arise.

Keywords

Community pharmacist; Self-medication; Rational use

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Economic Impact Of Pharmaceutical Interventions In A Tertiary Hospital In Southern Brazil

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Introduction

One of the goals of the clinical pharmacy department in a hospital is to increase patient safety by evaluating prescriptions. Studies show that clinical pharmacists contribute significantly to optimizing pharmacotherapy and preventing adverse drug events (1, 2, 3). In addition, their contribution to cost reduction is undeniable (4, 5). In this context, it is essential to measure the economic benefits achieved by pharmaceutical interventions in the hospital setting.

Aim

To measure the economic benefits achieved by interventions performed by clinical pharmacists based on prescription review.

Methods

Cross-sectional study including all patients admitted to the adult, pediatric, and neonatal wards from April to August 2025 in a large hospital complex in southern Brazil. Data collection was conducted using the NoHarm® artificial intelligence tool, used by pharmacists to analyze prescriptions and record pharmaceutical interventions. The economic outcome of the interventions was calculated by the average cost of the drugs that were suspended or had their doses reduced. According to the pharmacy service protocol, 48 hours is considered the maximum estimated time for drug use for interventions involving duplication, treatment time, and drug suspension due to internal care transition. The study does not require approval from the ethics committee, since the data are for clinical pharmacy service management.

Results

During the period evaluated, 9,750 pharmaceutical interventions were performed, of which 6,085 were accepted (62.6%) and, of this total, 3,565 (58.6%) generated cost savings. The savings obtained during the period amounted to R$654,202.82, with an average of R$130,840.56 per month and R$183.51 per intervention. The main pharmaceutical interventions responsible for cost reduction were “duplication” (36.8%), “suspension due to therapeutic indication” (19.5%), “overdose” (15.6%), “suspension due to patient care transition” (13.5%), and “drug presentation” (2.8%). The drugs whose pharmaceutical interventions generated the most savings are sedative-analgesics and vasopressors for patients in Intensive Care Units, such as dexmedetomidine (R$54,435.06), fentanyl (R$49,019.95), nitroglycerin (R$27,735.37), and norepinephrine (R$15,383.46), in addition to various antimicrobials, such as micafungin (R$16,575.97), polymyxin B (R$11,300.41), and meropenem (R$11,257.05). The interventions performed on vasopressors and sedative-analgesics were mainly due to suspension due to internal care transition, overdose, and duplication, while the interventions on antimicrobials occurred mostly due to overdose, treatment time, and frequency.

Discussion

Several studies address dose adjustment, removal of duplicates, and medication reconciliation as the main pharmaceutical interventions responsible for increased patient safety and significant cost savings for hospitals (6, 7, 8). In our study, we observed a higher prevalence of interventions in medications used in ICUs, such as vasopressors and sedatives, whose improper maintenance in prescriptions may pose a risk to patient care. In addition, the suspension of antimicrobials, whether due to inadequate treatment time, overdose, incorrect frequency, or replacement with lower-cost alternatives through clinical evaluation of the patient, also showed positive results in terms of cost reduction. A savings of 183 reais per pharmaceutical intervention has a significant impact on the sustainability of health systems, not to mention the savings obtained by increased patient safety, effects that were not measured in this study. The findings reinforce the relevance of the clinical pharmacist's role in the patient care process through pharmaceutical interventions, as well as in reducing therapeutic costs and optimizing institutional resources.

Keywords

Clinical Pharmacy; Interventions; Economic Impact

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The Pharmacist'S Contribution To Pharmacovigilance In Hypertensive Patients Using Ace Inhibitors: Identification And Pharmaceutical Management Of Adverse Reactions.

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Introduction

Systemic arterial hypertension (SAH) is a major public health issue and a significant risk factor for cardiovascular, cerebral, and renal diseases (1, 5, 7, 23, 30). Its prevalence is estimated to be on the rise due to population aging, increased obesity, and unhealthy lifestyles (1, 7, 18, 23). In most cases, pharmacological treatment is essential to reduce the morbidity and mortality associated with the disease (6, 7, 12). However, the continuous and often combined use of different classes of antihypertensive drugs can lead to adverse drug reactions (ADRs), which compromise treatment adherence and the patients' quality of life (10, 19, 21). In this context, pharmacovigilance plays a central role by enabling the identification, assessment, understanding, and prevention of adverse events related to the use of angiotensin-converting enzyme inhibitors (ACEIs) (4, 15, 24). The pharmacist, as a healthcare

professional trained in the rational use of medicines, plays a fundamental part in this process (4, 15, 26). Their role includes the early detection of ADRs, patient counseling, pharmacotherapeutic follow-up, and reporting to surveillance systems, such as VigiMed and NOTIVISA, coordinated by the National Health Surveillance Agency (ANVISA) (2, 8, 9, 24). This practice contributes not only to individual safety but also to the strengthening of national databases, enabling more effective public health actions (24). Thus, understanding the pharmacist's contribution to the pharmacovigilance of hypertensive patients is essential to highlight the relevance of this practice in promoting patient safety and optimizing the clinical outcomes of arterial hypertension treatment (4, 15, 26).

Aim

To analyze, through a systematic literature review, the contribution of the pharmacist to the safety of hypertensive patients, including the identification, counseling, and reporting of adverse reactions, specifically the persistent dry cough caused by medications from the angiotensin-converting enzyme inhibitor (ACEI) class.

Methods

This study conducted a literature review in predefined and renowned bibliographic databases, including Biblioteca Virtual em Saúde (Virtual Health Library), LILACS, PubMed, and SciELO. The search for scientific productions published within the last 5 years focused on the following keywords: “arterial hypertension,” “antihypertensive drugs,” “pharmacist,” “pharmaceutical intervention,” “pharmacovigilance,” “ACEIs,” and “adverse drug reactions” (1, 2, 3, 5, 6, 7, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 24, 25, 27, 28, 29). To complement the research, institutional sources were consulted, such as technical reports and guidelines issued by regulatory bodies, including the National Health Surveillance Agency, the Federal Council of Pharmacy, and the Ministry of Health (2, 8, 9, 15, 23). We selected articles and journals published in Portuguese, English, Spanish, and Italian that addressed the pharmacist's contribution to identifying adverse reactions in hypertensive patients using ACEIs. Editorials, letters to the editor, clinical trials, literature reviews, and final course papers were excluded (10, 12, 13, 17, 19, 21, 25, 27, 29). The study selection was performed by three independent reviewers, following the stages of reading the title and abstract, and subsequently the full text. The data collected from each study included the type of pharmaceutical intervention, the adverse reactions identified during antihypertensive therapy, the conduct adopted by the pharmacist, and the clinical outcomes (4, 15, 26, 28).

Results

The analysis of the consulted sources, including 20 scientific articles, volume 4 of the journal Infarma Ciências Farmacêuticas, and data from the National Health Surveillance Agency and the Ministry of Health, highlighted the crucial importance of the pharmacist in the pharmacovigilance of hypertensive patients using angiotensin-converting enzyme inhibitors (ACEIs) (2, 8, 9, 15, 23). The search of institutional data confirmed the high prevalence of adverse drug reactions as a considerable challenge that compromises adherence in more than 15% of cases (2, 14, 18, 19, 22). Although it is a well-tolerated class used by a large proportion of hypertensive patients, persistent dry cough is the most frequently reported adverse reaction (15, 21, 27). When identified, the pharmacist provides guidance to the prescriber on the best pharmacological approach, recommending a possible dose adjustment or substitution of the medication with another therapeutic class, aiming for treatment safety and the

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patient's clinical improvement (4, 15, 26). The reviewed studies indicated that dialogue between the patient and the pharmacist is essential for treatment adherence to achieve good therapeutic results (4, 15, 26). The findings point to the main pharmaceutical interventions for dealing with adverse reactions: informing the patient that the reaction may be a side effect of the medication, referring them to a doctor to consider a possible change, and reporting to pharmacovigilance bodies to ensure the safety of the entire population (4, 15, 24).

Discussion

Clinical studies prove that dry cough is a side effect of ACEI use, given that these medications increase the levels of bradykinin in the lungs, leading to mucosal irritation (21, 27). As a result, this discomfort can cause patients to give up on therapy, making it difficult to control their blood pressure (19, 21). As adverse reactions are common, the pharmacist's participation is essential due to their ability to recognize, register, and report adverse events early (4, 15, 24, 26). When a patient receives clear guidance, they better understand their condition, which results in better adherence and an improved clinical picture (4, 15, 26, 28). The pharmacist's role in pharmacovigilance goes beyond reducing risks; they help guide conduct and provide reliable information so that all health surveillance systems function efficiently (4, 15, 24, 26). The literature indicates that pharmaceutical interventions increase adherence measures, although the evidence is more heterogeneous when the evaluated outcome is clinical, such as blood pressure, hospitalizations, and mortality (4, 15, 28, 29). Pharmacist counseling and follow-up reduce non-adherence because they clarify doubts and help resolve practical barriers (19, 28). When the dialogue is patient-focused, it has a direct impact on adherence and favors shared decision-making (26). The adoption of regulatory and public health measures allows for the generation of signals from spontaneous individual notifications (2, 8, 9, 24). By improving surveillance and some clinical practices, professionals begin to recognize and monitor events, as well as strengthen systems that enable preventive actions (24). Focusing on one class of medications is a strong point of the research, as it deepens the understanding of a common clinical condition, persistent dry cough, which becomes an obstacle to treatment adherence (21, 27). Among the advantages of ACEIs is their greater clinical precision, which allows for the analysis of adverse reactions and the confirmation of their effectiveness (27, 30). Their practical relevance is widely recognized in hypertension and heart failure (13, 25, 30), and this approach allows for specific recommendations, such as monitoring creatinine, potassium, cough, and angioedema (13, 21, 27). However, some disadvantages may or may not be extrapolated to other classes, and with that, the opportunity to evaluate the relative cost-benefit, therapeutic preference, and aspects of adherence and safety is lost (6, 17, 27). Despite methodological challenges, the review offered a precise view of the pharmacist's contribution. The results of the review gain practical value, reinforcing that a pharmaceutical intervention is not just a bureaucratic act, but direct care (4, 15, 26). Dialogue and communication are the foundation for building patient trust and ensuring that treatment is safe and effective through guidance, recommending adjustments to the doctor, and reporting adverse events (4, 15, 26). The failures identified in the literature challenge us to advance (4, 15). In short, the validation of pharmaceutical interventions is crucial for the recognition of the profession in patient safety (15, 26), and this validation is already supported in public health notebooks (8, 9). Although its limitations do not invalidate this study, they may reduce its scope, justifying the need for future research (4, 15).

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Keywords

Pharmacy, hypertension, pharmacovigilance, ACE inhibitor

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The Clinical Importance Of The Use Of Cardiac Bioindicators For The Early Identification Of Acute Myocardial Infarction: A Literature Review

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Introduction

Acute myocardial infarction, known in the clinical world as AMI, is an emergency cardiovascular condition characterized by necrosis of the myocardial wall resulting from prolonged ischemia. It is considered the clinical condition that causes the highest number of deaths worldwide if identified late (1). Early diagnosis is of paramount importance for improving clinical outcomes, since early identification allows for rapid medical intervention, reducing both the size of the affected area and the complications that the patient may experience. Although symptoms, clinical signs, and the use of an electrocardiogram (ECG) are indispensable, they may have limitations in identifying AMI. In this context, the importance of using biochemical indicators, or cardiac biomarkers such as troponin and CK-MB (creatine kinase MB), as an essential and specific clinical tool for confirming the diagnosis, determining the severity of the disease, and raising a diagnostic hypothesis of AMI (2) arises.

Aim

To review the use of the main biochemical markers used in the diagnosis and prognosis of AMI, comparing their sensitivity and specificity; in addition to evaluating how these biochemical measurements contribute to pharmacological conduct, including in the management and therapeutic plan carried out by the healthcare team in the initial stages of patients with suspected AMI.

Methods

This is a literature review, whose scientific articles were obtained from the following databases: PubMed, Scielo, BMC Medicine, Frontiers in Cardiovascular Medicine, prioritizing publications that address biomarkers for AMI, cardiac troponin, and CK-MB; in addition to favoring clinical studies with human patients covering comparative diagnoses, meta-analyses, and systematic reviews.

Results

Cardiac troponin (cTnI and cTnT) is currently the benchmark biomarker in the diagnosis of AMI. Its high specificity stems from the fact that it is exclusive to myocardial tissue, directly reflecting cardiac necrosis (3). High-sensitivity troponin (hs-cTn) allows detection at very low values, enabling earlier diagnosis, already in the first hours of symptoms, and monitoring of clinical evolution; in addition, it remains elevated for 7 to 14 days, which facilitates late diagnosis and monitoring of persistent injury. Its main limitation is elevation in non-coronary conditions, such as chronic renal failure and myocarditis, requiring interpretation integrated with the clinical picture (4). There is another biomarker, creatine kinase MB (CK-MB), which was the most widely used marker before the advent of troponin; however, despite its lower specificity, it is still relevant in certain situations, such as suspected reinfarction or coronary reocclusion. Due to its kinetics, it rises 3 to 6 hours after the event, peaking in 12 to 24 hours and returning to normal in 48 to 72 hours (3). This behavior allows differentiation of new episodes of ischemia in patients who have had previous troponin elevation. However, its use in isolation is not recommended, and it should be interpreted in a complementary manner (3,4).

Discussion

The integration of troponin and CK-MB offers diagnostic and prognostic advantages for AMI, assisting the clinical pharmacist and healthcare team in interpreting laboratory results, monitoring the clinical condition, and making safer therapeutic decisions (4). These biomarkers are essential for optimizing patient safety, supporting multidisciplinary decision-making, and contributing to the reduction of cardiovascular morbidity and mortality. Thus, the diagnosis should be based on the combination of biochemical markers, ECG, and clinical condition (3,4).

Keywords

Biomarkers; Myocardial Infarction

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Clinical Pharmacist's Role In Antimicrobial Stewardship To Prevent And Control Healthcare-Associated Clostridioides Difficile Infection

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Introduction

Healthcare-associated Clostridioides difficile infection (HA-CDI) ranks among the most common HAIs. It typically occurs in hospital settings and is strongly associated with disruption of the intestinal microbiota, most often due to antibiotic use (1). It is considered an adverse event that compromises patient safety, prolongs hospital stay, and significantly increases healthcare costs (2). Evidence shows that both the choice of antimicrobial agent, particularly broad-spectrum antibiotics and the duration of therapy are major risk factors for the development of CDI (3, 4). In this context, Antimicrobial Stewardship (AMS) is defined as a strategy to optimize the rational use of antimicrobials, including the reduction of unnecessary use, with the aim of improving clinical outcomes, reducing antimicrobial resistance, and lowering the incidence of HAIs (2, 5). The role of the clinical pharmacist in these programs is widely recognized, being identified by the Centers for Disease Control and Prevention (CDC) as one of the core elements of AMS. Responsibilities include promoting rational antibiotic use, adjusting doses, tailoring treatment duration, evaluating administration routes, identifying duplications, preventing drug interactions, and supporting multiprofessional education. In many institutions, pharmacists take on leadership roles, contributing decisively to the effectiveness of stewardship programs (6).

Aim

To investigate the role of the clinical pharmacist in antimicrobial stewardship programs as a strategy for controlling and preventing healthcare-associated Clostridioides difficile infection.

Methods

This study is a literature review conducted using the Virtual Health Library (VHS) and PubMed databases. Articles published in Portuguese and English between 2015 and 2025 were included, based on the descriptors “Clostridioides difficile”, “antimicrobial stewardship” and “clinical pharmacy”.

Results

Of the 56 articles initially identified, 12 were selected for full-text review, and 6 were included in the final analysis. In a multidisciplinary approach, with active participation of the clinical pharmacist in reviewing prescriptions and recommending the reduction of antibiotics associated with higher risk of CDI, the incidence decreased from 1.27% to 0.91%, along with reduced use of broad-spectrum antimicrobials (7). Similarly, in a Japanese hospital in which clinical pharmacists performed daily reviews of broad-spectrum antimicrobials and conducted educational interventions, a significant decrease in HA-CDI incidence was observed (from 1.12 to 0.51 cases per 10,000 patient-days). This study also reported reduced use of carbapenems (11.1 to 8.1 DDD/1,000 patient-days) and fluoroquinolones (4.4 to 3.5 DDD/1,000 patient-days), as well as decreased total antimicrobial costs (USD 649,165 to 599,986) (8). In other contexts, the presence of the clinical pharmacist was not directly associated with lower CDI incidence but contributed to other relevant outcomes. In Canada, pharmacist interventions were associated with greater adherence to appropriate treatment (34% to 48.1%) and shorter hospital stays among patients with CDI (30 to 21 days) (9). Another study reported a marked increase in the discontinuation of unnecessary antimicrobials (1.75% to 27.8%) (1). In an AMS program specifically targeting CDI management, the involvement of the clinical pharmacist led to improved adherence to therapeutic guidelines (42% to 52%), with most failures related to suboptimal dosing in severe cases (10).

Discussion

The findings demonstrate that the involvement of clinical pharmacists in antimicrobial stewardship (AMS) programs has a positive impact on several healthcare outcomes. In some settings, even when a direct reduction in HA-CDI rates was not observed, pharmacist participation was associated with meaningful improvements such as greater appropriateness of prescriptions (route of administration, dosing, and duration), increased adherence to therapeutic guidelines, and shorter hospital stays for patients with CDI, factors that may indirectly contribute to the long-term prevention of other healthcare-associated infections (HAIs) (9). In certain studies, significant reductions in CDI rates were linked to a multidisciplinary approach that combined AMS with additional preventive strategies (7). Conversely, the integration of AMS with classical infection prevention measures, such as hand hygiene, environmental disinfection, and contact precautions, was also associated with a significant decline in CDI incidence (8). These findings suggest that both the integration of multiple preventive practices and the strengthening of stewardship efforts can lead to better outcomes, with the clinical pharmacist playing a key enabling role in both contexts. Although studies specifically addressing the role of pharmacists in HA-CDI

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prevention remain limited, their contribution has proven crucial across different aspects. Pharmacists were frequently responsible for reviewing prescriptions, both of antimicrobials associated with CDI risk (such as carbapenems and fluoroquinolones) and of therapies indicated for the treatment itself (1, 7, 8). Furthermore, in some reports, pharmacist-led interventions were directly linked to improved adherence to correct CDI treatment, with the most commonly identified failure being the use of suboptimal doses in severe cases, a factor already associated with unfavorable clinical outcomes (10). Another relevant aspect is the economic and organizational impact: pharmacist-led interventions were associated with reduced antimicrobial costs, shorter treatment duration, and fewer adverse clinical outcomes (8). These results reinforce that the clinical pharmacist not only contributes to CDI prevention but also enhances overall patient care and hospital efficiency. Ultimately, gaps remain regarding the standardization of the pharmacist's role in AMS programs and the isolated assessment of their impact on CDI. Many studies report CDI outcomes as part of a broader set of clinical benefits, such as decreased use of broad-spectrum antibiotics, increased frequency of de-escalation, and educational interventions, making it difficult to quantify precisely how much of the CDI reduction can be attributed solely to pharmacist interventions. Nevertheless, the body of evidence consistently indicates that clinical pharmacists are strategic players in both the prevention and management of CDI, underscoring the need for further studies specifically focused on this outcome.

Keywords

Antimicrobial stewardship; Clinical-pharmacist; Clostridioides difficile

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Pharmacotherapeutic Potential And Clinical Application Of Quercetin In The Modulation Of Metabolic Syndrome

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Introduction

Quercetin is a flavonol widely distributed in fruits, vegetables, and teas that has gained attention as an adjuvant agent in the management of metabolic syndrome (MetS) due to its antioxidant, anti-inflammatory, and energy metabolism–modulating properties. Preclinical studies demonstrate that quercetin acts on central pathways of metabolic homeostasis by activating AMPK and SIRT1 while inhibiting NF-κB, thereby reducing oxidative stress, chronic inflammation, and mitochondrial dysfunction associated with insulin resistance and dyslipidemia (1). In animal models, these actions translate into reduced weight gain, improved insulin sensitivity, lower blood glucose

and lipid levels, and vascular protection; additional mechanisms include modulation of gut microbiota composition and bile acid metabolism, both emerging factors in the pathophysiology of MetS (2). Clinically, recent reviews and meta-analyses suggest favorable effects of quercetin supplementation on fasting glucose and systolic blood pressure, although results remain heterogeneous and depend on dose, treatment duration, and formulation (bioavailability). Controlled trials in adults with MetS components have reported modest reductions in cardiometabolic markers, yet emphasize the need for larger, high-quality, and standardized trials to confirm long-term efficacy and safety (3,4). Thus, quercetin emerges as a promising candidate for complementary management of metabolic syndrome, with a multimodal pharmacological profile targeting multiple "arms" of cardiometabolic disease. However, until robust evidence from multicenter clinical trials defines dose–response relationships, optimal formulations, and potential drug interactions, its use should be considered adjuvant, integrated with established interventions such as diet, physical activity, and pharmacological control of risk factors (4,5).

Aim

The aim of this review is to critically analyze the preclinical and clinical evidence on the use of quercetin in the treatment of metabolic syndrome (MetS), highlighting its antioxidant, anti-inflammatory, and energy metabolism–modulating mechanisms of action, as well as its effects on metabolic and cardiovascular parameters. Furthermore, this review seeks to identify current limitations and future perspectives for its application as a therapeutic adjuvant.

Methods

A literature search was conducted in the PubMed database (National Library of Medicine) using the descriptors "quercetin, metabolic syndrome, diabetes, hypertension, obesity, and dyslipidemia," as defined by MeSH (Medical Subject Headings). Synonymous terms were combined with the Boolean operator "OR" in the advanced search to broaden coverage. Initially, a wide range of articles was identified and subsequently screened according to exclusion criteria: review articles, unavailable full texts, and titles or abstracts irrelevant to the review's objective. The final selection prioritized original studies, both in vitro and in vivo, addressing mechanisms of action, therapeutic effects, and clinical implications of quercetin in metabolic syndrome and related comorbidities. Extracted data were systematically organized to enable critical analysis, synthesis of evidence, and evaluation of quercetin's clinical potential, considering metabolic, inflammatory, and cardiovascular parameters. This methodological approach ensures scientific rigor, comprehensiveness, and consistency in the interpretation of available evidence.

Results

The literature demonstrates multimodal effects of quercetin on components of metabolic syndrome (MetS), supported by robust preclinical evidence and promising, though heterogeneous, clinical findings. In vitro and animal studies show that quercetin activates AMPK and SIRT1 and inhibits NF-κB–dependent pro-inflammatory cascades, thereby reducing oxidative stress and cytokines while improving mitochondrial function (1). In high-fat diet and diabetic rodent models, it reduced weight gain, macrophage infiltration, insulin resistance, glycemia, and plasma lipids, while attenuating vascular injury and atherogenesis, with concomitant increases in fatty acid oxidation and expression of PGC-1α, NRF1/2, and TFAM (5). Recent studies highlight its ability to modulate gut

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microbiota and bile acid metabolism, enhancing energy expenditure, increasing beneficial species such as Akkermansia, and promoting microbial metabolites linked to favorable metabolic outcomes (6). In humans, clinical trials and meta-analyses report reductions in systolic blood pressure and fasting glucose, along with modest decreases in total cholesterol and LDL, depending on dose, duration, population, and formulation (7). Individual studies show variable effects on body weight, BMI, blood pressure, and inflammatory markers, reflecting methodological heterogeneity (8). Limited oral bioavailability constrains translation of preclinical data, motivating development of formulations that enhance absorption and efficacy; safety appears favorable short term, though long-term and drug–interaction data remain scarce (9). Key gaps persist, including lack of standardized multicenter trials, limited evidence in specific MetS subgroups, and the need for pharmacodynamic biomarkers. Thus, while current findings suggest quercetin as a promising adjuvant in MetS, confirmation of clinical efficacy requires larger, well-designed randomized trials (10).

Discussion

Quercetin, a flavonol found in fruits, vegetables, and teas, has been investigated as an adjuvant agent in the management of metabolic syndrome (MetS) due to its antioxidant, anti-inflammatory, and energy metabolism–modulating properties. Preclinical studies demonstrate that quercetin activates AMPK and SIRT1 while inhibiting NF-κB, thereby reducing oxidative stress, chronic inflammation, and mitochondrial dysfunction associated with insulin resistance and dyslipidemia (11,12). In animal models, these actions result in reduced weight gain, improved insulin sensitivity, lower plasma glucose and lipid levels, and vascular protection, including modulation of gut microbiota composition and bile acid metabolism—emerging factors in the pathophysiology of MetS (6,13). In high-fat diet and diabetic rodent models, quercetin reduced macrophage infiltration, insulin resistance, vascular injury, and atherogenesis, while promoting enhanced fatty acid oxidation and increased expression of PGC-1α, NRF1/2, and TFAM, suggesting improved mitochondrial biogenesis (12,13). Furthermore, recent studies indicate that quercetin positively alters gut microbial composition, increasing beneficial species such as Akkermansia and promoting the production of microbial metabolites associated with favorable metabolic outcomes (6). Clinically, meta-analyses and controlled trials suggest that quercetin supplementation may reduce systolic blood pressure and fasting glucose, as well as induce modest reductions in total cholesterol and LDL, although outcomes depend on dose, treatment duration, study population, and formulation (3,12,13). Individual trials have reported heterogeneous effects on body weight, BMI, blood pressure, and inflammatory markers, reflecting methodological limitations such as small sample sizes, variability in randomization, and treatment duration (12,13). Low oral bioavailability limits translation of preclinical findings to humans, driving research on formulations that improve absorption and efficacy; while the short-term safety profile is favorable, data on long-term use and potential drug interactions remain scarce (11). Significant gaps persist, including the absence of standardized multicenter trials, lack of studies in specific MetS subpopulations, and the need for pharmacodynamic biomarkers correlating plasma and tissue levels with clinical outcomes (13). Therefore, although preclinical and clinical evidence suggests benefits of quercetin as an adjuvant in MetS, confirmation of robust clinical efficacy requires larger, high-quality randomized trials capable of defining dose–response relationships, optimal formulations, and long-term safety. Quercetin thus emerges as a promising candidate for complementary management of MetS, particularly when integrated with established interventions such as diet, physical activity, and pharmacological control of risk factors (14).

Based on current evidence, quercetin shows therapeutic potential as an adjuvant in managing metabolic

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syndrome, supported by well-characterized mechanisms and encouraging early clinical findings. However, low bioavailability, methodological heterogeneity, and limited robust trials hinder confirmation of efficacy. Its clinical use depends on optimized formulations, long-term safety assessment, and large, multicenter, randomized studies.

Keywords

Quercetin; Pharmacotherapeutic Potential; Metabolic Syndrome

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Methodological Quality Of Randomized Controlled Trials On Homeopathy For Pain Management

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Introduction

Homeopathy is an Integrative and Complementary Practice available through the Brazilian Unified Health System (SUS). Developed in the 18th century by Samuel Hahnemann, it is based on the principle of similars to treat a variety of ailments, including pain. Its standing as a legitimate health discipline is further reinforced by its recognition as a medical specialty by the Brazilian Federal Council of Medicine (CFM) and its inclusion in the curricula of Pharmacy schools (1).
While often viewed as an alternative medicine, its complementary use alongside conventional medicine could offer benefits to patients, whether or not through a placebo effect. However, fragile methodologies and biases prevents the establishment of solid evidence regarding its benefits or otherwise (2). To reach a conclusive scientific understanding of its efficacy, it is imperative that studies employ more robust and rigorous methodologies, such as those initially advocated by the Jadad scale (3).

Aim

The research aims to examine the methodological quality of randomized controlled trials on homeopathy for pain management. Additionally, it will investigate whether a better methodological quality is related to treatment outcomes, among other study characteristics.

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Methods

This study is a review of literature that analyzed the methodological quality of randomized controlled trials investigating the use of homeopathy for pain management as the primary or one of the study's objectives. The research was conducted in four main stages: research question formulation, article search and selection, methodological quality assessment, and synthesis of results.
The PICO (Problem, Intervention, Comparison and Outcome) strategy was employed to formulate the central research question (4), focusing on patients undergoing pain management. Homeopathy was applied as the treatment, compared to placebo, no treatment, or conventional medicine. The analyzed outcome was the methodological quality of these studies and their reported results.
The search used a combination of English descriptors ("homeopathy + pain"). Data collection was conducted in September 2025 using the PubMed and LILACS databases. Filters were applied for publications within the last 25 years (2000–2025) and the study type "randomized controlled trial." Articles that addressed the central question and had freely available full text were included, while studies that did not meet the timeframe or subject criteria were excluded. The methodology of the selected articles was analyzed using the Jadad scale (5). The findings were compiled using a descriptive synthesis.

Results

Initially, 69 articles were retrieved for analysis. After applying the inclusion and exclusion criteria, only 11 articles were selected for the research. The studies were obtained from the following databases: PubMed (n=7) and LILACS (n=4).
For these 11 articles, the Jadad scale was applied in an adapted format (3), consisting of 5 core questions:
1. Was the study described as randomized?
2. Was the study described as double-blind?
3. Was there a description of losses?
4. Was the randomization method appropriate?
5. Was the blinding method appropriate?

A score of 1 was awarded for each affirmative answer. According to the authors, a minimum score of 3 out of a maximum of 5 points was considered the threshold for acceptable methodological quality (6). Of the total, 9 articles were found to have an acceptable methodological quality, while 2 did not reach this minimum score.
The 2 articles whose methodological quality was not considered acceptable compared the results of homeopathic therapy with conventional therapy and concluded that homeopathic therapy had a positive or partially positive outcome compared to the conventional one.
The 9 methodologically acceptable articles compared the activity of homeopathic therapy with a placebo group. Of these 9 articles, 6 concluded that there was no statistical difference in pain management between the control (placebo) group and the group that received homeopathy, with one of these studies pointing out that, although the homeopathic medicine did not produce an effect, the homeopathic consultation itself produced clinically relevant benefits for patients.
Among the 3 articles that indicated that homeopathy brought benefits to the patient, one performed the treatment in conjunction with physiotherapy and conventional medications (with the homeopathic or placebo added to both groups), while the other two used only homeopathy vs. placebo.

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Discussion

In this study, it was possible to observe that the selected sample of randomized controlled trials mostly had a robust methodology that met the criteria established by the Jadad scale. These articles with higher methodological quality compared homeopathic therapy to a placebo group, with 3 of them finding homeopathy to be responsible for a greater benefit in pain management and 6 concluding that there was no statistical difference in this regard compared to placebo.
This study has a limitation regarding its sample size, which prevents generalized conclusions from being drawn. However, for future studies, it would be beneficial to increase this sample by including more databases, to verify whether a relationship exists between methodological quality and the clinical outcomes of homeopathic treatment. Furthermore, the Jadad scale presents basic and subjective questions and is not capable of excluding all biases, making a more rigorous analysis important for a better filter.

Keywords

Homeopathy; Pain Management; Methodological Quality.

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Analysis And Interpretation Of Potential Drug Interactions Of Medical Prescriptions In A Commercial Pharmacy In The Metropolitan Region Of Recife

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Introduction

Medicines are tools to alleviate human suffering from diseases, as they enable cures, increase life expectancy, and delay the onset of disease-related complications (1).
The administration of two or more drugs is common in clinical practice and aims to achieve desired therapeutic effects through the combination of several active substances. However, changes in the action of one drug may occur due to the presence of another (2).
Drug interactions (DDIs) can occur from changes in the pharmacokinetics or pharmacodynamics of the drugs involved. Potential drug interactions (PDIs) occur when two drugs known to interact with each other are prescribed simultaneously, regardless of whether any adverse effects on the patient's health occur. (3).
A drug-drug interaction (DDI) is an altered response to a drug in terms of its intensity and duration of action when in the presence of another drug. (4).
Considering that negative drug results become a significant public health threat, pharmaceutical care presents itself as an assertive alternative in the pursuit of better clinical and economic results, promoting health and preventing complications. This reinforces the importance of pharmaceutical professionals, who play an important role in the rational use of medications and the full development of pharmaceutical care (5).
Pharmaceutical Care is a professional practice in which medication users are the primary beneficiaries of the

pharmacist's actions, as it is a response to social needs by providing guidance on medication use to maximize pharmacotherapeutic benefits and minimize adverse effects. This is achieved through systematic monitoring of medication therapy, ensuring its necessity, effectiveness, and safety (6).

Aim

This study aimed to highlight the importance of pharmacotherapeutic monitoring in the outcome of pharmacotherapy, emphasizing the main therapeutic classes used and their potential drug interactions. It also demonstrated the importance of pharmacists in the multidisciplinary team, optimizing the outcome of pharmacotherapy.

Methods

Research Profile
This is a quantitative, observational, cross-sectional, descriptive study that analyzes potential drug interactions involving a documentary analysis of prescriptions filled at a commercial pharmacy.
Data Collection
The documents analyzed for this research included prescriptions filled and mandatorily dispensed, from March 1, 2025, to May 30, 2025.
Inclusion and Exclusion Criteria
For inclusion in the study, prescriptions issued in legible handwriting were accepted with at least two oral medications prescribed. Therefore, prescriptions from veterinary professionals and those prescribing topical (ocular, otological, and dermatological) and parenteral medications were excluded.
Procedures
Prescriptions were obtained through a commercial pharmacy in the Metropolitan Region of Recife, Pernambuco. All patient and prescriber data, as well as the data of suppliers and employees of the professional establishment, was kept strictly confidential. The total amount of prescriptions was thoroughly analyzed using the drugs.com database, considering the prescription profile and information regarding pharmaceutical care regarding possible drug-drug interactions, in order to classify them as mild, moderate, or severe.
Data Analysis
The results of the documentary research were obtained using Microsoft Excel.

Results

During the data collection period, 86 prescriptions were collected because they met the inclusion and exclusion criteria for this study. Regarding the number of medications prescribed per prescription, it was found that 25 of the 86 prescriptions collected had three medications in the prescription lines, 43 had two medications, and 18 prescriptions had four or more medications prescribed. All were analyzed using the drugs.com database. Of the 86 prescriptions collected, 57 contained no DDIs, totaling 66.28%, and 29 contained at least one DDI, totaling 33.72%. Regarding the classification of DDIs present in the sample, 21 of the interactions were classified as minor, six as moderate, and two as major. Of the 29 prescriptions containing interacting medications, 25 presented a single drug interaction, corresponding to 86.2% of them, and 4 prescriptions presented two different interactions between their prescription lines.

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Regarding the medications involved in the PDIs in the sample, the drug classes with the highest number of interactions are antiplatelet agents, followed by antihypertensives and oral antidiabetics, corresponding to percentages of 34%, 20%, and 12%, respectively. Twenty-nine PDIs were detected, divided into 10 drug pairs: Hydrochlorothiazide/acetylsalicylic acid; Furosemide/acetylsalicylic acid; Spironolactone/acetylsalicylic acid; Hydrochlorothiazide/acetylsalicylic acid/ibuprofen; Metformin/acetylsalicylic acid; Glicazide/acetylsalicylic acid; Glibenclamide/acetylsalicylic acid; Clopidogrel/pantoprazole; Warfarin/ibuprofen; and Amlodipine/simvastatin.

Discussion

Acetylsalicylic acid interacts with oral antidiabetics, beta-blockers, loop and thiazide diuretics, and angiotensin-converting enzyme inhibitors a total of seven medications. Hydrochlorothiazide interacts with nine other drugs from two different drug classes: nonsteroidal anti-inflammatory drugs and oral antidiabetics.
Furosemide, a loop diuretic, has PDIs with six other drugs from three different drug classes: nonsteroidal anti-inflammatory drugs, oral antidiabetics, and angiotensin-converting enzyme inhibitors. Metformin interacts with all drug groups described in this study.
The risks associated with the moderate interactions detected in this study include situations that require close attention, such as the interaction between amlodipine/simvastatin, which can cause rhabdomyolysis and myopathy, and hydrochlorothiazide/acetylsalicylic acid/ibuprofen, which can lead to reduced diuretic efficacy and the risk of nephrotoxicity.
Among the risks of potential drug interactions of the Major type, clopidogrel/pantoprazole stands out, which reduces the antiplatelet action of clopidogrel, compromising the antithrombotic therapy of patients taking this medication and increasing their risk of acute events related to prothrombotic phenomena, such as acute myocardial infarction and stroke. Also noteworthy is the combination of aspirin with hydrochlorothiazide and furosemide, in both cases which can lead to reduced diuretic efficacy and nephrotoxicity. Among the cases of Minor potential drug interactions are oral antidiabetics (metformin, glibenclamide, and gliclazide) combined concomitantly with aspirin, which in both cases can increase the risk of hypoglycemia.
Regarding the therapeutic classes that interact most with each other, it is clear that antihypertensives and oral antidiabetics are the ones with the highest percentage in the sample. These drugs, when administered together, can result in altered glucose metabolism and consequent loss of glycemic control. Therefore, patients should regularly monitor their blood glucose levels (7).
In turn, the interactions between antiplatelet agents, such as acetylsalicylic acid at doses of 100mg and 150mg, and antihypertensives, are related to the inhibition, by acetylsalicylic acid, of the formation of prostacyclin (PGI2), a potent vasodilator involved in blood pressure control, thus causing a decrease in the hypotensive effect of the antihypertensive agent, as indicated in the study by (8).
Oral anticoagulants such as warfarin are used for the prophylaxis and treatment of thrombosis, and they are prescribed primarily to elderly patients who are polymedicated and often have comorbidities, making them particularly susceptible to DDIs. Due to the specifics of this group of drugs, DDIs can have serious consequences, potentially leading to critical bleeding (9).
Statins, in turn, HMG-CoA reductase inhibitors, are widely prescribed as pharmacological therapy for the control of dyslipidemia. Statins are considered effective and safe, but their adverse effects on muscles, such as rhabdomyolysis, are a major concern for practitioners when prescribing these lipid-lowering drugs (10).

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Keywords

Drug interactions; pharmaceutical care

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Antitumor Potential Of Purpurin (1,2,4-Trihydroxyanthraquinone) And Related Molecular Mechanisms: A Review

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Introduction

Anthraquinones are naturally occurring compounds derived from the planar and rigid tricyclic aromatic system of anthracene. Structurally, they consist of a three-ring fused nucleus bearing two carbonyl groups (C=O) at the C9 and C10 positions, with various substituents attached at positions C1-C8 (1). Purpurin (1,2,4-trihydroxyanthraquinone) is a bioactive anthraquinone predominantly found in the roots of Rubia cordifolia (Rubiaceae), a perennial herb widely distributed across Asia, Europe, Africa, and the Americas (2). Numerous studies have highlighted the pharmacological versatility of purpurin, including antioxidant (3,4), anti-inflammatory (3,5,6), antibacterial (7,8), antifungal (9-11), analgesic (12), antidepressant (13), anticancer (14,15), antimutagenic (16-18), antiangiogenic (19), DNA anti-glycation (20), anti-adipogenic and anti-obesity (21), anti-aging (22), protection against acute hepatorenal injury (23), hepatoprotection against alcohol-induced toxicity (24), neuroprotection against ischemic damage (25) and in Alzheimer's disease (26,27), as well as enzyme inhibition, including acetylcholinesterase, butyrylcholinesterase, tyrosinase, α-glucosidase (4), and monoamine oxidase A (MAO-A) (28). Mechanistically, these effects are primarily attributed to purpurin's antioxidant and anti-inflammatory properties, modulation of apoptotic pathways, and regulation of signaling cascades involved in cellular homeostasis. Despite its broad bioactivity, no comprehensive review has focused on the antitumor potential of purpurin. Therefore, this study aims, for the first time, to systematically examine its cytotoxic effects across multiple tumor cell lines and to elucidate the underlying molecular mechanisms, including apoptosis

induction, cell cycle arrest, reactive oxygen species (ROS) modulation, and inhibition of oncogenic signaling pathways, providing insights into its potential development as a novel anticancer agent.

Aim

This review aims to compile and critically analyze experimental studies evaluating the antitumor potential of purpurin across diverse cancer cell lines, highlighting its cytotoxic effects, apoptosis induction, cell cycle modulation, ROS regulation, and the key signaling pathways and molecular targets involved, providing insight into its potential as a novel anticancer therapeutic agent.

Methods

The literature search was conducted in the PubMed database (National Library of Medicine) and the CAPES Journals Portal to identify relevant studies on purpurin. Advanced search strategies were employed using the descriptor “purpurin anthraquinone,” defined according to the MeSH (Medical Subject Headings) controlled vocabulary, combined with synonymous terms using the Boolean operator “OR” to ensure comprehensive coverage. The initial search yielded a broad range of records, which were subsequently screened for eligibility. Exclusion criteria included the type of publication (review articles), unavailability of full-text articles, and titles or abstracts deemed irrelevant to the research focus, specifically those not addressing pharmacological properties, molecular mechanisms, or antitumor activity of purpurin. Additionally, preference was given to original experimental studies, including in vitro and in vivo research, to provide detailed insights into the mechanisms of action, therapeutic potential, and bioactivity of purpurin. The selected studies were then systematically analyzed to summarize pharmacological effects, cytotoxic activities against various tumor cell lines, signaling pathways involved, and potential clinical applications. This rigorous search strategy enabled the compilation of a high-quality, up-to-date dataset of studies, forming a robust foundation for critical evaluation of purpurin as a bioactive compound with therapeutic relevance in oncology and other disease contexts.

Results

Only three experimental scientific articles were found that evaluated the cytotoxic/antiproliferative effects of purpurin on tumor cells. The first study, published in 2015, evaluated the long-term (72-hour) cytotoxic effect of purpurin on A2058 and HT168-M1 cells (human melanoma). The authors reported a growth inhibitory effect, unrelated to apoptosis, with a stronger effect observed in the A2058 cell line (64.1% viable cells) at the highest purpurin concentration (10^{-5} M), and a weaker effect in the HT168-M1 cell line (76.2% viability) at the same concentration (29). The second study, published in 2021, explored the inhibition of proliferation of A549 cells (human lung adenocarcinoma) by purpurin. This anthraquinone inhibited cell growth with an IC50 of 30 μM after 24 hours of treatment, with even greater inhibition observed after 48 hours. The results demonstrated high production of ROS, induction of lipid peroxidation, and a significant reduction in glutathione content by purpurin. Furthermore, Western blotting analysis showed a significant decrease in the expression of phosphatidylinositol 3-kinase/protein kinase B (PI3K/AKT), an increase in pro-apoptotic proteins Bax, cleaved PARP, cytochrome c, caspase-9, and caspase-3, and a decrease in Bcl-2 (antiapoptotic). Thus, the authors concluded that purpurin induces ROS-mediated apoptosis in A549 lung cancer cells by inhibition of the PI3K/AKT pathway (30). Finally, the third study, also published in 2021, revealed the inhibition of HCT-116 cell growth (human colorectal cancer) by

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this anthraquinone with an IC50 of 36 µM after 24 hours of exposure and 20 µM after 48 hours. This research demonstrated that purpurin caused overexpression of phospholysine phosphohistidine inorganic pyrophosphate phosphatase (LHPP), a tumor suppressor gene, reduced the expression of phosphorylated PI3K/AKT, and increased pro-apoptotic mediators (31).

Discussion

In colorectal cancer and lung adenocarcinoma cells, purpurin exerted antitumor effects by inducing apoptosis mediated through ROS overproduction and by reducing phosphorylated PI3K/AKT expression. Anthraquinones are metabolized via one- or two-electron reduction reactions, in which NADH and/or NADPH serve as electron donors for flavoenzymes catalyzing these processes. One-electron reduction generates a semiquinone radical, while two-electron reduction produces hydroquinone, which can subsequently form semiquinone through autoxidation. The unstable semiquinone radical donates an electron to molecular oxygen, returning to the original anthraquinone and generating superoxide radicals and other ROS, leading to oxidative stress (32). ROS act as crucial second messengers regulating multiple cellular signaling pathways, including PI3K/AKT, which controls protein synthesis, cell cycle progression, proliferation, and apoptosis. Depending on context, ROS can either activate PI3K/AKT, promoting cell survival and proliferation, or inactivate it, favoring cell death (33). Consistently, purpurin treatment decreased phosphorylated PI3K/AKT levels and upregulated pro-apoptotic proteins, thereby inhibiting tumor cell growth and proliferation. In human melanoma cells with varying metastatic potential, purpurin exerted antitumor effects through a distinct mechanism unrelated to apoptosis. The compound interfered with cell migration by inducing chemorepellent responses, thereby limiting metastatic dissemination. These findings suggest that purpurin exerts context-dependent antitumor activity, engaging both ROS-mediated apoptosis in certain tumor types and modulation of migratory behavior in highly invasive cells, highlighting its multifaceted therapeutic potential as an anticancer agent. Therefore, purpurin exhibits potent antitumor activity against colorectal cancer, lung adenocarcinoma, and melanoma, primarily via ROS-mediated apoptosis and PI3K/AKT pathway inhibition. These results position purpurin as a promising lead compound for novel anticancer therapies, although further studies across diverse cancer models are necessary to confirm its broad therapeutic potential.

Keywords

Purpurin anthraquinone; Antineoplastic agents; Apoptosis.

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Pharmacological Properties Of Purpurin (1,2,4-Trihydroxyanthraquinone): A Systematic Review

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Introduction

Purpurin (1,2,4-trihydroxyanthraquinone) is a naturally occurring anthraquinone of the alizarin type, first isolated in 1827 from the roots of Rubia cordifolia (Rubiaceae) (1). R. cordifolia, commonly known as Indian madder or manjistha, is a perennial climbing herb widely distributed across the Mediterranean basin, northern and western Europe, and tropical and subtropical regions of Asia, Africa, and the Americas. The roots of this plant have traditionally been used as a rich source of red pigments, widely applied since antiquity as natural food colorants and in the textile industry, particularly for dyeing wool and cotton. Beyond its role as a dye, R. cordifolia occupies an important place in traditional medicine systems, especially Ayurveda and Traditional Chinese Medicine (TCM). Its roots and extracts have been used for centuries to manage hemorrhagic disorders (epistaxis, hematemesis, menorrhagia, traumatic bleeding), inflammatory conditions, arthritis, joint pain, skin diseases, and some infections (2). These therapeutic applications are largely attributed to anthraquinones such as purpurin, which display a broad spectrum of biological activities. Pharmacological investigations indicate that purpurin exhibits antioxidant, anti-inflammatory, antimicrobial, anticancer, hepatoprotective, and neuroprotective effects (1,3), underscoring its potential as a bioactive compound for modern drug development. Nevertheless, despite its long history of use and growing pharmacological relevance, the body of scientific literature remains limited. To date, only one review article has comprehensively addressed the pharmacological activities of purpurin, published in 2021 (2). Since then, several experimental studies have emerged, providing new insights into its mechanisms of

action, therapeutic promise, and biomedical applications. This underlines the need for an updated review consolidating recent advances on purpurin and its medicinal relevance.

Aim

The main objective of this review is to comprehensively compile and critically analyze experimental studies that have investigated the pharmacological activities of purpurin to date. By doing so, we aim not only to provide an updated overview of its biological properties but also to highlight underlying mechanisms of action, therapeutic potential, and possible limitations.

Methods

The search for scientific articles was conducted in the PubMed database (National Library of Medicine) using the descriptor “purpurin anthraquinone,” defined by the controlled vocabulary MeSH (Medical Subject Headings). To increase search sensitivity, the advanced search tool was applied, combining synonyms and related terms through the Boolean operator “OR.” A total of 113 records were initially identified. Exclusion criteria included: (i) review articles, as they did not meet the objective of primary data collection; (ii) unavailability of full-text articles, which prevented detailed analysis; and (iii) titles and abstracts deemed irrelevant to the topic of interest (pharmacological activity and biomedical applications of purpurin). Furthermore, priority was given to original experimental studies, both in vitro and in vivo, addressing mechanisms of action, pharmacological properties, and potential therapeutic applications. This strategy enabled the compilation of a more consistent and up-to-date set of studies, providing a solid basis for critical analysis of purpurin as a bioactive compound of biomedical relevance.

Results

A total of 113 scientific articles were initially identified, and after applying exclusion criteria, 28 studies were included in this systematic review. These investigations revealed diverse pharmacological activities of purpurin, including antioxidant effects (4,5); anti-inflammatory properties (4), particularly in atopic dermatitis (3) and rheumatoid arthritis (6); and analgesic potential in neuropathic pain linked to type 1 diabetes (7). Purpurin also showed antibacterial (8,9), antifungal (10-12), and antidepressant effects (13). Anticancer activity was reported against colorectal (14) and lung cancer (15), along with antimutagenic (16-18) and antiangiogenic actions (19). Other studies demonstrated DNA antiglycation (20), anti-adipogenic and anti-obesity effects (21), and anti-aging potential (22). Protective roles were also observed against acute hepatorenal injury (23), alcohol-induced hepatotoxicity (24), and ischemic neurodegeneration (25). Furthermore, purpurin inhibited several enzymes, including acetylcholinesterase, butyrylcholinesterase, tyrosinase, α-glucosidase (5), and monoamine oxidase A (26). In addition, one study reported its anti-amyloidogenic activity, showing dose-dependent inhibition of insulin amyloid fibril formation (insulin amyloidosis), a condition often occurring at repeated sites of hormone administration that reduces insulin bioavailability (27). Purpurin was also shown to decrease Tau protein aggregation, a hallmark of various neurodegenerative disorders, suggesting therapeutic applications in Alzheimer’s disease (AD) (28) and chronic traumatic encephalopathy (29). Another study further supported its relevance in AD, demonstrating that purpurin reduced oxidative stress and neuroinflammation, enhanced neuroplasticity, and significantly improved learning and memory (30).

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Discussion

The experimental studies included in this review highlight the wide range of pharmacological activities of purpurin and its potential benefits in diverse clinical contexts. Notably, many of these effects are closely associated with its strong antioxidant and anti-inflammatory properties (4,21). For instance, the protective actions of purpurin against hepatorenal and ischemic injury are largely attributed to its capacity to scavenge free radicals and mitigate oxidative stress (23-25). This antioxidant activity is also critical in counteracting DNA glycation-induced oxidative damage, a process in which persistent hyperglycemia promotes the attachment of reducing sugars to DNA molecules, leading to the generation of advanced glycation end-products (AGEs) and reactive oxygen species (20). Purpurin's combined antioxidant and anti-inflammatory mechanisms further contribute to its anti-aging potential. Aging is associated with elevated levels of pro-inflammatory cytokines such as interleukin (IL)-1β, IL-6, and tumor necrosis factor (TNF)-α in the hippocampus, which drive chronic neuroinflammation, impair hippocampal neurogenesis, and predispose to age-related neurological disorders. In this regard, one study demonstrated that purpurin markedly suppressed the release of these cytokines and reduced microglial morphological alterations in the hippocampus of D-galactose–treated mice. In parallel, purpurin administration decreased reactive oxygen species formation and lipid peroxidation while enhancing the viability of HT22 murine hippocampal cells exposed to D-galactose (22). Together, these findings underscore purpurin's relevance as a multifunctional bioactive compound, with antioxidant and anti-inflammatory actions serving as central mechanisms for its protective and therapeutic effects across multiple pathological conditions. Therefore, multiple experimental studies have demonstrated the broad pharmacological versatility of purpurin, underscoring its potential as a promising lead compound for the development of novel therapeutic agents applicable to a wide range of clinical conditions.

Keywords

Purpurin anthraquinone; Rubia cordifolia; Pharmacology.

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Artificial Intelligence And Technology In Clinical Pharmacy And Pharmaceutical Care: Revolutionizing Patient Care

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Introduction

The practice of Clinical Pharmacy (CP) and Pharmaceutical Care (PC) is crucial for ensuring the safety and optimization of drug treatment, with a focus on preventing and resolving Drug-Related Problems (DRPs). Historically, the meticulous screening and analysis of medical prescriptions—essential for detecting potential Medication Errors (MEs)—has been an intensive process, demanding time, high concentration from the pharmacist, and susceptible to human fatigue. Such limitations, particularly in high-volume and complex settings like hospitals, often create barriers to the time professionals can dedicate to higher value-added activities, such as Pharmacotherapeutic Follow-up (PFU) and direct patient counseling.

Artificial Intelligence (AI) and Machine Learning are disrupting the healthcare industry. They process and analyze vast amounts of health data in real-time, unattainable by human analysis (1). This predictive power elevates medication safety and operational efficiency. In the pharmaceutical industry, AI is a strategic ally. It acts as

clinical decision support, identifying complex drug interactions, inadequate dosages, allergies, and other risks (2). This technological revolution spans from patient screening in telecare and optimizing hospital workflows to personalizing medication therapies based on clinical and genetic data. The pharmacist, equipped with these tools, can reallocate their focus from screening for operational errors to complex clinical management and effective communication within the multidisciplinary team. It is crucial to map the real impact of these technologies within the Brazilian scenario, where institutions are already implementing innovative solutions, highlighting both the clinical benefits and the practical challenges of infrastructure, ethics, and algorithm validation (3).

Aim

This study aims to map and analyze the transformative role of Artificial Intelligence and technological tools in clinical pharmacy services and pharmaceutical care, focusing on optimizing pharmacotherapeutic follow-up, medication safety, and the challenges of their implementation, while mapping the evidence of clinical impact in Brazilian hospitals.

Methods

A descriptive and qualitative bibliographic review was conducted. The literature search was structured to focus on studies addressing the application, impact, and challenges of AI and technology in pharmaceutical services (CP and PC), as well as studies utilizing machine learning algorithms to guide PFU (4).
Data collection prioritized scientific articles, systematic reviews, institutional publications, and technical impact reports. The search was performed in the following controlled databases: PubMed/MEDLINE, LILACS, SciELO, Cochrane Library, and CAPES Journal Portal. The controlled descriptors (MeSH/DeCS) and free terms were combined using the Boolean operator "AND". Search terms included: "Inteligência Artificial" OR "Artificial Intelligence" AND "Farmácia Clínica" OR "Clinical Pharmacy" AND "Atenção Farmacêutica" OR "Pharmaceutical Care" AND "Segurança do Paciente" OR "Patient Safety" AND "Erros de Medicação" OR "Medication Errors". Articles published in the last five years (2020-2025), in Portuguese and English, were included. These reported AI applications or analyses are directly related to pharmaceutical practice (e.g., prescription analysis, drug discovery, pharmaceutical telecare). Studies focusing on non-pharmaceutical uses of AI were excluded. Materials were selected by screening titles and abstracts, and then confirmed through full-text review.
The analysis examined the use of AI in Brazilian institutions, highlighting the implementation methods and results. Detailed studies of hospital AI systems for prescription analysis enabled the synthesis of national success cases (3, 5).

Results

The review confirms Artificial Intelligence as a practice-redefining tool in clinical care. It offers solutions from diagnosis to pharmaceutical care optimization. Its Big Data processing improves precision, efficiency, and patient-centered care. In drug discovery, AI accelerates the identification of new molecules and optimizes compounds, directly impacting drug pipelines. AI also personalizes treatments by creating individualized plans from genetic and clinical data.
In Clinical Pharmacy and Pharmaceutical Care, AI is a valuable asset, enabling predictive analysis of prescriptions

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and early detection of Medication Errors (MEs). AI systems, such as NoHarm.ai, have shown robust results in Brazilian hospitals. Data from its use in a public hospital in Belo Horizonte show a 50% average increase in assessed prescriptions and a 43-fold decrease in the error rate (from 13% to 0.3%) (5). This represents a significant improvement over traditional manual review, highlighting the transformative potential of AI. Before AI implementation, manual prescription analysis typically resulted in higher error rates and fewer assessed prescriptions. The study also reported nearly triple the number of pharmaceutical interventions per month and a sevenfold reduction in direct costs after implementation.

The automation of routine tasks by AI, such as primary prescription screening and telecare triage, frees up the pharmacist's time to focus on more complex interventions and direct counseling to the patient, aligning practice with PFU. In experiences such as that of Santa Casa de Porto Alegre, the technology had a positive impact on over 11,000 lives within a five-month period. AI's capacity to generate detailed insights and reports supports the continuous improvement of clinical processes and PFU.

Discussion

The incorporation of Artificial Intelligence and advanced technologies represents an evolutionary milestone in Clinical Pharmacy and Pharmaceutical Care, raising the standard of patient safety and operational efficiency. The results demonstrate that AI is an indispensable ally in mitigating Medication Errors (MEs) and optimizing professional time (1). However, it is important to acknowledge certain uncertainties that accompany AI integration. For instance, issues like data quality can significantly influence AI performance, and alert fatigue might hinder the effective utilization of AI tools. Despite these challenges, the drastic reduction in prescription error rates observed in Brazilian hospitals (5) allows pharmacists to shift from primary surveillance tasks to clinical care management, such as complex Pharmacotherapeutic Follow-up and active participation in multidisciplinary rounds. This optimization is crucial in the public health scenario, where resource limitations and high demand are constant (3).

However, the implementation of AI in the Brazilian healthcare scenario, particularly within the SUS (Sistema Único de Saúde, or Unified Health System), presents several challenges. Adoption requires a robust investment in Information Technology (IT) infrastructure and, crucially, ensuring interoperability between various hospital systems, such as electronic health records and pharmacy software (6). Data security and privacy in healthcare, in compliance with the General Data Protection Law (LGPD), are central concerns that demand rigorous protocols for handling sensitive information.

A crucial ethical challenge lies in the clinical and ethical validation of algorithms. AI tools must be transparent (explainable AI) and validated in Brazilian populations. This ensures that clinical decision support does not introduce biases or errors. The ultimate responsibility for therapeutic conduct remains with the pharmacist and the healthcare team (7). Reliance on the AI "black box" requires a profound understanding from professionals. To address potential biases, implementing external audits of AI systems and integrating diverse training datasets are essential steps. These measures can help identify and mitigate biases, ensuring the development of fair and accurate algorithms. Establishing regular algorithm reviews and involving diverse stakeholder perspectives further enhances the ethical deployment of AI in clinical settings.

The pharmacist's role transforms but remains irreplaceable. AI amplifies human expertise, not replacing it. This relationship between humans and AI leads to more efficient, safer, predictive, and patient-centered care. To maximize this, ongoing investment in applied research and professional training in digital skills and data science is

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required in the pharmaceutical field (4). The expansion of AI presents a unique opportunity to enhance healthcare standards and empower pharmacists as leaders in medication safety and therapy management.

Keywords

Artificial Intelligence; Clinical Pharmacy

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The Importance Of Medication Reconciliation In A Psychiatric Hospital In Ponta Grossa, Brazil

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Introduction

Medication reconciliation is a systematic process performed by pharmacists at the time of hospital admission. It involves obtaining a complete list of all medications used by the patient before hospitalization, including dosage regimen, dose, route of administration, and any allergic reactions reported (7).
The goal of reconciliation is to prevent medication errors, substitutions, incorrect dosages, and other incidents, collectively called discrepancies. These may be intentional, such as substitution with standardized drugs or dose adjustments, or unintentional, such as incorrect dosages or prescription of non-standardized drugs (15).
Medication errors may lead to inappropriate use of drugs and can occur despite the involvement of healthcare professionals. Most are associated with ineffective communication, confusing medication names, prescription mistakes, and dispensing or preparation errors (1). Reconciliation minimizes such risks by allowing systematic data collection, enabling pharmacists to detect failures in medication history and track discrepancies (16).
Polypharmacy, defined as the simultaneous use of multiple drugs, is frequent in psychiatric patients and increases the risk of interactions (12). In this context, reconciliation plays a vital role in ensuring treatment safety and effectiveness.

Aim

To identify the impacts of medication reconciliation in the hospital setting and to evaluate unintentional discrepancies, as well as to identify polypharmacy patients and their comorbidities.

Methods

This analytical, cross-sectional, and demographic study was conducted at São Camilo Psychiatric Hospital, Ponta Grossa – PR, Brazil. Data were collected from electronic medical records, including: age, gender, comorbidities, polypharmacy, standardized or non-standardized medications, and discrepancies.
The study period was June–July 2022. Data were analyzed using Microsoft Excel® (tables and graphs).
Confidentiality was ensured, and ethical approval was obtained from the Unicesumar Research Ethics Committee (CEP No. 5.446.878). Literature review for comparison was performed using Google Scholar, Scielo, PubMed, and Elsevier databases.
Pharmacists conducted patient interviews, collecting demographic and clinical data, allergy history, and pre-admission medications with their respective dosages. The collected information was entered into the hospital's Syspront® system. Discrepancies identified during admission were reported to the attending physician for evaluation and possible prescription adjustments.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

A total of 91 records were analyzed between June and July 2022. Of these, 7 were excluded because admission was not performed by a pharmacist or nurse. Collected data included: gender prevalence, age group, presence of comorbidities, and identification of polymedicated patients admitted during the study period.
Among the analyzed data, females were more frequent (54.76%) compared to males (45.24%). The predominant age group was 18–47 years.
Regarding comorbidities, 72% of patients had no pre-existing conditions; hypertension and hypothyroidism accounted for 11% and 7%, respectively; diabetes mellitus for 4%, and other comorbidities for 3%.
As this was a psychiatric hospital, patients' mental disorders were also analyzed. Results showed that 35% had schizophrenia, 20% depression, and 20% bipolar affective disorder.
Medications were divided by class: anxiolytics, anticonvulsants, antidepressants, antiparkinsonians, mood stabilizers, and antipsychotics. Among them, 25% of patients used antidepressants, 30% anticonvulsants, and 25% antipsychotics.
It was observed that 88% of patients were polymedicated, and 14% of these were elderly, increasing the risk of adverse effects during treatment.
Regarding continuous-use medications, 88% of patients reported using them, while 12% did not—most frequently due to side effects. Among those using continuous medications, 60% adhered to treatment, 29% did not, and 12% had interrupted their use.

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In relation to discrepancies, only intentional discrepancies were analyzed, where substitution of medication, dose, or regimen occurred. During admission, when a medication was not available in the hospital formulary, the pharmacist recorded it, and the physician subsequently replaced it with another from the same therapeutic class or according to the patient's needs.
In this case, only 26% of patients had their prescriptions modified due to the use of non-standardized medications.

Discussion

The predominance of female patients can be explained by the greater number of beds available for women compared to men. A 2021 study, however, reported a higher prevalence of males and an age range between 61–70 years (15).
The present results regarding comorbidities (hypertension and diabetes mellitus) were similar to a 2016 study (9). In a 2019 study with 31,458 admissions, 36% of patients presented schizophrenia and 14% affective disorders (4), findings consistent with our study.
A 2013 study showed that 63.2% of patients used antidepressants, 29.7% anticonvulsants, and 20.4% antipsychotics (11). In contrast, in our study anticonvulsants were more prevalent. Some psychotropic drugs may also be used to treat other symptoms of mental disorders (2).
Patients using more than two medications concurrently were considered polymedicated (3). Similar to our findings, a 2017 study showed that 85.3% of patients used more than two drugs (6), while a 2019 study reported 44.7% of patients as polymedicated (5).
The role of the clinical pharmacist is essential in reconciliation services (8), evaluating drugs and classes, particularly psychotropics acting on the central nervous system, many of which are enzyme inducers or inhibitors, increasing the risk of relevant drug–drug interactions in polymedicated patients.
The pharmacist also advises patients on the importance of proper treatment to alleviate symptoms and improve health and well-being.
A 2017 study reported that 78.6% of patients had intentional discrepancies, with 21 patients experiencing drug substitution because the hospital did not have the prescribed medication available (10). Similarly, in our study 26% of patients had substitutions for the same reason. However, a 2021 study (14) reported 554 intentional discrepancies, most related not to substitutions but to additions, withdrawals, or adjustments in dosage and frequency.
Discrepancies can negatively affect patient treatment. Without proper prescription review, treatment may be interrupted, worsening comorbidities (9). Thus, the pharmacist's participation in reconciliation is crucial to minimize these risks.

Keywords

Medication reconciliation; Clinical pharmacist;

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Education in Clinical Pharmacy Applied to Palliative Care: A Literature Review on Challenges and Training Experiences

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Introduction

Palliative care (PC) comprises interventions directed toward patients with diseases that no longer respond to curative treatment, with the primary goal of promoting quality of life through the management of physical, psychological, and social symptoms (1). According to the Brazilian National Academy of Palliative Care (ANCP) (2), these are therapeutic approaches that provide assistance to patients with serious, life-threatening chronic conditions, who should be followed by a multidisciplinary team composed of physicians, nurses, physiotherapists, psychologists, occupational therapists, social workers, pharmacists, among other

professionals. Furthermore, the benefits of PC extend not only to patients but also to family members and caregivers, including during the bereavement period (3). Within this team, however, the pharmacist's role is not yet fully consolidated. By the nature of the profession, pharmacists are focused on the rational use of medicines, encompassing safe storage, monitoring of adverse drug reactions, and providing guidance to patients, families, and healthcare professionals regarding pharmacotherapy, thereby contributing to greater treatment adherence and patient safety (3; 4; 5; 6; 7). Nonetheless, pharmacists are often not recognized by other professionals as an essential part of the PC team and, in some cases, also face difficulties in clearly understanding their role in this setting, a reflection of the scarce attention given to the subject in academic training and the lack of a precise definition of their responsibilities (9; 10; 4).

Aim

The objective of this study is to highlight the benefits of incorporating palliative care into pharmaceutical education and practice, illustrating teaching and training strategies based on experiences and programs described in the literature.

Methods

A descriptive literature review was conducted in PubMed Central (PMC), Latin American and Caribbean Literature in Health Sciences (LILACS), and the Virtual Health Library (VHL). The search included open-access studies published between 2015 and 2025. Descriptors were selected from the Health Sciences Descriptors (DeCS/WHO): Palliative Care and Education, Pharmacy. Studies focusing exclusively on specific drugs or drug classes, as well as those not related to the proposed theme, were excluded.

Results

Database searches identified 998 articles, of which 675 met the time frame criteria and 460 were available in open access. After full-text reading, 20 studies were selected for discussion. Among the included studies, four addressed the benefits of teaching palliative care in pharmaceutical education, highlighting desirable competencies and the challenges to consolidating this practice. Seven articles had an epidemiological approach, focusing on the presence of the topic in undergraduate curricula and/or textbooks, as well as through professional interviews—one conducted in Saudi Arabia, one in India, one in Australia, and two in the United States. The remaining studies consisted of reports on training experiences for pharmacists and their impacts, distributed as follows: two in Japan, one in Pakistan, and six in the United States. The findings demonstrate specific advances in the integration of palliative care into pharmaceutical education, mainly through training programs and isolated courses. Such initiatives appear to strengthen pharmacists' clinical and communication skills, enhancing their contribution within multidisciplinary teams. However, the scarcity and heterogeneity of experiences highlight the need for greater integration of the subject into curricula and educational practices.

Discussion

A scarcity of content on PC in pharmaceutical education was identified, both at the undergraduate and postgraduate levels. In Saudi Arabia, a survey of 131 pharmacists showed that although most recognized the

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benefits of PC and felt confident in their ability to provide care, their knowledge remained limited and was often restricted to terminal patients (11). In India, among 50 pharmacy students, only 25% reported familiarity with the subject, whereas better results were observed among nursing students, whose curriculum included a specific PC module (12). In Australia, a study with 200 graduating pharmacy students demonstrated that lectures, case studies, and clinical placements significantly increased confidence and self-perceived competence (13). In the United States, an analysis of six pharmacy textbooks indicated greater inclusion of the topic, but with only rare references to the pharmacist's role (14). A systematic review of educational interventions revealed a wide variation in workload (1 to 200 hours), with 27% mandatory and 35% elective, and highlighted that interprofessional activities prior to internships enhanced knowledge and skills (15).

In practice, essential skills for working in PC include clear and humanized communication with patients, families, and the care team, supporting treatment adherence and decision-making (16). These competencies must be combined with empathy and critical thinking (17), as well as technical mastery of pathophysiology, pharmacotherapy, and eligibility criteria for PC (18). Emotional preparedness is also required to cope with suffering, fear of death, and physical and psychological burden (19).

Regarding the inclusion of PC in pharmacy curricula, there is divergence over whether courses should be mandatory or elective, but different teaching methodologies have shown positive outcomes. At the University of Pittsburgh, a weekly interdisciplinary elective course achieved high student satisfaction and increased enrollment in subsequent years (20). In Australia, clinical placements and case-based discussions improved confidence and knowledge in pain management (13). In a case-based course, practicing "deprescribing" was initially challenging but improved following instruction (21). End-of-life simulations also proved effective, reducing learning gaps compared with lectures alone (22). In Japan, pharmacists certified in PC demonstrated a greater ability to improve quality of life through appropriate pharmacotherapy management (23). Another educational program revealed sustained improvement in competencies even months after the intervention (24). Specialization in PC may occur through training programs, residencies, internships, or postgraduate studies (25), but factors such as completion of a residency, higher weekly workload, and a positive attitude toward the subject were associated with a greater intention to provide PC services (11).

In conclusion, the inclusion of palliative care in pharmaceutical education, regardless of the methodology employed, enhances competencies, promotes a more humanized practice, and stimulates students' interest in the subject.

Keywords

Palliative care; Education, Pharmacy;

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The Use Of Generative Artificial Intelligence As A Tool In Medication Therapy Management

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Introduction

The incorporation of artificial intelligence (AI) into healthcare represents one of the most significant transformations in contemporary clinical practice. Among its various branches, generative AI and large language models (LLMs), such as ChatGPT, have gained prominence for their ability to process vast amounts of data, generate contextualized information, and support decision-making processes. Unlike traditional algorithms, these tools not only analyze patterns but also produce texts and recommendations in natural language, facilitating communication between healthcare professionals and patients, as well as the systematization of complex clinical information (1,2).

In the context of pharmacotherapy, there is growing interest in exploring how AI can contribute to Medication Therapy Management (MTM), defined as a set of services aimed at optimizing medication use, improving adherence, reducing adverse events, and promoting safer and more cost-effective clinical outcomes. MTM

encompasses activities such as pharmacotherapy review, identification of drug-related problems, adherence monitoring, and interprofessional clinical practice follow-up, establishing itself as a strategic component for the quality of healthcare delivery (3).
Recent studies suggest that generative AI may serve as a practical tool in clinical settings, supporting the identification of drug interactions, proposing therapeutic alternatives, and integrating with electronic health records and telehealth platforms. Moreover, there is evidence of positive economic impact, with reductions in costs and hospital service utilization when AI-based systems are applied in medication management programs. Despite these advances, challenges remain related to clinical accuracy, individualized dosing, and ethical issues such as privacy and algorithmic transparency (4).
Against this backdrop, it becomes relevant to synthesize current knowledge on the role of generative AI in MTM, in order to understand its potenti

Aim

To analyze the available evidence on the use of generative artificial intelligence as a support tool in Medication Therapy Management (MTM), highlighting its potential, benefits, limitations, and implications for interprofessional clinical practice.

Methods

For this narrative literature review, a search was conducted in September 2025 in the PubMed, Scopus, and SciELO databases. The search strategy was developed using a combination of controlled descriptors from the Medical Subject Headings (MeSH) vocabulary and free-text terms, in order to capture both indexed studies and recent publications not yet incorporated into the structured vocabulary. The MeSH descriptors used included: Artificial Intelligence, Artificial Neural Networks, Clinical Decision Support Systems, Natural Language Processing, and Medication Therapy Management. To increase the sensitivity of the search, free-text terms related to the topic were also included, such as Generative Artificial Intelligence, Artificial Intelligence, ChatGPT, Large Language Models, LLM, as well as terms associated with pharmacotherapy review, including Medication Therapy Management, Pharmacotherapy Review, and Drug Therapy Management.
The inclusion criteria were: articles published within the last five years (2020–2025), written in English or Portuguese, and addressing the use of artificial intelligence as a tool in medication therapy management. Exclusion criteria were: studies not directly related to the proposed topic or those for which full-text access was not available.
Article selection was performed in two stages. In the first stage, titles and abstracts were screened, and those not meeting the criteria were excluded. In the second stage, the full texts of the preselected articles were reviewed to confirm eligibility. Data extracted were organized into spreadsheets, allowing for the systematization of key information regarding year of publication, country of origin, methodological design, objectives, AI applications, and main findings.

Results

Of the 11 articles initially identified in PubMed, six were excluded for not directly addressing the application of artificial intelligence in Medication Therapy Management (MTM), for employing distinct technologies, or for being

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classified as editorials and opinion pieces without empirical data. Thus, five studies fully met the established criteria.

The incorporation of artificial intelligence (AI) into pharmacotherapy management has been highlighted as a strategic resource to strengthen MTM services. Recent evidence shows that the application of generative language models has already demonstrated potential in activities typical of clinical pharmacy practice. In one study involving 39 cases (simple, complex, and highly complex), GPT-4 successfully resolved 100% (39/39) of the cases, identified drug interactions, suggested therapeutic alternatives, and structured general management plans; however, it did not recommend specific dosages. Even with high accuracy in case resolution, ChatGPT did not provide individualized dosing, underscoring the need for pharmacist validation and the importance of avoiding reliance on the model for direct dosage calculation (5).

This finding aligns with narrative reviews on the application of AI in pharmacy, which highlight how these technologies can support pharmacotherapy review, predict adverse events, optimize medication selection, automate processes in community and hospital pharmacies, and provide support for medication adherence and integration with telehealth platforms. Such contributions reinforce the notion that AI—particularly generative AI—can function as a complementary tool to MTM, offering systematic support to clinical practice and enhancing the personalization of care (6).

These results converge with conceptual analyses that emphasize the need to integrate AI into health information systems, such as electronic health records and telehealth. In this perspective, medication management should be understood as a continuo

Discussion

The findings of this review indicate that the application of artificial intelligence (AI), particularly generative AI, in Medication Therapy Management (MTM) represents a significant advance, though still at an early stage of consolidation. The performance of ChatGPT in solving simulated clinical cases demonstrates the robustness of language models in identifying drug interactions and suggesting therapeutic alternatives, which are central functions of MTM (5). However, the absence of dosage recommendations highlights a critical limitation, reinforcing the notion that AI should be understood as a support tool rather than a substitute for clinical judgment. This distinction is essential, as it delineates the boundary between intelligent automation and the ethical and technical responsibility of the pharmacist.

When these findings are articulated alongside narrative reviews, it becomes evident that the impact of AI goes beyond the resolution of isolated cases. Its integration can accelerate pharmacotherapy reviews, predict adverse events, optimize medication selection, and support treatment adherence (6). The possibility of linking these tools with digital platforms and telehealth services further broadens their scope, fostering a more agile and accessible model of care. In this regard, generative AI emerges as a catalyst for personalized care, transforming complex data into actionable information for everyday clinical practice.

Another relevant aspect concerns the integration of AI into health information systems, such as electronic health records and remote monitoring tools. The literature suggests that such convergence can enable closed-loop care, in which data collection, predictive analysis, and pharmaceutical intervention occur continuously and in an interconnected manner. This scenario enhances the effectiveness of MTM but also demands the establishment of robust regulatory frameworks to ensure privacy, information security, and algorithmic transparency, without which the technology's potential could be undermined (7).

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AI's contribution also extends to patient safety. Evidence showing that 71% of the studies included in a systematic review reported reductions in medication-related errors is particularly noteworthy. Considering that prescribing errors and inappropriate medication use are among the leading causes of preventable adverse events in healthcare, AI can serve as an additional layer of protection, reducing clinical risks across different levels of care (8).

Furthermore, the observed economic impacts cannot be overlooked. Reductions in total cost of care, medication expenditures, and hospital service utilization, accompanied by a highly favorable return on investment, demonstrate that AI applied to MTM not only improves care quality but also contributes to the sustainability of health systems. This is particularly relevant in contexts of budgetary constraints and growing demand for efficient resource utilization (9).

Taken together, the results suggest that generative AI has the potential to transform MTM across multiple dimensions—clinical, economic, organizational, and technological. Nonetheless, it remains evident that its role must be complementary to interprofessional practice, requiring constant oversight and governance protocols. The balance between innovation and clinical responsibility must be carefully managed to ensure that the observed benefits are consolidated in a safe and ethical manner. Therefore, the fut

Keywords

Digital Health; AI; Pharmacoterapy; MTM

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Antimicrobial Resistance Profile In Uropathogens Isolated In Western Santa Catarinaand The Role Of Therapeutic Alternatives In Reducing Antibiotic Dependence.

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Introduction

Urinary tract infections (UTIs) are among the leading causes of antimicrobial prescriptions in clinical practice, with Escherichia coli being the main etiological agent. However, the extensive and often empirical use of antibiotics has favored the emergence of antimicrobial resistance (AMR), reducing the effectiveness of classes such as penicillins, fluoroquinolones, and trimethoprim-sulfamethoxazole, thereby intensifying therapeutic challenges (1).

Surveillance studies have shown significant changes in resistance profiles among uropathogens, highlighting the importance of continuous monitoring and the search for alternative strategies (2). In this context, the rational use of antimicrobials and the implementation of non-antibiotic therapies become essential measures (3,4).

Aim

To evaluate the antimicrobial resistance profile in uropathogens isolated in Western Santa Catarina over ten years and to correlate the findings with potential non-antibiotic therapeutic alternatives, aiming to identify strategies that contribute to reducing antibiotic dependence in the management of UTIs.

Methods

A retrospective and cross-sectional study that assessed antimicrobial susceptibility and resistance, by class, in Enterobacterales and major Gram-positive bacteria isolated from urine cultures of a medium-sized clinical laboratory in Western Santa Catarina between 2013 and 2023, according to standardized testing methodology and breakpoints (5). Resistance patterns were compared with literature data pointing to therapeutic alternatives to antimicrobials

Results

Among Enterobacterales, resistance to fluoroquinolones was 12.4%, with similar susceptibility to ciprofloxacin (88.2%), levofloxacin (87.7%), and norfloxacin (87.1%). Aminoglycosides maintained high activity (resistance 3.9%; amikacin 2.2%; gentamicin 5.7%). Carbapenems preserved efficacy (meropenem resistant in 2.2% of Enterobacterales and 1.3% of other Gram-negatives). For E. coli, nitrofurantoin (87.5%) and fosfomycin (84.2%; 0.9% requiring higher exposure) showed good activity. Trimethoprim-sulfamethoxazole exhibited resistance of 24% in Gram-negatives. In Gram-positives, cases of multidrug resistance (MRSA and VRE) were identified, as well as carbapenem-resistant Gram-negatives in the outpatient setting. These findings reinforce that, although aminoglycosides, nitrofurantoin, and fosfomycin remain effective for uncomplicated UTIs, fluoroquinolones and TMP-SMX present limitations for empirical use. In this scenario, non-antibiotic alternatives are promising: vaccines against extraintestinal E. coli and K. pneumoniae are advancing in clinical trials; phages combined with CRISPR are emerging as potential therapies against resistance; probiotics and microbiota modulators may prevent recurrent infections; and nanotechnology applied to urological devices may reduce colonization and biofilm formation (3,4).

Discussion

The study showed that some antibiotics remain effective in the treatment of UTIs, particularly carbapenems (2.2% resistance), aminoglycosides (3.9%), nitrofurantoin (87.5% susceptibility), and fosfomycin (84.2% susceptibility) against E. coli, consolidating them as relevant therapeutic options. On the other hand, fluoroquinolones (12.4% resistance) and trimethoprim-sulfamethoxazole (24%) showed higher resistance rates, limiting their empirical use. These results reinforce the importance of prudent antimicrobial use and point to the need to incorporate alternative strategies, such as vaccines, probiotics, and innovative therapies, in tackling bacterial resistance at the community level.

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Keywords

Uropathogens; Antimicrobial resistance; Therapeutic alternatives;Probiotics;UTIs

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Impact Of Pharmaceutical Prescriptions On The Accreditation Of Health Services

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Introduction

The clinical role of the pharmacist has become essential for health promotion, especially in Brazil, where public policies now support their involvement in multidisciplinary teams focused on primary and patient-centered care (7). The earlier focus on dispensing has shifted to an integrated approach, with evidence showing fewer medication errors, better adherence, and improved clinical results (2). Pharmaceutical prescribing is now seen as an extension of clinical duties, enabling pharmacists to intervene directly in patient care when protocols are followed. However, while Resolution No. 5/2025 of the Federal Pharmacy Council expanded pharmacists' scope, its enforcement was suspended due to legal challenges from the Federal Council of Medicine, which addressed safety and competency issues (10). This situation has sparked ongoing debates regarding regulatory, ethical, and legal issues. At the same time, health services strive for improved care through accreditation programs such as Organização Nacional de Acreditação (ONA) in Brazil, and Joint Commission International (JCI) in the USA (24),

where pharmacists' clinical roles play a crucial role in supporting risk management, patient safety, and quality of care (11). However, research directly connecting pharmaceutical prescribing and accreditation remains limited, underscoring the need for further study, particularly in Brazil, where legal issues persist.

Aim

To analyze the potential impact of pharmaceutical prescribing on health care quality and accreditation processes, considering advances, limitations, and challenges for its effective implementation in Brazil.

Methods

This study is a qualitative, exploratory research project of the narrative literature review type, aiming to gather and synthesize evidence on the impact of pharmaceutical prescribing on care quality and health service accreditation. The narrative review approach was chosen over a scoping or systematic review due to its flexibility in exploring broad themes and synthesizing diverse types of literature, addressing the nuanced nature of this emerging topic. The research universe comprised scientific articles, normative guidelines, and technical documents published between 2015 and 2025, from Resolution No. 586/2013 to the suspension of Resolution No. 5/2025 by the Federal Pharmacy Council (CFF), resulting in 22 documents selected according to predefined inclusion and exclusion criteria. Data were collected between April and May 2025 from SciELO, LILACS, BVS, and PubMed, as well as official documents from the CFF, Ministry of Health, ONA, and WHO. Controlled descriptors were combined using Boolean operators according to DeCS: "Drug Prescribing," "Pharmacists," "Health Care Quality," "Patient Safety," and "Health Accreditation." The included articles were full-text, published in either Portuguese or English, and addressed the clinical role of pharmacists, with an emphasis on prescribing and/or accreditation processes, between 2015 and 2025. Excluded works were unrelated or lacked practical or normative relevance. Data were analyzed descriptively, using thematic content analysis according to Bardin (4), which identified emerging categories: care benefits, patient safety, regulatory aspects, professional perception, and the link to accreditation standards. As this study is based on a literature review without primary data collection, statistical tests were not applied; qualitative systematization relied on scientific and technical literature to comprehensively understand the impact of pharmaceutical prescribing on clinical practice and accreditation processes.

Results

Pharmaceutical prescribing is a strategic tool for enhancing the quality of care, particularly in primary care and ongoing services. It enables trained pharmacists to recommend over-the-counter medications and intervene in self-limiting conditions, thereby reducing physician workload and promoting safe access to treatment (17). Studies show it improves treatment adherence, rational drug use, and resolution of minor complaints, positively impacting quality indicators (14).

Patient safety is central. Prescribing according to evidence-based protocols allows identification of interactions, prevention of adverse reactions, and avoidance of medication errors (2). Protocols guide practices for pain, fever, gastrointestinal disorders, and mild allergies. This aligns with clinical pharmacy and patient-centered care (12). Resolutions No. 585 and 586/2013 of the CFF regulate clinical practice and prescribing. These resolutions allow pharmacists to indicate over-the-counter medications or prescribe other drugs within protocols (9). The suspension of Resolution No. 5/2025 caused uncertainty (12).

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Pharmaceutical prescribing consolidates the pharmacist's role in the multidisciplinary team; however, regulatory fragility and heterogeneous perceptions by other professionals may limit its adoption (31, 22). In accredited institutions such as ONA and JCI, it enhances safety, efficacy, and comprehensive care (25). ONA emphasizes standardization, therapeutic follow-up, quality control, and patient education, whereas JCI requires prescription review, the use of structured forms, computerized systems, and the monitoring of interactions and errors. Protocol-based practice promotes rational drug use, prevents adverse events, enhances adherence, and improves safety, thereby meeting national and international accreditation requirements (15).

Discussion

Clinical pharmacy in Brazil has evolved from a dispensing role to an active model of patient care. The pharmacotherapeutic monitoring, focused on chronic patients, optimizes therapy, reduces adverse events, and improves quality of life through multidisciplinary integration. Studies show that clinical pharmacists in hospitals, outpatient clinics, and community pharmacies enhance therapeutic rationality, safety, and system efficiency, prevent pharmacotherapy problems, and generate significant cost savings (29, 1). An analysis from hospitals and community settings demonstrated that integrating pharmacists into the care team can result in an estimated 20% reduction in hospital readmissions, saving the health system millions annually. High adherence to recommendations and rational drug use are observed (13, 27), with a positive cost-benefit ratio for the health system (SUS) (20).

Pharmaceutical prescribing naturally extends the scope of clinical pharmacy, enabling pharmacists to select, guide, and recommend drugs, particularly over-the-counter medications (OTCs), in accordance with protocols to prevent risks, interactions, and adverse events. Resolution No. 5/2025 authorized pharmacists with specialized qualifications (RQE) to prescribe medications, including controlled ones, under evidence-based protocols, but was immediately suspended following a judicial challenge by the federal medical council (CFM), citing encroachment on medical competencies and patient safety risks.

Even with the suspension, protocol-based practices remain valid. Current challenges include continuous training, greater multiprofessional integration, and recognition of the pharmacist's clinical role. University curricula still emphasize laboratory skills. This makes postgraduate courses and multiprofessional residencies essential for consolidating clinical and prescribing competencies.

Monitoring drugs and adhering to protocol-based prescribing help ensure the quality of care and patient safety. They cut errors, prevent harm, and support patients. Since Resolution No. 586/2013, prescribing has been part of clinical pharmacy, enabling pharmacists to prescribe non-prescription and, in some cases, other medications if they follow established guidelines.

Clinical pharmacist practice, combined with responsible prescribing, reinforces the accreditation pillars of ONA, JCI, and ISO 9001. The combination promotes rigorous documentation, multiprofessional integration, quality indicators, reduction of adverse events, and patient-centered care. This approach consolidates pharmacists' contribution to health system safety and efficiency.

To further understand the impact of pharmaceutical prescribing on accreditation, future empirical studies could focus on the following unexplored areas: 1) What is the role of pharmacist prescribers in enhancing patient outcomes within accredited institutions compared to non-accredited ones? 2) How do changes in accreditation standards influence the integration and perception of pharmaceutical prescribing in multidisciplinary teams? By addressing these questions, future research could provide valuable insights into optimizing pharmacist

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involvement in healthcare quality and accreditation initiatives, thereby fostering both academic and practical advancements in the field.

Keywords

Drug Prescriptions; Accreditation; Health Services.

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Mobile Clinical Practice Algorithms: Application Adapted From The Federal Council Of Pharmacy Guides For The Management Of Self-Limited Health Problems

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Introduction

In the current health scenario, marked by profound transformations, the Federal Council of Pharmacy (CFF) has redefined the role of the pharmacist. CFF Resolution No. 585/2013 (1) regulated its clinical attributions, and No. 586/2013 (2) consolidated pharmaceutical prescription as one of them. This is understood as the selection and documentation of therapies (pharmacological and non-pharmacological) and other interventions for the patient's health care, including recommendations or referrals (2).

Despite the normative advances and the expansion of the pharmacist's responsibilities, it is perceived that the language of the guidelines and standards, often technical and complex, can hinder the practical application. This barrier in the communication of guidelines becomes even more critical in a scenario of high self-medication in the Brazilian population (3). Currently, there is a significant prevalence of self-medication, a behavior that, when performed without proper professional guidance, can lead to therapeutic failure and additional health problems (3). The lack of adequate care poses a risk to patient safety, reinforcing the urgency of tools that facilitate clinical decision-making and safe guidance.

Pharmaceutical intervention is fundamental in the management of Self-Limited Health Problems (PSAL), contributing to the reduction of the burden on health systems (5). To optimize this performance, digital tools, such as mobile health applications (mHealth), are promising (6). These technologies, especially Clinical Decision Support Systems (SADC), provide greater safety to clinical practices, supporting the pharmacist with up-to-date, objective information based on the best scientific evidence and ethical principles. In addition, SADC improves the quality of care, reduces errors, time and costs, and increases therapeutic efficiency (7).

Aim

to develop an application that assists pharmacists in clinical decision-making in the management of self-limiting health problems, facilitating access to accurate and evidence-based information, adapted from the Clinical Practice Algorithms (4).

Methods

The material used as a reference was the work Clinical Practice Algorithms (4), which brings together clinical protocols aimed at the management of PSAL. This content was chosen for its comprehensiveness and foundation in scientific evidence. This work proposes an alternative approach to the practical application of algorithms, making them more accessible, easier to use and contributing to a clearer and more objective anamnesis.
Pharmacological procedures were organized in Google Sheets spreadsheets (Google LLC, USA), categorized according to the patient's profile: adults, the elderly, pregnant and/or breastfeeding women, and children. In addition, it was formatted in columns with: dosage, special situations, contraindications, and guidelines during use. Warning messages in special situations were also highlighted. After the preparation of the spreadsheets according to established criteria, they were linked to Google Forms, allowing their integration and facilitating access to clinical recommendations in a practical and digital way.
The decision flows were developed in Google Forms (Google LLC, USA), in order to simulate iterative screening algorithms. Each form follows a logical sequence of questions and answers, leading the user to the definition of the conduct: a) TIME; b) CHARACTERISTICS/QUALITY; c) SEVERITY/INTENSITY; d) ENVIRONMENT/SITUATION; e) FACTORS THAT AGGRAVATE OR ALLEVIATE; f) ASSOCIATED SIGNS/SYMPTOMS; g) PATIENT PROFILE; h) CLINICAL HISTORY; i) PHARMACOTHERAPEUTIC HISTORY; j) NON-PHARMACOLOGICAL TREATMENT; k) PHARMACOLOGICAL TREATMENT; also in each item there is a medical referral, in cases if CLINICAL ALERT is identified.
After review with three pharmacists, all algorithms were included in the PWA model, using the Canva tool (Canva Pty Ltd. Australia). Allowing an experience similar to that of a native application, without the need to download from traditional stores (Google Play or App Store) and with reduced development costs.

Results

As a product of the development process, an application was obtained in Progressive Web App (PWA) format, which can be accessed both through a website and installed as an application in the browser using the "ADD TO HOME SCREEN" option. The application was structured in a simple and responsive interface, allowing it to be used on different devices, such as computers, tablets and smartphones.
The home screen displays three main menus: Algorithms, Enhancement, and References. In the Algorithms menu,

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the 13 PSAL flows adapted from the Clinical Practice Algorithms document (4) are available, which have icons to facilitate their location. When making the selection, the user is directed to the page with the chosen form, hosted on Google Forms, which adopts the approach described in the METHODOLOGY. At the end of the conduct, if no clinical alert is identified, a final report is issued to the user containing all the answers provided during the anamnesis.

The Improvement menu contains links to access free professional training materials for pharmacists and other health professionals. On the other hand, the References menu provides information about the technical material used in the adaptation, including the original CFF document and other scientific sources consulted. The three menus of the application have an informative footer, which includes the name of the creator of the project, reviewers in charge, purpose of the development of the tool and a direct link to the official material provided by the CFF. This resource aims to ensure transparency, credibility and traceability of the information used.

Discussion

The advancement and increasing diffusion of mobile devices and health applications (mHealth) have transformed the health care landscape, offering new opportunities for self-care and decision-making support (8).

The mHealth is defined by the World Health Organization (WHO) as medical and public health practice supported by mobile devices, with enormous potential to facilitate access to specialized clinical diagnostics and treatment advice (8). They can help change behavior, keeping the user engaged and increasing adherence to treatment through condition monitoring (9).

The accelerated growth of knowledge and the volume of information require professionals to be able to learn and adapt quickly to the current context, developing skills and strategies to provide care based on scientific and technological evidence (10). It is worth noting that applications are already widely used by health professionals, in proportions ranging from 45% to 85%, even surpassing the use of books and magazines as a source of consultation (11).

Apps can simplify access to crucial information, assist in screening for warning signs, and guide you on when to seek professional care (12). The use of mHealth also optimizes clinical practice, supports professionals in guidance, can reduce unnecessary care, and strengthens the relationship with the patient (12). The diffusion of these technologies in various subjects and health care is relevant, opening space for new studies that evaluate their impacts and benefits in the provision of health services (13).

In the context of self-limiting health problems, aiming to promote continuing education, clinical updating, and the integration of evidence-based best practices, the developed application offers resources that go beyond the simple consultation of protocols. This functionality aims to support the strengthening of pharmaceutical clinical practice, in line with the CFF guidelines. In this sense, the present study is in line with the evidence available in the literature on the role of technology in health, demonstrating that the use of digital applications can work not only as a support for clinical decision-making, but also as a means of encouraging continuous professional development and qualified patient guidance.

Keywords

Digital Health Technology; Pharmaceutical Services;

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The Role Of The Microbiota In The Treatment Of Irritable Bowel Syndrome And Its Relationship With Depression

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Introduction

Irritable Bowel Syndrome (IBS) is one of the most common gastrointestinal disorders, characterized by intestinal alterations that alternate between diarrhea and constipation, causing abdominal pain without the detection of pathological processes or abnormalities in motility or intestinal structures. Although not classified as a severe disease, IBS considerably affects patients' quality of life (1). For years, therapeutic approaches have been focused on managing gastrointestinal symptoms, with little emphasis on the gut-brain axis. However, patients frequently report symptoms related to depression, suggesting that the intestinal microbiome maintains a balanced relationship with its host, from which both benefit. When this balance is disrupted, the individual may experience several health alterations, including stress, anxiety, depression, and cognitive impairment (2).
In addition, studies have highlighted the role of the gut-brain axis, emphasizing that modulation of the intestinal microbiome is not limited to digestive function and satiety, but is also associated with disorders such as IBS, in which stress is a contributing factor, reinforcing the potential connection between the central nervous system and the intestinal microbiome (3).

Aim

This research aimed to analyze selected articles to understand the influence of intestinal microbiome modulation on IBS symptoms and its relationship with the reduction of depressive symptoms. It also sought to map its

interaction with the gastrointestinal tract, analyze the gut-brain axis, and highlight intestinal modulation as a therapeutic strategy for IBS and associated mental disorders.

Methods

This study is a bibliographic review, characterized as qualitative and descriptive research, involving stages such as formulating research questions, selecting articles according to inclusion and exclusion criteria, and analyzing and presenting the results. The P.I.C.O. strategy (Patient, Intervention, Comparison, Outcome) was used, focusing on the role of the microbiome in the treatment of IBS and its relationship with depression.
The keywords/descriptors used in the search were: dysbiosis, human, gastrointestinal microbiome, intestine, microbiology, IBS, and psychological stress. Books, dissertations, and scientific articles were searched in the following databases: Google Scholar, SciELO, and PubMed, using descriptors in both English and Portuguese.
Data collection was carried out between March and May 2025.
Data collection was carried out between March and May 2025.
Inclusion criteria were articles related to microbiota, IBS, depression, and the gut-brain axis. Exclusion criteria included publications outside the time frame or scope of the study, as well as those not meeting the proposed objectives.

Results

The bibliographic data collection followed the previously defined criteria, covering publications between 2011 and 2025, available in the Google Scholar, SCIELO, and PubMed databases. After applying the inclusion and exclusion criteria, 11 articles were selected to compose the final sample.
In the analysis of this scientific production, the following annual distribution was observed: one article in 2011, two in 2015, one in 2016, one in 2019, one in 2020, two in 2021, one in 2023, and two in 2024.
The results indicate that the intestinal microbiome plays a fundamental role in modulating the gut-brain axis, with direct influences on gastrointestinal, immunological, and neurological functions. It was verified that dysbiosis is associated with the worsening of IBS and the development of psychiatric disorders, including depression and anxiety.
The reviewed literature suggests that modulation of the microbiome, through the use of probiotics and dietary interventions, represents a promising therapeutic strategy, contributing to the reduction of gastrointestinal symptoms such as abdominal pain, bloating, and alterations in bowel transit, as well as to the attenuation of psychological manifestations. The literature also reports that certain intestinal microorganisms take part in the synthesis of neurotransmitters, such as serotonin, dopamine, and GABA, which influence mood and the stress response.
Thus, the findings reinforce the relevance of an integrated and multidisciplinary approach to the management of IBS and its psychiatric comorbidities, promoting more effective clinical practices aimed at improving patients' quality of life.

Discussion

The intestinal microbiome is composed of a wide diversity of microorganisms essential to health maintenance, providing protection against pathogens, regulating pH, competing for nutrients, and maintaining intestinal

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homeostasis (4, 5). The human intestine is estimated to contain about 10^{14} microorganisms—outnumbering human cells—comprising up to 1,000 distinct species, predominantly commensal bacteria (6). The diversity of the microbiome is influenced by genetic, age-related, environmental, and behavioral factors such as stress, medication use, and diet. Its imbalance, referred to as dysbiosis, is associated with gastrointestinal and systemic diseases (5, 6).

The interaction between the microbiome and the central nervous system occurs through the gut-brain axis, integrating neural, hormonal, and immune pathways. The hypothalamic-pituitary-adrenal (HPA) axis, activated by stress, triggers cortisol release and interacts with the enteric nervous system, modulating motility, permeability, and immune responses. The microbiome, in turn, both influences and is influenced by these processes (7).

Evidence suggests that dysbiosis contributes to IBS pathophysiology and is associated with psychiatric disorders such as depression and anxiety through neurotransmitter modulation (serotonin, dopamine, glutamate, and GABA) and inflammatory pathways (2, 3).

IBS is clinically characterized by altered bowel habits, abdominal pain, bloating, and flatulence, alternating between constipation and diarrhea. Diagnosis is clinical, based on Rome criteria, with no specific laboratory marker (1, 8). Global prevalence ranges from 3% to 25%, while in Brazil it is estimated at 12%, with higher prevalence among women. Psychiatric comorbidities are frequent and influence prognosis (8, 9).

Microbial metabolites such as short-chain fatty acids (SCFAs) exert neuroprotective effects. However, dysbiosis can increase intestinal permeability and systemic inflammation, disrupting tryptophan metabolism and elevating pro-inflammatory cytokines linked to depressive and anxious symptoms (9, 10). Lower microbial diversity and higher inflammatory markers have been observed in individuals with depression and IBS (3, 10).

The management of IBS remains essentially symptomatic. Nevertheless, interventions targeting microbiome modulation—including probiotics and dietary strategies (e.g., reduction of fermentable foods)—have shown effectiveness in reducing gastrointestinal symptoms and modulating immune responses, with a favorable impact on quality of life (4, 11). Probiotics also influence cytokine profiles, enhance NK cell activity, and stimulate regulatory T cells, configuring a relevant immunomodulatory mechanism (11).

In summary, the reviewed evidence indicates that microbiome modulation represents a promising therapeutic strategy for managing IBS and its comorbidities, reinforcing the need for integrated approaches that consider the interrelationship between gut health and mental health (4, 11).

Keywords

Gut; Microbiome; Mental Health; Gut-Brain

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Artificial Intelligence In Primary Health Care: Pharmaceutical Triage

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Introduction

With the accumulation of demand for basic health care services, increasing pressure has been exerted to ensure adequate patient triage mechanisms in pharmaceutical technologies. Recent innovative solutions, such as the use of Artificial Intelligence (AI) tools, assist pharmacists in detecting drug-related problems, optimizing therapy, and directing patients to the correct level of care (1). AI differs from the traditional triage model as it can analyze large amounts of clinical, pharmaceutical, and demographic data in real time to identify adverse drug events, potential interactions, and adherence problems earlier (2). Studies show that AI-based systems can significantly improve clinical decision-making and reduce waiting times for care (3). Integrating these tools into primary health care requires attention to ethical issues, patient confidentiality, and professional recognition. In areas with limited access to specialized pharmacists, AI can extend service reach and standardize triage quality. While trial data are promising, evidence regarding its impact in routine primary care, especially in low-resource areas, remains scarce. This narrative review explores applications, benefits, and limitations of AI in pharmaceutical triage, and offers insights to improve clinical pharmacy outcomes.

Aim

The purpose of this paper is to review and explore the role of Artificial Intelligence (AI) in pharmaceutical triage delivered via Primary Health Care, including its advantages, potential challenges, and ethical implications. It also

seeks dissemination strategies and examines how AI can be used to support pharmaceutical care, ensuring patient safety and health care efficiency.

Methods

This scoping review aimed to identify and synthesize the best available evidence related to the use of AI in pharmaceutical triage in primary health care. Searches were conducted in PubMed, Scopus, and Google Scholar using the terms “artificial intelligence,” “pharmaceutical triage,” “primary care,” and “clinical decision support” for the period 2015–2025. Inclusion criteria were original articles in English or Portuguese, regardless of study design. Reports from health organizations and professional pharmacy associations' guidelines were also included. Data were extracted on AI models (machine learning, natural language processing, expert systems), clinical applications (adverse event detection, drug interaction alerts, adherence monitoring), and performance outcomes (accuracy, time saved for providers, patient satisfaction) (1,4). The evidence included case studies from Brazil and other low- and middle-income countries. Ethical considerations, data privacy regulations, and integration challenges were analyzed, referencing Brazil’s General Data Protection Law (LGPD) (5). This synthesis followed PRISMA-ScR guidelines. No ethical approval was required, as only secondary data sources were used.

Results

The review identified 27 studies and 9 technical reports on AI in pharmaceutical triage. Sensitivity was high for detecting drug–drug interactions, and machine learning algorithms predicted adverse drug events with accuracy rates between 82–95% (1,2). Natural language processing extracted information from electronic health records to facilitate real-time triage without overburdening pharmacists. AI helped reduce patient waiting times by up to 35% and increased detection of high-risk medication use in elderly populations by 28% in Brazilian pilots (4). However, barriers included lack of digital infrastructure in primary care, low AI literacy among professionals, and resistance due to fears of technology replacing human judgment (3,5). Data security, algorithm transparency, and ethical concerns were also noted. AI showed promising results when combined with pharmacist-led review but performed poorly without professional oversight.

Discussion

Artificial intelligence in pharmaceutical triage can enhance primary health care, especially in resource-limited areas. The ability to analyze large datasets enables faster recognition of issues and more accurate allocation of resources (1,2). AI should be viewed as a supportive tool for pharmacists, not a replacement. Clinical relevance, patient trust, and bias in training data must be addressed through professional validation of AI outputs (3). The digital divide is a significant concern, as many rural and underserved settings lack infrastructure for AI deployment (4). Without investment in hardware, connectivity, and professional training, AI may replicate existing inequalities. Legal and ethical frameworks, such as Brazil’s LGPD, are essential to protect patient data and ensure responsible adoption (5). In countries with low population density, like Brazil and parts of Africa, public–private partnerships and capacity-building programs may enable sustainable AI integration. Long-term success depends on regular algorithm updates, EHR integration, and clinical outcome evaluations. Moving from identifying to preventing problems in pharmaceutical triage could transform pharmacy practice, enhancing health promotion and disease prevention.

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Keywords

Pharmaceutical Care; Artificial Intelligence; Primary

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Medications And The Environment: Risks Of Improper Disposal

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Introduction

The disposal of medicines is becoming an increasingly significant global issue with implications for public health and the environment (1). Improper disposal — loss of medicines into the sewers or trash at home in addition to the medicine cabinet — is a significant source of contamination of soils, surface waters, and groundwater (2). After entering the atmosphere, many medications, such as antibiotics, anti-inflammatory drugs, and hormones, remain for years as they are chemically stable. They accumulate in biological systems and interfere with environments, causing toxicity to aquatic life and other animals along the food chain. Furthermore, chronic exposure encourages even the worst of bugs; the WHO has declared antimicrobial resistance one of our most pressing health threats for the 21st century (3). Chronic risks (even at very low doses) have been associated with trace concentrations measured in drinking water. This condition is global, and developing countries are particularly at risk because their waste collection and treatment infrastructure is often underequipped. This problem needs to be tackled by educating, enforcing policy, and developing sustainable technology. As respected members of the healthcare team, pharmacists can serve as liaisons between science, public policy, and the community to influence knowledge about proper medicine disposal so that environmentally safe practices are embraced to safeguard well-being for all while upholding a healthier planet.

Aim

This paper aims to evaluate the impacts of this mismanagement on the environment and public health, summarize legislation and preferable practices, and recommend sustainable policies for safe disposal with a view of augmenting environmental awareness through responsibility education by pharmacists.

Methods

We performed a scoping literature review to search for and summarize evidence on medicine disposal practices, environmental contamination with medicines, and effective mitigation strategies (4). A search was conducted in databases such as SciELO, PubMed, and Google Scholar involving publications between 2015 and 2025. Relevant terms were: medicine disposal, environmental pollution, health education. Inclusion criteria: studies published as full text in English. Besides scientific papers, Brazilian and international legislation was reviewed with emphasis on the National Solid Waste Policy (Law No. 12,305/2010) and Anvisa Resolution RDC No. 222/2018. Supplied by local environmental and health agencies, major pharmaceutical pollutants, their environmental and health impacts, and methods for proper disposal of the drugs were abstracted. The paper identified steps like reverse logistics, pharmacy and hospital collection programs, and public education campaigns. Because the present study was a secondary analysis of published data, it did not require ethical approval.

Results

As summarized in the review, pharmaceutical residues — mainly antibiotics, non-steroidal anti-inflammatory drugs (NSAIDs), and endocrine disruptors — occurred in environmental matrices including rivers, lakes, and soils (2,5). These substances have been linked to toxicity in aquatic organisms, feminization of fish, and changes in the composition of microbial communities. In humans, indirect exposure through water contamination brings issues of cumulative risks and antimicrobial resistance. Monitoring studies suggest that even at levels undetectable in drinking water, chronic low-level exposure and subsequent bioaccumulation could have long-term consequences. The use of collection programs in pharmacies and hospitals, increased reverse logistics to guarantee collection and proper treatment, and awareness campaigns addressing correct disposal of medicines are among strategies expected to be effective. Pharmacists, frequently accessible to the public and a trusted health information resource, should be important components in health communication activities that promote environmental stewardship within their communities.

Discussion

The inappropriate disposal of medicines is not only an environmental problem but also a health, ecological, and social one. An increase in collection points and public campaigns implemented by pharmacists could lead to a significant short-term decrease in improper disposal. However, achieving long-term, sustainable impacts will require policy enforcement and investments in advanced disposal technologies (such as high-temperature incineration and advanced oxidation) along with strong social advocacy (1,4). The report outlines the need for government agencies, the pharmaceutical industry, and civil society to work together to integrate environmental stewardship into health systems. This strategy helps alleviate environmental hazards, improves public health by limiting antimicrobial resistance, and conserves biological equilibrium.

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Itraconazole Pharmacokinetics: Determinants Of Variability And Clinical Implications

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Introduction

Sporotrichosis is a subcutaneous mycosis caused by fungi of the Sporothrix genus, with increasing incidence in endemic regions (1). Spontaneous resolution is extremely rare, and majority of the patients will require treatment. Itraconazole is considered the treatment of choice for most clinical forms of sporotrichosis due to its proven efficacy and favorable safety profile (2). It inhibits enzyme cytochromeP450 lanosterol 14α-demethylase that converts lanosterol to ergosterol, the main sterol in fungal cell wall. The absorption of Itraconazole is pH-dependent and can be influenced by factors such as concomitant ingestion of acidic beverages, fed versus fasting states, and various health conditions (3-5). The drug undergoes extensive hepatic metabolism via cytochrome P450 3A4 (CYP3A4), initially to the active metabolite hydroxyitraconazole, and subsequently to inactive metabolites before excretion (6). Because itraconazole is both a potent inhibitor and a substrate of CYP3A4, it is susceptible to clinically significant drug–drug interactions, which may alter systemic exposure and therapeutic outcomes (6, 7). These features can potentially lead to treatment failure and complicate the establishment of optimal dosing regimens. Therefore, understanding altered PK parameters and desired clinical responses is necessary to provide individualized treatment.

Aim

To systematically review and synthesize available data on pharmacokinetic parameters of itraconazole across diverse health conditions to support individualized treatment strategies in sporotrichosis, minimizing adverse effects and maximizing therapeutic outcomes.

Methods

Systematic searches on PubMed and Web of Science databases were conducted to integrate the current evidence on itraconazole pharmacokinetics, using keywords related to pharmacokinetics and itraconazole. Data extraction encompassed demographic variables, clinical status, dosing regimens and key pharmacokinetic metrics (e.g., C_max, T_max, AUC, half-life, clearance, and volume of distribution). Eligible studies included both traditional pharmacokinetic investigations and population pharmacokinetic analyses in human subjects. Descriptive statistical analyses were performed, with means and standard deviations calculated to identify trends and quantify variability in the presence of covariates. The quality of the included studies was assessed using ClinPK's checklist.

Results

The search yielded 69 studies meeting inclusion criteria, comprising 61 traditional pharmacokinetic studies and 8 population pharmacokinetic studies. Across traditional studies, 220 pharmacokinetic profiles were analyzed, spanning various clinical contexts. Itraconazole elimination follows a biphasic pattern, with terminal half-lives of 20–24 hours for itraconazole (8). Results demonstrated that itraconazole pharmacokinetics is markedly influenced by multiple covariates. Food intake enhanced exposure (mean AUC_{0}–∞ 2406 ng·h/mL), whereas fasting states resulted in reduced absorption (mean AUC_{0}–∞ 1786 ng·h/mL) after single oral dose of 100 mg in healthy patients. Drug to drug interactions with ciprofloxacin were associated with prolonged elimination half-life (72h) and a 35% lower volume of distribution (9). Itraconazole clearance is around 133 L/h, which may be reduced by cyclosporine A (10.8–45.8 L/h), reinforcing the need for dose adjustment in patients with hematologic malignancies (10, 11). Population pharmacokinetic studies further highlighted interindividual variability and identified clinically relevant predictors of pharmacokinetic behavior, supporting the feasibility of model-informed precision dosing.

Discussion

Overall, our work provides an integrative overview of itraconazole pharmacokinetic variability and its determinants, with direct implications for the treatment of sporotrichosis. The findings emphasize the importance of considering patient-specific factors such as co-medications, nutritional status, age, and hepatic function when selecting dosing regimens. By consolidating current evidence, the study contributes to advancing personalized therapeutic approaches and optimizing itraconazole use in clinical practice. Moreover, it identifies knowledge gaps, particularly in underrepresented patient populations and in real-world treatment contexts, pointing to priorities for future pharmacokinetic research.

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Sporotrichosis; Itraconazole; Pharmacokinetics

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Pharmaceutical Care In Smoking Cessation

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Introduction

Smoking is one of the leading preventable causes of disease and death worldwide and is classified as a chronic disease due to nicotine dependence. Brazil is internationally recognized for its tobacco control program and was one of the first countries to establish regulations on labeling, content, and emissions of tobacco products, as well as to implement warning images on cigarette packaging (1).

The assessment of nicotine dependence is essential in both epidemiological studies and research on the effects of nicotine and treatments related to smoking and its various comorbidities (2).

The Fagerström Test for Nicotine Dependence (FTND) was developed to distinguish occasional smokers from those dependent on nicotine, considering the substance as a primary reinforcer of the addictive behavior of cigarette consumption. It is the most widely used tool in the world and served as the basis for the development of other instruments (3).

The test evaluates factors such as the number of cigarettes smoked per day, the nicotine dose consumed, the time until the first cigarette of the day, and the difficulty of refraining from smoking in inappropriate places (3).

In this context, the pharmacist has proven to be an essential professional in smoking cessation actions, working directly in primary care and public health programs (4).

Aim

To assess the level of nicotine dependence among students at UFMT – Sinop Campus, using the Fagerström Test, and to report the role of the pharmacist in this context.

Methods

This is an investigative study approved by the Research Ethics Committee (Opinion No. 4.471.865/2020). The target population consisted of 136 students over 18 years of age, randomly selected through an online self-administered form.
Data collection was carried out using an electronic form that included demographic information and the Fagerström Test. The test evaluates nicotine dependence through six questions related to smoking habits, such as time to the first cigarette after waking up, difficulty refraining from smoking in prohibited areas, the most desired cigarette, number of cigarettes per day, frequency of morning use, and smoking even when ill.
The data were organized into tables and charts and analyzed using Microsoft Excel software.

Results

Most participants (70.6%) were between 18 and 24 years old. Among the 136 students who answered the online form, 97 (71.3%) did not use any type of cigarette. Among smokers, 11.8% reported using traditional cigarettes and 38.2% smoked electronic cigarettes (vape, pen, pod, hookah).
Among the smokers, three reported smoking even while bedridden, indicating high dependence. Regarding the time to the first cigarette of the day, 16.3% reported smoking within the first 5 minutes after waking, which is indicative of high dependence. As for the hardest cigarette to give up, 10.3% mentioned the first one of the day, indicating moderate dependence. However, 56.4% reported difficulty giving up any cigarette, which may reflect a consolidated habit, though without signs of extreme compulsion.
The study, conducted with a sample composed mostly of young adults aged 18 to 24, identified a level of dependence considered low to moderate. However, it is possible that this population may develop a higher level of dependence over time.

Discussion

According to the literature, individuals over the age of 50 present a higher degree of severe nicotine dependence (5), due to a longer history of smoking and a higher daily consumption of cigarettes. These individuals also face greater difficulty quitting and suffer more health complications related to smoking.

The consumption of electronic cigarettes has significantly increased in Brazil. Although they are often considered a less harmful alternative, their vapor contains high concentrations of carbon monoxide, nicotine, and carcinogenic substances, which can also lead to nicotine dependence (6).

The study demonstrated that the Fagerström Test is an effective tool for identifying the level of nicotine dependence and is useful for developing intervention strategies. The pharmacist's role proved to be essential both in administering the test and in providing clinical, educational, and motivational support to patients. Their

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involvement in smoking cessation—through counseling, pharmacotherapeutic follow-up, and participation in health campaigns—is crucial for successful treatment and relapse prevention, promoting significant improvements in quality of life and public health.

Keywords

smoking cessation; nicotine dependence; Fagerström.

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The Relevance Of The Pharmaceutical Office In Providing Patient Care.

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Introduction

Since the 1980s, Hepler and Strand have highlighted the assignment of pharmaceutical care as part of the profession's philosophy. In Brazil, this practice was encouraged in 2002 with the “Brazilian Consensus on Pharmaceutical Care,” aiming to define and adopt a model for Pharmaceutical Care practice. Chagas et al. (2019) propose a shift in the term pharmaceutical care to a composition of clinical services summarized as pharmaceutical care (1, 2, 3). Pharmaceutical care is a professional responsibility of pharmacists to ensure the ethical and rational use of medications. The validation of the correct use of each medication must be ensured to provide a unique and individualized therapy for each patient, respecting their particularities (4, 5). In addition to contributing to medication access, pharmacists must also provide services, clarifying doubts at any time for individuals, caregivers, families, or the community (5). The care process begins with the dispensing of medications, and it is the pharmacist's responsibility to ensure the quality of this process, achieving greater efficiency in community pharmacies by including or improving clinical pharmacology practices, rather than focusing solely on technical dispensing activities, such as processing and checking prescriptions, which consume the pharmacist's time without directly contributing to the patient (6). Professionals, academics, and public

policies recognize the potential to provide more person-centered care, aiming to improve patient pharmacotherapy outcomes.

Aim

To report the experience of patient-centered pharmaceutical care practice in a pharmaceutical office located within a public pharmacy in the municipality of Sinop/MT, including: Performing patient reception, evaluation, and pharmaceutical counseling at the pharmaceutical office; Carrying out clinical pharmaceutical services such as pharmacotherapy review, health education, pharmacotherapeutic follow-up, and health management; Conducting screening and analysis of physiological parameters.

Methods

This work was conducted in a public pharmacy in the municipality of Sinop, in the interior of the state of Mato Grosso, Brazil. Invited patients were attended in a private consultation room by a faculty member, accompanied by pharmacy students.
The observation and action period of this study was based on the experience accumulated throughout 2023. For recording the necessary information, a form adapted from official guidelines (7) was used to collect data regarding each patient's pharmacotherapy and health condition, as well as for pharmacotherapeutic follow-up purposes (6). The form included the following steps: patient profile, social history, health problems/complaints, current pharmacotherapy (treatment adherence, other alternative or complementary therapies), and a table for recording physiological parameters such as capillary blood glucose and blood pressure. This study complies with the ethical principles established by Resolution 466/12/2012, with opinion number 3209352 (2019) from the CEP/SINOP, and it is also approved by the Teaching-Service Integration Commission of the municipality of Sinop/MT.

Ethics

The authors have obtained and submitted all necessary ethical approvals and documentation required for the conduct of this study.

Results

Between February and December 2023, 337 patients were attended, of whom 168 were men (49.85%) and 169 were women (50.15%). Among these, 88 patients (26.11%) had diabetes mellitus (DM), and 125 (37.09%) had Systemic Arterial Hypertension (SAH). A total of 37 patients (10.98%) had both diseases simultaneously. Regarding blood pressure values, readings above 130x90 mmHg were considered altered, even though Hypertension and/or high blood pressure is officially defined as equal to or greater than 140x90 mmHg, according to the Brazilian Society of Hypertension (2024). Patients with measurements above 130x90 mmHg were advised to implement lifestyle changes, monitor their blood pressure more frequently, manage their diet (reduce salt, avoid fried foods, and increase fruits, vegetables, and greens), avoid smoking and alcohol consumption, adhere to treatment, and manage stress. This approach aimed at preventing SAH in individuals not yet diagnosed (8). For glycemic control in non-insulin-treated individuals with type 2 diabetes (DM2) or those undiagnosed, 99 mg/dl was used as the upper limit for analysis with a capillary blood glucose meter. Thus, readings above 100 mg/dl were

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considered altered. It is important to note that an individual is classified as pre-diabetic when fasting blood glucose levels are between 100 and 125 mg/dl. Those who reach 126 mg/dl or more are considered diabetic and should be referred to a physician.
When non-adherence to pharmacotherapy was identified, patients were engaged in a more attentive conversation to understand the reasons behind this situation. Common statements included: “I stopped taking it because I feel fine now,” “I only take it in the morning,” and “I realized I don't need it anymore,” among others.

Discussion

Throughout 2023, many patients returned weekly and, by following the team’s guidance, showed improvements in their clinical condition. This was achieved either through better adherence to treatment, proper medication use at the indicated times, or through lifestyle and dietary changes.
Education on the benefits of the correct use of medications can transform both patients' perceptions and pharmacists' approach regarding the real necessity of pharmaceutical care practices. This promotes better alignment of perceptions between patients and pharmacists, based on similarities or divergences in their actions.

Keywords

clinical pharmaceutical services; pharmaceutical care;pharmacotherapy.

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Pharmaceutical Education Related To Medication Administration Through Enteral Feeding Tubes

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Introduction

The administration of medications via enteral feeding tubes is common in hospitalized patients, particularly those who are critically ill or unable to swallow. This practice presents several challenges, including mechanical tube obstruction, drug interactions, altered pharmacokinetics, gastrointestinal side effects, and reduced therapeutic efficacy (1). These risks demand close attention to ensure safe and effective pharmacological therapy.
The pharmaceutical form of medications is crucial for enteral tube administration. Low-osmolarity liquid formulations are preferred to minimize gastrointestinal adverse effects. While immediate-release tablets can often be crushed and dissolved, and capsules opened for administration, film-coated, enteric, or modified-release forms should not be crushed, as this can alter pharmacokinetics, cause incompatibilities, reduce efficacy, or lead to toxicity and tube obstruction (2).
Considering the high complexity of adverse events that may occur as a result of medication administration via enteral feeding tubes, integrated multidisciplinary actions involving healthcare professionals in the development of recommendations related to this topic are essential to ensure the safety and effectiveness of pharmacological therapy in patients using enteral tubes. These recommendations should be incorporated into ongoing professional

education within the institution to standardize and systematize practice and to minimize the risks associated with the preparation and administration of medications (3).
With the establishment of the Clinical and Hospital Pharmacy section within the Society of Critical Care Medicine (SCCM) in 1989, the pharmacist gained recognition as an essential member of the multidisciplinary team, qualified to provide guidance and clarification to the healthcare team, as well as to assess and manage pharmacotherapy for critically ill patients (4).

Aim

To develop and implement strategies for health education through workshops on medication administration via nasoenteral tube in two intensive care centers of a general hospital, aiming to enhance professional knowledge among the nursing team and evaluate the learning outcomes.

Methods

The present study has an exploratory, prospective nature, with a quantitative approach and descriptive data analysis, conducted between May and August of 2024 at a general public hospital in the city of Joinville, Santa Catarina state, that serves as a referral center for medium- and high-complexity care for the local and regional population. The hospital has two Intensive Care Units (ICUs): a general medical and cardiological ICU with 20 beds, and a general surgical and cardiological ICU, also with 20 beds.
Initially, data were collected regarding the main topics of interest related to medication administration via feeding tube among nursing professionals working in the hospital's Intensive Care Units.
To identify these topics of interest, a card was created in which the staff could select up to three options from various possible themes. Six themes were listed: 1 - preparation of solid pharmaceutical forms for administration via feeding tube; 2 - main interactions between medications and between medications and nutrients; 3 - diet interruption; 4 - tube obstruction; 5 - tube positioning; 6 - others (described by the participant).
Based on the data obtained and the literature, the workshop was designed to deepen team knowledge and guide practice on key topics identified. Its format aimed to create an engaging, dynamic learning experience within the routine workday, focusing on topics with direct patient impact. Initially, participants completed a true/false questionnaire to assess baseline knowledge. Following this, a didactic session provided educational materials and reinforced routine practices. Participants then engaged in a Question and Answer activity, fostering interaction and discussion. Finally, participants completed the same questionnaire to measure knowledge gains post-activity. This approach aimed to evaluate the effectiveness of the educational intervention in enhancing team knowledge.

Results

Regarding the initial data collection on the topics of interest listed by the nursing professionals, the following data were obtained: 119 staff members from the two ICUs participated in this phase of the research, resulting in 281 selections of topics of interest. The topic of interest: main interactions between medications and between medications and nutrients was the most chosen by the staff, representing 35.6%; followed by topic of interest: preparation of the solid pharmaceutical form for administration via feeding tube, with 23.8%, and topic of interest: tube obstruction, accounting for 18.5%.

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The least selected topics were: diet pause, representing 11.7%; tube positioning, with 8.2%; and others, at 2.1%. The average accuracy rates on the questionnaire, administered before and after the workshop, were 60.95% and 79.52% for the medical ICU, and 68% and 74% for the surgical ICU, respectively. This corresponds to an 18.57% increase in correct responses among medical ICU professionals and a 6% increase among those in the surgical ICU. A t-test was conducted to evaluate the significance of these improvements, resulting in p-values of 0.099 for the medical ICU and 0.254 for the surgical ICU. A significance level of $p < 0.05$ was considered.

Discussion

Based on the observed accuracy rates, a more significant impact was noted in the medical ICU, where the increase in correct responses after the educational intervention was more pronounced. Although the surgical ICU started with a higher baseline accuracy, its improvement was less marked. Despite the lack of statistical significance in the p-values when comparing pre and post-workshop scores, the knowledge gain among professionals reinforces the importance of continuous education in healthcare.

Analysis of individual questionnaire items revealed notable improvements in some areas. Question 5, related to the volume of water used to flush feeding tubes, showed the greatest increase in correct answers, indicating prior knowledge gaps that were addressed through the workshops. This aligns with literature recommending 40 to 50 mL of water for flushing tubes before and after medication administration (5). Question 2, regarding the necessity of flushing tubes before and after medication, was already well understood by participants. Conversely, question 3, on simultaneous administration of multiple drugs via the tube, showed high correct response rates even before training, reflecting awareness of potential drug interactions and the need to flush between administrations (6,7). Conversely, questions 1 and 4 highlighted persistent knowledge gaps: most participants incorrectly believed bisacodyl could be safely administered via tube despite its formulation making this inappropriate (8,9); and uncertainty about administering calcium polystyrene sulfonate powder suspension, which is associated with tube obstruction(8,10). These findings emphasize the need for clear, accessible guidance to prevent medication errors and adverse events.

The chosen topics for the educational card reflect daily nursing concerns in ICUs, with staff showing interest in deepening their knowledge. Workshops aimed to review routine practices and expand existing understanding. Active learning methodologies, especially those involving group work, problem-solving, and interactive sessions, have been recognized as effective alternatives to traditional teaching (11). The present workshop aligns with such approaches, fostering knowledge sharing and discussion.

However, the modest increase in accuracy may be attributed to challenges typical in continuing professional education, including workload, lack of planning, low managerial support, staff turnover, and limited adherence (12). Additionally, environmental distractions during work hours may have impeded full participant engagement. Limited staff numbers and high workloads further hinder frequent training opportunities.

Integrating training facilitators within the team, who observe daily routines and identify educational needs, can enhance learning effectiveness (13). Collaboration between pharmacy and nursing is crucial, as clinical pharmacists play an increasingly recognized role in multidisciplinary ICU teams by addressing medication-related queries and delivering strategic health education (14).

In summary, ongoing education for healthcare professionals is essential to ensure safe routine practices. The improvement in knowledge after workshops shows that pharmacist-led, multidisciplinary training effectively

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enhances skills. Additionally, integrating specialized teams in the ICU and using active learning methods can strengthen daily practices and improve patient outcomes.

Keywords

Pharmaceutical Education; Enteral Feeding Tubes;

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Cystatin C: The Precision Biomarker In Chronic Kidney Disease And Its Strategic Impact On Pharmacotherapy Optimization

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Introduction

Chronic Kidney Disease (CKD) constitutes a severe and growing global public health challenge, with significant prevalence in the Brazilian context, severely burdening the Unified Health System (SUS) [1]. Early diagnosis, however, is often limited by the inherent deficiencies of traditional biomarkers [8]. Serum creatinine, a historically used marker, is significantly influenced by multiple extrarenal factors, including muscle mass, age, sex, ethnicity, and diet, creating a critical "diagnostic blind spot" [2,4,6,8,9]. It is crucial to note that elderly, malnourished patients, or those with reduced muscle mass may already have compromised Glomerular Filtration Rate (GFR) (stage G3a or lower), while serum creatinine may remain falsely within the normal range due to its low metabolic production. This imprecision masks the early loss of renal function and delays crucial interventions [2, 4, 6, 8, 9]. This diagnostic delay is particularly critical in pharmacotherapy, where precise estimation of GFR is vital for the safe and effective dosing of medications [7, 10]. An inaccurate GFR estimate can lead to therapeutic failure or, more dangerously, to toxicity related to renally eliminated drugs, especially those with a narrow therapeutic index,

such as certain antibiotics (e.g., aminoglycosides), direct oral anticoagulants (DOACs), digoxin, or chemotherapeutic agents [7,10]. In these cases, the risk of renal and systemic Adverse Drug Events (ADEs) is significantly elevated. In this context, Cystatin C (CysC) emerges as a superior alternative [2, 4, 6, 8]. CysC is a low-molecular-weight protein produced at a constant rate by all nucleated cells [2,4,6,8,9] and is freely filtered by the glomerulus, followed by complete reabsorption and catabolism by the renal tubules. Unlike creatinine, its plasma concentration reflects GFR with higher sensitivity and specificity, being less influenced by extrarenal factors [2, 4, 6, 8]. Its superior kinetics establish it as a more reliable biomarker for the early detection of subtle renal dysfunctions [2,4,6,8,9]. The incorporation of a more precise biomarker is essential for optimizing patient safety and efficacy in clinical and hospital pharmacy practice [7,10].

Aim

This study aims to analyze, through a comprehensive and evidence-based literature review, the clinical relevance of Cystatin C as an integrated biomarker for early diagnosis, prognostic assessment, and personalization of therapeutic regimens in Chronic Kidney Disease (CKD), specifically highlighting its crucial implications for precise pharmacotherapeutic dose adjustment and the mitigation of Adverse Drug Events (ADEs) in the clinical setting.

Methods

The methodological procedure adopted was an integrative literature review, a strategy that enables the rigorous synthesis of multiple empirical and theoretical studies to achieve a comprehensive understanding of the topic [8]. The goal was to identify and analyze the main theoretical contributions and published clinical evidence on the subject. The search strategy was designed with high methodological rigor, based on a systematic approach to ensure maximum scope and clinical relevance. Academic and scientific articles were systematically analyzed using the specific Health Sciences Descriptors (DeCS)/Medical Subject Headings (MeSH): "Cystatin C", "Chronic Kidney Disease", and "Biomarker". These primary descriptors were combined with the Boolean operators AND and OR, essential for capturing the precise intersection of themes, and subjected to further refinement, with the inclusion of terms of greater relevance to pharmaceutical practice and CKD management, such as "dose adjustment", "pharmacokinetics", "CKD-EPI CysC equations", and "mortality". The search covered the main and most robust international biomedical databases: PubMed (MEDLINE), SciELO, LILACS, and the Cochrane Library, spanning the publication period from 2014 to 2025 [8]. This period was selected to include the most recent and high-impact evidence, such as the consolidation of GFR estimation equations based on CysC, essential for updating clinical protocols. The inclusion criteria were strict, determining articles that directly addressed Cystatin C in the context of diagnostic, prognostic biomarkers, or its application in the pharmacokinetics of medications in patients with CKD. The exclusion criteria involved studies that primarily focused on other diseases or contexts, which did not address Cystatin C as a biomarker for CKD patients. Articles published in Portuguese, English, and Spanish were considered, aiming to achieve geographical diversity in the evidence. Methodological rigor was maintained by the transparent and detailed description of the search strategy and the selection criteria, ensuring the scientific validity of the review.

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Results

The literature review consistently demonstrated that Cystatin C is a significantly more accurate predictor of GFR than serum creatinine [3,5], particularly in special populations where creatinine has inherent limitations [3,5]. This includes high-risk groups essential for Clinical Pharmacy, such as the elderly (with low muscle mass), diabetic patients (for early nephropathy detection), and children [5]. Robust studies confirm its essential role in the early detection of diabetic nephropathy, often preceding the manifestation of microalbuminuria. Furthermore, the use of Cystatin C (and combined GFR estimation equations CysC-Cr) has emerged as a more robust predictor of adverse outcomes in CKD patients, including cardiovascular events and all-cause mortality, even in early stages (CKD G1-G2) [2,4]. This prognostic value is crucial for proactive risk stratification by the pharmacist, enabling the targeting of preventive interventions and intensive monitoring. In the context of pharmacotherapy, CysC allows for a more reliable calculation of GFR compared to isolated creatinine, resulting in safer and more effective drug dosing [7,10], thereby mitigating the risk of Adverse Drug Events (ADEs). However, the main obstacle identified for its widespread implementation in routine hospital and clinic laboratories remains the higher initial cost of the assay compared to traditional methods, which imposes the urgent need for cost-effectiveness analyses.

Discussion

Cystatin C has established itself as an indispensable precision biomarker for the early detection of chronic kidney disease, due to its superior ability to identify subtle drops in GFR, often before significant changes in creatinine levels become apparent [2,4,6,8,9]. This early detection is fundamental for the clinical pharmacist, allowing for timely pharmacological interventions, a more precise adjustment of dosages for renally excreted medications, and the prevention of toxicity, which are essential pillars for patient safety and effective pharmacotherapeutic management [7,10]. CysC's precision translates directly into a lower incidence of drug-induced nephrotoxicity and greater therapeutic success, elevating the quality of care. Although the higher initial cost of the assay represents a barrier to large-scale implementation in current clinical practice, a meticulous medium and long-term cost-benefit analysis is imperative and key to its incorporation. The investment in early CKD detection, facilitated by Cystatin C, has the potential to substantially reduce future healthcare costs associated with high-cost therapies and disease progression, such as dialysis and transplantation [2,4,6,8]. Furthermore, early diagnosis and precise dosing reduce the burden of treating medication-induced complications (ADEs) resulting from imprecise GFR estimates and renal toxicity, which also represents significant savings in hospital resources and length of stay [7,10]. Therefore, the progressive incorporation of Cystatin C into clinical protocols and dose adjustment guidelines, particularly for high-risk populations and within the strategic scope of Hospital and Clinical Pharmacy, represents an unavoidable clinical and economic advance [7,10]. Continued research is suggested, focusing on the optimization of laboratory costs and the validation of its application in diverse health system realities. To maximize the benefits of both markers and offer the most robust GFR estimate, the use of combined equations (creatinine and CysC) should be prioritized, as recommended by international guidelines, representing the strategic path to democratize access to a more precise renal diagnosis and, consequently, a more adequate and earlier management of CKD [2,4,6,8].

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Chronic Kidney Disease; Cystatin C

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Polypharmacy And Deprescribing In The Elderly: Challenges And The Clinical Pharmacist's Role In Optimizing Pharmacotherapy

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Introduction

Aging is accompanied by profound physiological changes that significantly alter pharmacokinetics and pharmacodynamics. Reductions in renal clearance, hepatic metabolism, total body water, and lean body mass, together with an increased fat-to-muscle ratio, substantially affect drug absorption, distribution, metabolism, and elimination. These modifications increase the risk of drug adverse outcomes at standard dosages. At the same time, multimorbidity is highly prevalent among older adults, frequently leading to polypharmacy, usually defined as the chronic use of five or more medications (1). This complex clinical scenario heightens the likelihood of adverse drug reactions (ADRs), inappropriate prescribing, and clinically relevant drug–drug interactions, with potentially severe outcomes such as cognitive impairment, delirium, falls, hospitalizations, and reduced quality of life (2,3). Addressing these challenges requires a multidisciplinary approach to pharmacotherapy, in which the clinical pharmacist plays a pivotal role in medication optimization, patient education, and shared decision-making (4). This integrative review underscores the urgent need to re-evaluate medication management strategies in older adults, with rational prescribing and deprescribing as key interventions to improve patient safety and therapeutic outcomes.

Aim

To synthesize and critically analyze recent evidence on the challenges of pharmacotherapy in the elderly, with particular emphasis on the contribution of the clinical pharmacist to mitigating the risks associated with polypharmacy.

Methods

An integrative review was conducted based on evidence from systematic reviews, meta-analyses, and high-quality observational studies addressing pharmacotherapy in older adults. The databases PubMed, Scopus, and Web of Science were searched for publications between 2023 and 2025. Inclusion criteria comprised studies investigating the clinical impact of polypharmacy, adverse outcomes related to medication burden, and strategies for optimizing therapy in this population. Priority was given to articles evaluating deprescribing interventions and pharmacist-led approaches. Data extraction followed a structured process, and the evidence was synthesized narratively, with emphasis on recurrent findings, methodological quality, and knowledge gaps. Special attention was given to the application of validated tools, such as anticholinergic burden scales, and to the analysis of deprescribing protocols.

Results

The synthesis confirmed that polypharmacy is highly prevalent among older adults worldwide, with rates between 40 % and 60 % of adult (5). Physiological vulnerabilities associated with aging substantially elevate the risk of drug-related problems, and anticholinergic burden scales have been consistently identified as robust predictors of cognitive impairment, functional decline, and frailty (5). Among these, the most commonly applied tools are the Anticholinergic Drug Scale (ADS), the Anticholinergic Risk Scale (ARS), the Anticholinergic Cognitive Burden Scale (ACB), and the Brazilian Scale of Medications with Anticholinergic Activity (SBMAA) (3). Several studies demonstrated that pharmacist-led interventions, particularly structured medication reviews and deprescribing protocols, significantly reduced medication burden, improved adherence, and decreased the incidence of ADRs and hospitalizations (6). The findings also emphasized the importance of multidisciplinary collaboration, with pharmacists actively contributing to clinical decision-making by detecting potential drug–drug interactions, optimizing dosage, and leading deprescribing strategies. Despite heterogeneity across studies, the evidence consistently supported the clinical and economic benefits of integrating pharmacists into geriatric care teams (7).

Discussion

This integrative review highlights the interplay between age-related physiological changes, multimorbidity, and polypharmacy, which together pose significant challenges to safe and effective pharmacotherapy in older adults. Conventional prescribing practices often fail to consider altered pharmacokinetic and pharmacodynamic profiles, resulting in underdosing, overdosing, and preventable complications. The reviewed evidence reinforces that the role of the clinical pharmacist extends beyond dispensing to encompass comprehensive functions such as individualized medication reviews, risk assessment, therapeutic monitoring, and deprescribing initiatives (1,6,7). By applying tools such as anticholinergic burden scales and leveraging pharmacological expertise, pharmacists are uniquely positioned to mitigate adverse outcomes and promote rational drug use (3,7). Furthermore,

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deprescribinwg, when conducted in a structured, patient-centered, and interdisciplinary manner, emerges as a safe and effective strategy to reduce polypharmacy-related risks without compromising disease control. Nonetheless, barriers persist, including prescriber resistance, patient concerns about medication withdrawal, and limited institutional support. Addressing these challenges requires stronger recognition of the pharmacist's role within health systems, expanded training in geriatric pharmacotherapy, and policy-level initiatives to standardize deprescribing practices (6,7). Ultimately, optimizing pharmacotherapy in older adults demands a paradigm shift toward proactive, collaborative, and personalized pharmaceutical care, capable of significantly improving health outcomes and quality of life for this vulnerable population.

Keywords

Polypharmacy: Deprescribing: Pharmacotherapy; Clinical pharmacist

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Pathways For Managing Polypharmacy In Primary Health Care: An Educational Pharmaceutical Approach

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Introduction

Polypharmacy, defined as the concurrent use of five or more medications, has become increasingly common, especially among older adults with chronic conditions. This scenario raises the risk of adverse drug reactions, therapeutic duplication, and poor adherence, compromising the safety and effectiveness of treatment (1). In Primary Health Care (PHC), pharmacists play a strategic role in identifying risks related to polypharmacy and promoting the rational use of medicines through patient-centered clinical consultations. However, despite the relevance of clinical practice, structured initiatives in community settings remain scarce.

In this context, the development of educational tools and standardized clinical workflows can enhance patient understanding, medication organization, and adherence, while strengthening the pharmacist–patient relationship and promoting multidisciplinary collaboration. This experience report describes the implementation of clinical pharmaceutical actions for the management of polypharmacy, using the Patient Medication Booklet (Caderneta de Medicamentos do Usuário – CMU) as a central educational resource to promote safe and effective pharmacotherapy.

Aim

To describe the experience of implementing clinical pharmaceutical care actions for polypharmacy management, emphasizing the use of the Patient Medication Booklet as an educational tool for organizing pharmacotherapy and improving medication safety.

Methods

This qualitative, descriptive, and observational experience report was conducted in a Primary Health Care context between January and March 2025. The intervention was carried out by nine postgraduate students in Pharmaceutical Care, who conducted clinical consultations with users identified as polypharmacy cases (≥5 medications). Patient inclusion occurred by convenience sampling during scheduled consultations, excluding individuals under palliative care or with severe cognitive impairment without caregiver support.
The process consisted of four main stages: (1) identification of users and risk assessment; (2) creation and adaptation of the Patient Medication Booklet for individualized recording of therapeutic regimens; (3) training of pharmacists for standardized clinical consultations; and (4) clinical care involving pharmacotherapeutic anamnesis, medication reconciliation, assessment of adherence and potential interactions, and patient education.
All consultations were recorded in the electronic health record and analyzed descriptively. As the activity was part of an educational and care initiative using anonymized secondary data with no patient-identifying information, ethical approval was not required, in accordance with Resolution CNS nº 510/2016.

Results

A total of 27 users were assisted, most of them older adults with multiple chronic conditions. The clinical consultations allowed individualized interventions that improved understanding of treatment, optimized medication schedules, and identified potential drug interactions — many of which were resolved through dose adjustments and better medication timing. The use of the Patient Medication Booklet facilitated organization of pharmacotherapy, reduced confusion and errors, and was well accepted by users due to its simplicity and visual clarity.
Pharmacists reported that the booklet enhanced communication during follow-up visits and strengthened the educational dimension of pharmaceutical care. Patients showed greater adherence and confidence in managing their medications, with several expressing satisfaction for understanding the purpose of each drug for the first time. The experience also promoted professional integration and reflection on the importance of structured clinical documentation within PHC.

Discussion

The results confirm that clinical pharmaceutical consultations supported by educational tools such as the Patient Medication Booklet are effective in managing polypharmacy within PHC. Similar initiatives in the literature show that individualized patient education combined with structured documentation increases pharmacotherapy safety and empowers users to take an active role in their care (2,3).
The multidisciplinary nature of the intervention contributed to the continuity and effectiveness of treatment, in

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alignment with the principles of Brazil's Unified Health System (SUS). The experience reinforces the relevance of simple, low-cost educational technologies applied with methodological rigor, capable of generating meaningful clinical and educational impact.
The CMU proved to be an accessible and replicable innovation that helps reduce communication failures between professionals and users, particularly in resource-limited contexts. Strengthening the pharmacist's clinical role in PHC represents an advance toward safer, more humanized, and evidence-based pharmaceutical practices. The main challenge identified was the limited time for continuous follow-up, but the model demonstrated feasibility and potential for expansion to other healthcare units.

Keywords

Polypharmacy;Pharmaceutical Care;Health Education;Primary Health Care;PatientSafety

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Café: Nutritional Education For Health Promotion: An Experience Report

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Introduction

Coffee is one of the most consumed beverages in the world, present in diverse cultures and social contexts. In Brazil, the habit of drinking coffee is deeply rooted in the population's daily routine, serving as a symbol of hospitality, social interaction, and productivity. Beyond its cultural role, coffee has sparked scientific interest due to its numerous bioactive compounds, such as caffeine, polyphenols, and chlorogenic acids, which exert diverse physiological effects on the human body. However, excessive or inadequate consumption can have negative repercussions, such as sleep disorders, increased blood pressure, and anxiety (1). In this context, nutritional education and interprofessional collaboration between different health fields, such as Nutrition and Pharmacy,

play a fundamental role in promoting the conscious and balanced use of this beverage, combining scientific knowledge with the cultural reality of individuals. Thus, promoting educational initiatives aimed at clarifying the benefits and potential harms of coffee becomes an effective strategy for encouraging more informed and healthy dietary choices, strengthening the community's autonomy in self-care (2,3).

Aim

To report the experience of Pharmacy and Nutrition students in an educational activity aimed at discussing the benefits and harms of coffee consumption, highlighting the importance of nutritional education and the integration of technical and popular knowledge.

Methods

The curricular extension activity was developed at the Peace Community Center (COMPAZ), located in the city of Recife, as part of an interprofessional initiative involving Pharmacy and Nutrition students. Participants included community residents and regular visitors, with diverse ages and education levels. The initiative was planned based on the principles of popular health education, prioritizing dialogue, active listening, and respect for local knowledge. The methodology adopted involved a didactic and participatory oral presentation, structured around four thematic areas: (1) types and methods of preparing coffee; (2) nutritional properties and bioactive compounds; (3) benefits associated with moderate consumption; and (4) potential harms of excessive consumption. Visual aids, everyday examples, and an interactive activity entitled "Myths and Truths about Coffee" were used to facilitate understanding. This activity encouraged critical thinking and knowledge sharing among participants, creating a relaxed and engaging environment.

Results

During the activity, the audience demonstrated great interest and engagement. Many participants expressed curiosity in better understanding the effects of coffee on health, especially regarding blood pressure, sleep, and digestion. The "Myths and Truths" activity revealed that, although some prior knowledge existed, misinformation and popular beliefs persisted, such as the idea that "strong coffee is bad for the heart" or that "decaffeinated coffee has no benefits." The explanation of each myth, based on scientific evidence, helped correct distortions and strengthen knowledge on the topic. Students reported that the experience fostered the development of communication skills and broadened their understanding of the importance of accessible and culturally appropriate language in health actions. Participants found the meeting enlightening, practical, and applicable to their daily lives, especially regarding conscious coffee consumption, which promotes balance and body awareness.

Discussion

The educational initiative enabled a rich exchange of knowledge between students and the community, demonstrating the potential of nutritional education as a tool for promoting health and encouraging more balanced eating habits. The dialogic and culturally sensitive approach enabled not only the transmission of information but also the strengthening of emotional bonds and trust between the faculty and the community.

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Experiences like this reaffirm the social role of pharmacists and nutritionists as health promoters, capable of working collaboratively and interdisciplinarily to transform local realities through the dissemination of information based on scientific evidence. Furthermore, they demonstrate that the integration of teaching, service, and community is essential for the development of critical, empathetic professionals committed to humanized care, consolidating university extension as an important instrument for the collective construction of knowledge and social transformation.

Keywords

Nutritional Education; Health Promotion

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Beyond The Walls Of The Primary Health Unit: Expanding Multiprofessional Home Care Access

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Introduction

Primary Health Care (PHC) is the first level of contact between individuals and the public health system, based on the principles of universality, comprehensiveness, and equity. However, certain populations still face geographic and social barriers that prevent them from accessing healthcare services, especially older adults and bedridden patients. Many remain for long periods without medical follow-up, which leads to treatment discontinuity and worsening of chronic conditions (1).

In several Primary Health Units (PHU), administrative and territorial boundaries hinder the provision of care to patients residing outside the assigned area, even when they present severe clinical conditions and require home

visits. This fragmentation challenges the principles of Brazil's Unified Health System (SUS) and calls for strategies that expand the reach of healthcare actions beyond formal geographic limits.
Faced with this scenario, a multiprofessional team decided to go beyond administrative boundaries and provide home care to patients outside their designated coverage area, many of whom had been unsuccessfully seeking care for months. The initiative aimed to guarantee universal, equitable, and humanized access, reinforcing the team's ethical and social commitment to person-centered and community-oriented care.

Aim

To report the experience of a multiprofessional team conducting home visits beyond the administrative coverage area of a PHU, highlighting their impact on therapeutic adherence, continuity of care, and the reduction of health inequities.

Methods

This is a qualitative and descriptive study, in the form of an experience report, carried out in a Family Health Unit located in the northern region of Brazil. The multiprofessional team was composed of a physician, a pharmacist, two nutritionists, and a social worker, with occasional nursing support. Home visits were conducted between March 2023 and January 2025, totaling 75 visits, 18 of which were to patients residing outside the assigned area. Patient selection was based on social and clinical screening led by the social worker, prioritizing individuals in vulnerable situations and those lacking recent medical follow-up. During the visits, the physician performed clinical evaluation and prescribed treatments; the nutritionists conducted anthropometric assessment and provided dietary counseling; and the pharmacist evaluated medication use, storage, and potential interactions, making necessary adjustments.
After each visit, the team held case discussions and documented the care in electronic medical records. Patients received updated prescriptions, referrals, and the Patient Medication Booklet — an educational tool that helped organize treatment schedules and ensure medication safety. Data analysis was descriptive, based on the professionals' records and reflective discussions throughout the process.

Results

A total of 44 patients benefited from the intervention, including elderly, bedridden individuals, and those with chronic conditions requiring continuous monitoring. Providing care beyond the assigned area proved essential to ensure healthcare access for people who had been waiting for months for assistance. The multiprofessional approach enabled clinical monitoring, therapy review, nutritional counseling, and safe medication use, resulting in improved symptoms, better adherence, and reduced hospitalizations.
The Patient Medication Booklet was well received by patients and caregivers, helping them understand medication schedules, dosages, and purposes, thereby reducing errors and strengthening the bond between professionals and the community. The teamwork promoted greater integration among the professionals and optimized care delivery in expanded areas. Reports from patients and families revealed high satisfaction, demonstrating the social and clinical impact of the initiative.

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Discussion

This experience demonstrated that exceeding administrative boundaries can be an effective strategy for promoting health equity. The decision of the multiprofessional team to provide home care outside their designated area reaffirmed the principle of universality and showed that empathy and ethical commitment are driving forces in building a more accessible SUS.

Previous studies indicate that geographic and bureaucratic barriers remain major obstacles to the comprehensiveness of care in PHC (2). However, flexible and humanized care models — such as this one — show that rethinking work processes allows professionals to act effectively without compromising service organization. Interprofessional collaboration enabled complementary and simultaneous interventions, enhancing problem-solving capacity and the exchange of knowledge. The pharmacist played a key role by reviewing prescriptions, identifying potential drug interactions, and promoting safe medication use; the nutritionists contributed to dietary adequacy and education; and the physician ensured continuity of clinical management.

Beyond clinical benefits, the initiative strengthened the relationship between the team and the community, humanizing care and fostering shared responsibility. The success of this project suggests that overcoming administrative barriers depends less on resources and more on professional commitment, collective planning, and alignment with SUS principles.

The “Beyond the Walls of the PHU” experience reaffirms that the true territory of care is defined by human need, not by cartographic boundaries. This replicable model can inspire other teams to transform structural limitations into opportunities to expand access and reduce health inequities.

Keywords

Home Visits; Primary Health Care;InterprofessionalRealtions;HealthEquity;Patient-CenteredCare

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Health Education And Rational Use Of Medicinal Plants: Experience Report Of Pharmacy Students In A Basic Health Unit In Recife-Pe

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Introduction

The use of medicinal plants and phytotherapeutics is deeply rooted in Brazilian popular culture and is officially recognized by the Unified Health System (SUS) through the National Policy for Integrative and Complementary Practices (PNPIC) (1). However, indiscriminate consumption, lack of professional guidance, and lack of knowledge about drug interactions and toxicity still pose challenges to patient safety (2). Pharmacists, as pharmaceutical professionals, play a strategic role in promoting the rational use of phytotherapeutics, providing guidance to the population and scientifically validating traditional knowledge (3). Pharmacists' educational activities help prevent risks associated with self-medication, ensure therapeutic efficacy, and strengthen the link between empirical knowledge and evidence-based practice. Therefore, practical experiences involving pharmacy students in this field are essential for the development of clinical, communication, and ethical skills (4).

Aim

To report the experience of Pharmacy students in an educational activity on the rational use of medicinal plants and phytotherapeutics, carried out in a basic health unit in Recife-PE, highlighting the formative and assistance impacts of the activity.To report the experience of Pharmacy students in an educational activity on the rational use of medicinal plants and phytotherapeutics, carried out in a basic health unit in Recife-PE, highlighting the formative and assistance impacts of the activit

Methods

The initiative was developed between May and June 2024 at a Basic Health Unit (UBS) located in the northern zone of Recife, Pernambuco. Five pharmacy students from the Pernambuco School of Health (FPS) participated, under the direct supervision of a pharmacist preceptor. Initially, a survey of the medicinal plants most commonly used by the community was conducted through semi-structured interviews with 40 UBS users. The most frequently cited species were boldo (Plectranthus barbatus), chamomile (Matricaria recutita), fennel (Pimpinella anisum), mint (Mentha piperita), and aloe vera (Aloe vera). Based on this survey, the students created illustrative brochures containing information on therapeutic indications, appropriate preparation methods (infusion, decoction, and maceration), safe doses, duration of use, storage precautions, and potential drug interactions with long-term medications. Guidance was also included on the inappropriate use of plants with known toxicity, such as comfrey (Symphytum officinale) and St. John's wort (Hypericum perforatum), which can cause hepatotoxicity and interfere with the action of antidepressants and contraceptives (5). During the activity, students facilitated a discussion group with users, followed by individual consultations to clarify any doubts. The information provided was based on scientific sources, such as the Brazilian Pharmacopoeia, the Anvisa Phytotherapeutic Formulary (2011), and the Micromedex database.

Results

Approximately 60 users participated in the initiative, mostly elderly individuals with chronic diseases and polypharmacy. Forty-two questions were raised regarding the correct preparation of teas, compatibility with medications, and safe duration of use. The most commonly used medicinal plants were for digestive disorders and mild anxiolytics. Instances of inappropriate use were identified in 25% of respondents, including incorrect preparation (excessive boiling time or quantity), concomitant use with potentially interactive medications, and lack of knowledge about contraindications for pregnant women and those with high blood pressure. After the guidance, users demonstrated a greater understanding of the need for caution and seeking professional guidance. Academically, students reported improvements in clinical reasoning, use of accessible language, and recognition of the pharmacist's role as a health educator. The initiative also allowed them to apply theoretical knowledge of pharmacognosy and clinical phytotherapy in a real community context, bringing teaching closer to the reality of the Unified Health System (SUS).

Discussion

The experience demonstrated that health education is a powerful tool for promoting the rational and safe use of medicinal plants and phytotherapeutics. Involving pharmacy students in such initiatives contributes to their clinical, social, and communication skills, in addition to reinforcing the importance of pharmacists in preventing risks associated with the inappropriate use of these products. Strengthening public policies such as the PNPIC (National Health Policy) and increasing the presence of pharmacists on multidisciplinary teams are essential for integrating popular and scientific knowledge, ensuring comprehensive, safe, and culturally sensitive care for the population.

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Keywords

Phytotherapy; Health Education

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Pharmaceutical Intervention In Drug Interaction In An Oncological Patient With Anxiety

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Introduction

Cancer, in addition to its physical implications, represents a significant risk factor for the development or worsening of mental disorders such as anxiety and depression. The literature indicates that up to half of oncology patients experience anxious or depressive symptoms at some point during treatment, negatively influencing therapeutic adherence, pain perception, and quality of life (1,2). In the oncology context, polypharmacy is frequent due to the need for chemotherapy, radiotherapy, adjuvants, and symptomatic medications. This practice increases the likelihood of drug interactions (DIs), which may reduce treatment efficacy, intensify adverse effects, and generate significant risks for the patient (3). In this scenario, the role of the clinical pharmacist is essential, as

the detection and management of interactions can prevent severe complications. Effective communication between the multidisciplinary team, the patient, and the clinical pharmacy ensures greater therapeutic safety and promotes adherence to treatment (4,5). This report describes the case of a young patient diagnosed with tongue cancer undergoing cisplatin-based chemotherapy, who presented symptoms suggestive of a severe drug interaction resulting from the association between fluvoxamine and bromopride, emphasizing the importance of pharmaceutical intervention.

Aim

To demonstrate the effectiveness of pharmaceutical intervention in identifying and resolving a clinically relevant drug interaction in an oncology patient with a previous diagnosis of anxiety.

Methods

This is a single case report conducted at an Oncology Institute in Curitiba, southern Brazil, in 2025. The case concerns a 25-year-old male patient diagnosed with tongue carcinoma, previously submitted to partial glossectomy and left cervical lymph node dissection, who was referred to the clinical oncology service for adjuvant treatment. The established protocol consisted of cisplatin 100 mg/m^2 every 21 days, administered concomitantly with radiotherapy. Cisplatin has a high emetogenic potential (approximately 90% of patients without adequate prophylaxis experience nausea and vomiting) (6), requiring both pre- and post-chemotherapy antiemetic prophylaxis. The supportive prescription included dexamethasone 4 mg orally every 12 hours for 3 days (starting the night before chemotherapy), ondansetron 8 mg orally every 8 hours for 4 days, and bromopride 10 mg orally every 6 hours for 4 days.

The patient had a previous diagnosis of anxiety and was under continuous use of fluvoxamine 100 mg/day, a selective serotonin reuptake inhibitor (SSRI). The institution provides a mobile application for remote patient support. After initial psychological follow-up, the patient was referred to the clinical pharmacy service due to questions regarding the concurrent use of medications.

The contact was made by telephone, during which the patient reported symptoms following the first cisplatin infusion: “mind disconnected,” “no will to live,” and “loss of color in life.” A pharmacotherapeutic assessment of the prescriptions was performed, identifying a risk X interaction—avoid combination (7)—between fluvoxamine and bromopride, characterized by the potential for serotonin syndrome and increased extrapyramidal adverse effects.

Results

Pharmaceutical intervention was performed immediately after identification of the interaction. The pharmacist contacted the attending medical team, reporting the potential risks of the combination. The management adopted included the substitution of bromopride with dimenhydrinate in case of post-chemotherapy nausea, maintenance of ondansetron and dexamethasone as prescribed, clinical monitoring in subsequent applications, and referral for continuous psychological follow-up due to the symptoms reported. As a result, the intervention led to the elimination of a risk X drug interaction, prevention of potential serotonin syndrome, improved adherence to oncologic treatment, and enhanced clinical safety as perceived by the patient and the healthcare team.

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Discussion

This case illustrates how the association of psychotropic agents with antiemetics may represent a significant risk in the oncology setting. Fluvoxamine, by inhibiting cytochrome CYP1A2 and interfering with serotonergic receptors, increases susceptibility to severe interactions, as observed in combination with bromopride (8). Serotonin syndrome, although rare, is potentially life-threatening and is characterized by cognitive changes, autonomic instability, and neuromuscular symptoms (9). The initial symptoms reported by the patient ("mind disconnected," "loss of color in life") could represent early manifestations, justifying the urgency of the intervention.

The clinical pharmacist's role was crucial to patient safety, preventing complications resulting from a severe drug interaction. Moreover, integration with the multidisciplinary team facilitated the prompt adoption of appropriate measures and improvement of the clinical condition. Previous studies have demonstrated that incorporating the pharmacist into the routine review of oncology prescriptions reduces the number of severe interactions, improves adherence, and positively impacts clinical outcomes (10,11). This case reinforces the need for structured clinical pharmacy programs in all oncology services, especially in patients with psychiatric comorbidities.

Keywords

Interação medicamentosa, multiprofissional, farmácia clínica

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Clinical Pharmacist'S Role In Medication Reconciliation In A Hospital Unit: Academic Experience Report

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Introduction

Medication reconciliation is a systematic and structured process designed to ensure the continuity and safety of pharmacotherapy during care transitions, such as admission, transfer, and discharge. During these stages, discrepancies between prescriptions can result in medication errors, adverse events, and prolonged hospital stays. The clinical pharmacist plays a central role in this process by identifying and correcting discrepancies between the patient's previously prescribed medications and current hospital prescriptions, promoting rational and safe medication use (1). Studies show that implementing medication reconciliation significantly reduces the occurrence of adverse events and improves clinical outcomes in hospitals (2). In Brazil, the expansion of pharmacists' clinical activities in hospitals is supported by recent legislation, such as CFF Resolution No. 675/2019, consolidating their role in supervising and guiding the multidisciplinary team and monitoring pharmacotherapy quality indicators (3).

Aim

To report the experience of pharmacy students in carrying out medication reconciliation activities under pharmaceutical supervision in a general hospital, highlighting the clinical and formative impacts of this practice, as well as its contribution to patient safety and multidisciplinary integration.

Methods

The activity took place between March and June 2024 in a 30-bed ward of a general hospital in Recife, Pernambuco, with the participation of four pharmacy students under the direct supervision of clinical pharmacists. The work began with the collection of medication histories through patient interviews and chart reviews, including continuous-use medications, supplements, and herbal remedies. The information was compared with current hospital prescriptions, allowing the identification of unjustified discrepancies, such as omissions, duplications, dose or route changes, and the use of inappropriate medications. When necessary, pharmaceutical interventions were implemented, communicated to the medical team, and recorded on monitoring spreadsheets, monitoring compliance with the recommendations. The students also participated in multidisciplinary meetings with physicians, nurses, and nutritionists, contributing pharmacological guidance to optimize therapy. The analyses were based on institutional protocols, scientific literature, and databases such as UpToDate. The experience reinforced the importance of medication reconciliation as a safety tool in care transitions and highlighted the essential role of the clinical pharmacist on the hospital team.

Results

Forty-eight medication reconciliations were performed involving 37 patients, with a mean age of 62 years. Twenty-nine unintentional discrepancies were identified, the main ones being: omission of continuous-use medications (41.3%), inappropriate dose changes (27.6%), therapeutic duplication (17.2%), and change in administration route (13.9%). The most frequently involved therapeutic classes were antihypertensives, oral hypoglycemic agents, and psychotropics. Of the proposed interventions, 86% were accepted by the medical team, including dose adjustments, substitution with safer alternatives, and readjustment of therapeutic regimens. Among the most relevant cases, we highlight the dose adjustment of enoxaparin in a patient with severe renal failure, preventing the risk of bleeding, and the correction of antihypertensive prescriptions in a polymedicated patient, avoiding therapeutic duplication and potential adverse cardiovascular events. In addition to the impact on healthcare, students reported significant gains in clinical-pharmaceutical reasoning, improved interdisciplinary communication, and greater familiarity with hospital protocols. This practical experience reinforced the importance of integrating theoretical knowledge of applied pharmacology with clinical analysis, focusing on identifying drug interactions and adverse effects of critical medications such as anticoagulants, antimicrobials, and psychotropics.

Discussion

The experience demonstrated that the clinical pharmacist's role in medication reconciliation is essential to promoting patient safety, preventing adverse events, and optimizing pharmacotherapy. The high acceptance rate of the interventions demonstrates the multidisciplinary team's confidence in pharmaceutical work. From an academic perspective, the experience provided students with an opportunity to integrate theory and practice, fostering essential skills for clinical practice, such as critical thinking, decision-making, effective communication, and collaborative work. These results reinforce the need to consolidate the presence of clinical pharmacists in hospitals, not only as safety agents but also as a central element in multidisciplinary care (3).

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Keywords

Intensive Care Units; Drug Utilization

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The Importance Of Clinical Evaluation By Pharmacists In An Intensive Care Unit Of A Philanthropic Hospital: A Report Of The Training Experience Of Pharmacy Students

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Introduction

The Intensive Care Unit (ICU) is a setting designed for the care of critically ill patients, characterized by clinical complexity, high therapeutic burden, and frequent use of potentially dangerous medications. In this setting, the presence of a clinical pharmacist is strategic to ensure the rational use of medications, identify problems related to pharmacotherapy, and prevent adverse events (1). The literature shows that prescribing errors, therapeutic duplication, physicochemical incompatibilities, and drug interactions are frequent in ICUs and can compromise patient safety (2). In Brazil, Resolution No. 675/2019 of the Federal Council of Pharmacy formally recognizes the clinical responsibilities of pharmacists in this setting, reinforcing their responsibility for critically analyzing prescriptions, guiding the multidisciplinary team, and implementing pharmacotherapy quality indicators (3). Therefore, including pharmacy students in supervised practical experiences in the ICU allows not only the consolidation of clinical pharmacology knowledge but also the experience of collaborative work, essential for professional practice.

Aim

To report the perception of Pharmacy students in prescription analysis and pharmacotherapeutic monitoring activities in a general ICU of a philanthropic hospital in Recife-PE, highlighting the assistance and training impact of clinical practice.

Methods

The initiative was developed based on the experience of six pharmacy students, between February and May 2024, under the direct supervision of hospital pharmacist preceptors, in a 20-bed ICU for highly complex medical and surgical patients. The methodological process consisted of daily analysis of medical prescriptions, considering aspects such as dose, frequency, route of administration, dilution, and compatibility, supported by institutional clinical protocols, scientific literature, and specialized databases such as UpToDate®. During this evaluation, medication-related problems (DRPs) were identified and classified into categories such as therapeutic duplication, potential drug interactions, physicochemical incompatibilities, and use of inappropriate drugs. The detected DRPs were communicated to the attending physician through pharmaceutical interventions, duly recorded in indicator monitoring spreadsheets. Furthermore, multidisciplinary discussions with physicians, nurses, and nutritionists were held, enabling pharmacological input into the development of the treatment plan. Finally, indicators were raised regarding the number of prescriptions analyzed, DRPs identified, types of interventions performed and acceptance rate by the team.

Results

During the study period, 61 prescriptions were analyzed, corresponding to approximately 25 hospitalized patients. Nineteen potential DRPs were identified, distributed as follows: therapeutic duplication (two cases, primarily between antihypertensives and anxiolytics), dilution incompatibilities in intravenous therapy (one case, involving antibiotics and parenteral nutrition solutions), use of doses outside the recommended range (four cases), and risk of serious interactions (five cases), especially involving antimicrobials, anticoagulants, and antiarrhythmics. Of the interventions proposed by the pharmacist, 80% were accepted by the medical team, including dose adjustments, substitution of medications with safer alternatives, and readjustment of dilution regimens. For example, a notable case was the substitution of ceftriaxone combined with intravenous calcium in an elderly patient, preventing the risk of fatal precipitation, as widely described in the literature. Another relevant case involved dose adjustment of enoxaparin in a patient with severe renal failure, preventing bleeding. In addition to the healthcare outcomes, the experience had a significant formative impact. Students reported improved clinical reasoning, greater confidence in communicating interventions with doctors and nurses, and familiarity with hospital protocols. The importance of applied clinical pharmacology was also emphasized, providing a practical understanding of the mechanisms of action, interactions, and adverse effects of medications used in intensive care, such as sedatives, antimicrobials, and vasoactive drugs.

Discussion

Experience has shown that the inclusion of pharmacists in the ICU is essential to strengthen patient safety and optimize pharmacotherapy. The high acceptance rate of interventions highlights the recognition of the pharmacists' role by the multidisciplinary team. From an academic perspective, the experience provided students with a unique opportunity to integrate theory and practice, fostering technical and behavioral skills essential to clinical practice, such as critical thinking, decision-making, and effective communication. Thus, this report reinforces the need to expand and consolidate the presence of clinical pharmacists in critical units, not only as patient safety agents but also as a central element in multidisciplinary care (3).

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Keywords

Drug Utilization; Patient Safety

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Preparation Of Informative Material On Hypertension And Pharmaceutical Care For The Elderly

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Introduction

Systemic arterial hypertension is one of the most common diseases among the elderly population. In Brazil, its prevalence among people over 65 years of age was 65.1% in 2023 (1). It is a significant public health problem, as it can lead to cardiovascular, renal, and cerebrovascular complications (1).
The elderly are a particularly sensitive population, as they experience physiological changes resulting from aging that can interfere with the course of diseases and treatments (2). In the case of hypertension, proper adherence to treatment, whether pharmacological or non-pharmacological, is of paramount importance. To achieve this, patients must be well-informed about their health condition and the appropriate management of treatments.
Pharmaceutical care is a model of professional practice in which the pharmacist performs a series of actions and services directed at the patient, family, and community, in an integrated manner with the healthcare team, with the aim of promoting the safe and rational use of medications and achieving the best health outcomes (3). In the context of hypertension in the elderly, this practice is strategic in the treatment process. Through pharmaceutical services, the pharmacist can identify and resolve problems related to pharmacotherapy, provide pharmacotherapeutic monitoring, and provide health guidance and education (4). Therefore, creating an informative material, in the form of a booklet, integrating information about the disease with pharmaceutical care can help promote patient autonomy and enhance the value of the pharmacist.

Aim

To describe the development of an informative material, in the form of a booklet, to provide guidance on hypertension and pharmaceutical care for the elderly population diagnosed with hypertension.

Methods

This is an experience report study. The booklet was developed as one of the products for a pharmacy undergraduate's final project entitled "The role of the pharmacist in care for hypertensive elderly person: a review of the last 5 years." While writing the project, the need for informative material that was engaging and accessible in language that highlighted the role of pharmacists in caring for elderly individuals with hypertension was recognized.
The information included in the booklet was obtained from a literature review conducted during the final project preparation process, which consulted PubMed, the Virtual Health Library, SciELO, and websites of the Brazilian Ministry of Health, the World Health Organization, the Brazilian Society of Cardiology, and the Federal Council of Pharmacy. The chronological framework adopted for the bibliographic survey covered the period from January 2018 to October 2023.

Results

The developed material has 24 pages, 17 of which are textual content and the remaining pages include the cover and pre-textual elements. The booklet was titled: "Guidance booklet for elderly hypertensive patients: pharmaceutical tips." The language was adapted to the booklet's target audience, avoiding technical terms and prioritizing direct sentences. Colorful, educational images were used, with preference given to those that translated or were closely related to the written text. A white background and black font were chosen to create contrast with the text and figures, making it more engaging and enjoyable to read.
The booklet was divided into eight topics in the form of questions, resembling a conversation between the reader and the pharmacist. The topics covered included: "What is blood pressure?" that explains the physiology and function of blood pressure in a simplified manner, with illustrations; "What is hypertension?" defines the concept of the disease and how it is diagnosed; "What are the causes?" addresses the risk factors for the development of hypertension; "What problems can it cause?" informs about the possible complications and consequences of uncontrolled hypertension; "What is the treatment like?" provides guidance on healthy lifestyle habits, physical activity, and the types of pharmacological therapy, whether monotherapy or combination therapy; "How to take care of myself?" provides other information on self-care, such as adherence to treatment, checking blood pressure levels regularly, and managing other comorbidities; "How can a pharmacist help me?" provides information and explains the pharmaceutical services available; and "Final Tips" reviews and reinforces key self-care guidelines.

Discussion

Health education is a fundamental pillar of patient self-care (5,6). The use of adapted language, pictures, and direct sentences is extremely important for people with different levels of health literacy. Accessible language democratizes access to information and can stimulate patients' interest in participating in their own care and

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improve their adherence to treatment (5,6). The use of playful tools, such as booklets, facilitates and aids in the understanding of information, in addition to being a quick and practical source of reference for patients and their caregivers (7).

By providing information about treatment, the booklet reinforces the importance of non-pharmacological therapy, often neglected by hypertensive patients (5). Regarding self-care, the description of measures that older adults can take at home helps empower them, encouraging their autonomy and making them aware that they are capable of managing their own health, something essential in the treatment of chronic diseases such as hypertension (5,6). One of the highlights is the emphasis on the role of pharmacists in caring for elderly individuals with hypertension. Pharmaceutical services are presented in a simple and straightforward manner, with an emphasis on pharmacotherapeutic monitoring, health education, and promoting treatment adherence. The pharmacist is also presented as a support agent for the elderly throughout their treatment. This highlights the importance of increasing the inclusion of these professionals in multidisciplinary healthcare teams, in accordance with current healthcare guidelines (1).

The booklet was developed following formatting and content presentation guidelines from specialized literature (8), enabling the creation of educational and easy-to-understand information material adapted for laypeople. This experience highlights the importance of developing initiatives and projects that bring the community closer to scientific knowledge, especially in the healthcare field. It is hoped that the material developed will contribute to improving the quality of life and self-care of elderly individuals with hypertension and to the appreciation of pharmaceutical care as a healthcare tool.

Keywords

Pharmaceutical care; Hypertension; Elderly

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Contributions Of Clinical Pharmacists To Health Education And The Promotion Of Neonatal Care

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Introduction

The role of clinical pharmacists has expanded significantly in Brazilian hospitals, crossing boundaries that were once occupied exclusively by other professional categories. Resolution No. 654/2018 of the Federal Pharmacy Council formally recognizes and regulates the participation of pharmacists in the administration of immunobiologicals, thereby broadening their involvement in immunization programs (1). This expansion represents a major step forward in both the comprehensiveness of care and the quality of health services. Within the hospital setting—particularly in maternity wards and neonatal units—the participation of clinical pharmacists in newborn immunization has emerged as a key strategy to strengthen vaccine chain safety, optimize processes, and promote educational activities for families (2). The integration of pharmacists into neonatal immunization programs offers an opportunity to enhance service quality and safety while also contributing to the training of professionals committed to comprehensive care and the promotion of health education, with a focus on maintaining continuity of the vaccination schedule (3).

Aim

This study aims to report the experience of a resident clinical pharmacist in neonatal immunization, emphasizing technical and educational responsibilities in the vaccination of newborns at a university hospital in the Midwest region of Brazil.Report on the experience of a resident clinical pharmacist in neonatal immunization, highlighting their technical and educational responsibilities in the vaccination of newborns at a university hospital in Mato Grosso do Sul.

Methods

This experience report was developed within the scope of the Single-Profession Residency in Clinical Pharmacy at a university hospital in the Midwest region of Brazil during May 2025. The resident pharmacist joined the maternity ward immunization team, actively participating in the vaccination of newborns, with a focus on the BCG and Hepatitis B vaccines administered within the first 24 hours of life. The activities performed included: clinical screening of newborns to identify temporary contraindications; verifying vaccine indication and expiration; monitoring storage conditions (cold chain); preparing and administering vaccines in accordance with institutional protocols; and documenting all procedures in both medical records and the national immunization information system. Families also received individualized counseling on the vaccination schedule, potential adverse reactions, and post-vaccination care, supported by printed educational materials. Observations were systematically recorded in a field diary and later subjected to descriptive analysis of the activities and their perceived impacts.

Results

During the observation period, the resident pharmacist was directly involved in the screening and vaccination of 53 newborns admitted to the HU-UFGD maternity ward. All vaccine doses were administered following clinical verification, assessment of storage conditions, and inspection of vial integrity. Two cases of temporary postponement of the BCG vaccine were identified due to fever and mild respiratory disorders. Educational guidelines were well received by families, with 53 information leaflets—written in accessible language and supported by visual aids—distributed. The main concerns expressed by parents and guardians related to injection-site pain, the possibility of fever, and the continuation of vaccination at primary health care units. No serious adverse reactions were observed during the observation period. Improvements were noted in documentation flow and in the integration of the health care team throughout the vaccination process, with increased recognition of the role of clinical pharmacy (4).

Discussion

he inclusion of resident clinical pharmacists in the neonatal immunization process proved effective from both technical and educational perspectives. Prior assessment of the clinical conditions of newborns enhanced the safety of vaccine administration, reducing the risk of adverse events and promoting individualized care (3). Collaboration with the nursing team was strengthened by the pharmacist's presence, supporting adherence to protocols and ensuring strict control of the cold chain—an essential factor in maintaining the efficacy of immunobiologicals (4).

The pharmacist's role as a health educator was also significant. The preparation and distribution of informational materials to families contributed to adherence to the vaccination schedule and reinforced trust in the health system. In the context of increasing vaccine hesitancy, educational interventions delivered by qualified professionals play a strategic role in fostering a culture of prevention (5).

The importance of immunobiological traceability should also be emphasized, as accurate documentation of administered vaccines is fundamental for both epidemiological surveillance and patient safety (6). Overall, this experience demonstrates how integrating pharmacists into neonatal immunization programs can enhance the

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quality and humanization of health care, underscoring the need to expand and encourage this practice in other settings.

Keywords

Pharmaceutical Services, Health Education, Immunization

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Clinical Pharmacist'S Role In Diabetic Foot Assessment: A Case Report

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Introduction

Foot complications in people with diabetes are a major cause of pain, infection, hospitalization, and amputation, with significant clinical and financial impact on healthcare systems. International and national guidelines recommend periodic screening for peripheral neuropathy and structured foot assessments: in type 1 diabetes (T1D), starting after 5 years of disease duration, and in type 2 diabetes (T2D), from diagnosis (1). In Brazil, the Guidelines of the Brazilian Society of Angiology and Vascular Surgery synthesize preventive measures, diagnosis, and follow-up, reinforcing a multiprofessional approach and patient education (2).

In this context, the clinical pharmacist plays a strategic role by identifying risk factors, promoting self-care education, optimizing therapies, and providing early referrals when necessary. Reviews and clinical trials demonstrate that pharmacist-led interventions improve adherence, metabolic control, and outcomes, including markers predictive of foot complications (3,4).

Although international and national guidelines emphasize the need for regular foot assessment in individuals with T1D after five years of diagnosis, there is still a scarcity of publications describing, in real-world practice, the pharmacist's role in this process. Particularly among young adults, often perceived as low-risk, the lack of detailed reports on structured pharmacist-led screening limits the visibility of their contribution to early detection of modifiable factors and prevention of complications. This case report aims to address this gap by providing evidence on the applicability and relevance of such practice in the Brazilian context.

Aim

To report the experience of pharmacotherapeutic follow-up with emphasis on diabetic foot assessment in a patient with T1D, highlighting the clinical pharmacist's role in early risk detection and patient self-care education.

Methods

This case report was developed within the extension project Clínica Farmacêutica – Pharmacotherapeutic follow-up of patients with systemic arterial hypertension and diabetes mellitus, in João Pessoa, Brazil. The patient in this study was a 21-year-old male diagnosed with T1D at age 15, with seven years of disease progression, using insulin glargine as basal therapy and insulin lispro as bolus.

The diabetic foot assessment was conducted during an individualized pharmaceutical consultation, using a structured form covering clinical history, self-reported symptoms, and segmented physical examination. Investigated items included history of ulcers, amputations or revascularization, smoking status, and neuropathic symptoms. The dermatological exam assessed nail changes, fissures, calluses, maceration, and signs of fungal infection. The musculoskeletal exam evaluated deformities and joint mobility, while the neurological exam measured protective sensation using the Ipswich Touch Test. The vascular exam included palpation of dorsalis pedis and posterior tibial pulses, as well as assessment of skin temperature and hair distribution.

Results

The patient reported no pain, burning sensation, paresthesia, or history of ulcers/amputations and was a non-smoker. Neurological examination indicated preserved sensation on the Ipswich Touch Test. Vascular assessment revealed palpable dorsalis pedis and posterior tibial pulses bilaterally, with no thermal asymmetry or hair loss. No fissures, hyperkeratosis, deformities, or mobility changes were detected. The only finding was an interdigital fungal infection (maceration and scaling between toes), associated with irregular use of topical miconazole and inadequate drying of interdigital spaces after bathing.

Based on these findings, the patient was classified as low risk for ulceration (absence of loss of protective sensation and ischemia), but with a modifiable factor (dermatomycosis and moisture) that could precede fissures and infection entry points. The pharmaceutical intervention focused on adherence to antifungal therapy, proper application technique, thorough drying of the feet, and daily self-care practices, including toenail care. The patient

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understood the guidance provided and agreed with the therapeutic plan. All information was documented in a standardized record, and follow-up appointments were scheduled.

Discussion

This case confirms the relevance of initiating annual foot screening in T1D patients with ≥5 years of disease, even in young adults, in accordance with the Standards of Care in Diabetes – 2025 from the ADA (1). The Brazilian Guidelines of 2023/2024 emphasize prevention, regular inspection, management of interdigital fungal infections, and patient education as low-cost, high-value measures to prevent ulcerations (2). Trials and reviews demonstrate that pharmacist-led interventions improve knowledge, adherence, and risk predictors; in a quasi-experimental study with the DMTAC adherence program, there was significant improvement in diabetic foot predictors and HbA1c reduction in the pharmacist-counseled group (3). A systematic review showed consistent effects of pharmacist-led educational strategies and support materials on adherence and clinical measures of diabetes (4).

Thus, this report describes, in a real-world care setting, a structured pharmacist-led foot evaluation protocol in a T1D patient, integrating a minor dermatological finding with immediate educational action and a follow-up plan. The case illustrates how clinical communication, structured documentation, and reinforcement of medication technique can transform a minor finding into a prevention opportunity. Considering the high economic burden of diabetic foot disease in Brazil's public health system (5), screening and educational practices during pharmaceutical consultations can generate cumulative clinical and economic benefits.

Systematic pharmaceutical involvement in foot screening, focusing on modifiable factors (moisture, fungal infections, footwear, toenail care, adherence to topical agents), aligns with guideline recommendations and enhances the team's ability to prevent ulcers and infections, particularly in patients who, although asymptomatic, already meet the criteria for regular assessment (1,2).

Keywords

Diabetic Foot; Pharmaceutical Care; Diabetes

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Promoting Rational Use And Conscious Disposal Of Medicines: The Pharmacist's Role In Primary Health Care And Public Health

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Introduction

The consumption of medicines in Brazil has consistently increased, following the expansion of healthcare access, the growth of public programs, and the significant presence of pharmacies and drugstores — making the country the largest pharmaceutical market in Latin America (1). In 2024, the Brazilian pharmaceutical market reached approximately R$160.7 billion in revenue, with about 6.07 billion packages sold, according to data from the Statistical Yearbook of the Pharmaceutical Market of the Chamber for the Regulation of the Pharmaceutical Market (CMED) (21). This growth accentuates the challenge of managing and properly disposing of pharmaceutical waste, particularly when inappropriate disposal occurs in sewage systems or common garbage. Such practices

may introduce resistant pharmacological residues into soil, rivers, and aquatic ecosystems, posing risks to the environment and human health (2,3,20).
ANVISA's RDC No. 222/2018 classifies pharmaceutical waste as hazardous and defines its management within the framework of Good Practices for Health Service Waste (4). This regulation is aligned with the National Solid Waste Policy (Law No. 12.305/2010), which promotes sustainable consumption. Reverse logistics, regulated by Decree No. 10.388/2020, enables the return of expired or unused products (10). In João Pessoa, Law No. 14.730/2023 reinforces the responsibility of consumers and companies in final disposal (11).
The increasing consumption of medicines in Brazil and the frequent improper management of pharmaceuticals contribute to intoxications, bacterial resistance, waste of resources, and clinical, social, and environmental risks, turning this issue into a public health challenge (5,6,7). In this context, educational actions, discussion groups, installation of collection points, guidance during dispensing, and development of informational materials are essential strategies to promote rational use, conscious disposal, and sustainability (8,9,12).

Aim

To report the educational and clinical strategies implemented by the extension project entitled "Conscious Storage and Disposal of Medicines in the Municipality of João Pessoa – Descarta CIM" in Family Health Units (FHUs), highlighting actions aimed at promoting the rational use of medicines, the proper disposal of pharmaceutical and healthcare waste, and the role of the clinical pharmacist in primary care.

Methods

The methodological framework consists of an experience report from the extension project of the Federal University of Paraíba (UFPB), carried out between 2024 and 2025 in Family Health Units (FHUs) of João Pessoa, PB. The activities were developed by Pharmacy students, under faculty supervision, focusing on the rational use of medicines and conscious disposal, integrating the implementation of collection points and health education actions into the practice of clinical pharmacy (13,14).
The project plan involved the implementation of the campaign "Bring it back", which aimed to install medicine containers in FHUs, where responsible pharmacists would carry out clinical counseling activities on the importance of proper disposal of such waste to prevent intoxications and environmental impacts, in addition to providing continuous care at the time of dispensing (5,6,15).
In this sense, clinical interventions involved direct contact with users during educational activities and campaigns, enabling individualized guidance on therapeutic adherence, self-medication, drug interactions, storage, and risks associated with the consumption of expired medicines (16,17). At the same time, students acted as mediators in identifying frequent population doubts and in adapting technical language to ensure accessible and effective communication with the community (18).
In addition, informative materials were produced, both printed and digital, with an emphasis on educational actions about the rational use of antimicrobials, guidance on reverse logistics, the importance of proper disposal of NSAIDs and glucocorticoids, and sharps waste. These strategies were complemented by debates and visits to educational institutions, creating spaces for dialogue and awareness among different audiences (7,8,12).

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Results

The project enabled the implementation of three fixed medicine collection points in Family Health Units (FHUs) of João Pessoa, located in the neighborhoods of Bancários (USF Eucalipto), Manaíra (USF São José), and Altiplano (USF Integrada). Over the course of one and a half years of execution, significant engagement was observed among the pharmacists working in the FHUs, who assumed responsibility for supervising the containers and providing clinical and educational guidance to the population (4,5,19).
The actions included individualized consultations and informative campaigns addressing topics such as the rational use of medicines, risks of self-medication, and proper disposal of pharmaceutical products. In parallel, digital materials, leaflets, and banners were created and disseminated, expanding the spread of information both within the health units and through social media, thus enhancing community outreach (13,14,18). These results demonstrate that the integration of clinical activities, educational actions, and communication strategies contributed to raising public awareness regarding rational use and conscious disposal, while also strengthening the role of the pharmacist as an agent of health promotion, sustainability, and social responsibility (6,9,12,21).

Discussion

The activities aimed to promote the rational use of medicines and the conscious disposal of pharmaceutical waste, highlighting the relationship between public health and the environment (2,3,20).
Students, guided by faculty, participated in educational activities in Family Health Units (FHUs), providing guidance on proper storage, risks associated with the use of expired or unused medicines, and the importance of appropriate disposal of these products (7,8,15). At the same time, medicine collection points were implemented under the supervision of pharmacists to ensure environmentally safe disposal (5,6).
The actions carried out in FHUs made it possible to provide individualized counseling, including clarifications on proper storage, risks of consuming expired or unused medicines, self-medication, drug interactions, and the importance of environmentally appropriate disposal of packaging (9,13,14). These activities reinforce the principles of clinical pharmacy and raise community awareness about public health, sustainability, and pharmaceutical care (12,18).
In addition to in-person activities, digital informational materials, posts, and banners expanded public awareness and promoted good disposal practices (16,17). The project had an impact on academic training, allowing students to develop clinical competencies such as health communication, individualized counseling, and the promotion of rational medicine use. Furthermore, extension participants acquired an ethical and humanitarian perspective on the role of the pharmacist as an agent of social transformation, capable of integrating technical knowledge, environmental responsibility, and positive impact on the community (19,20).
In summary, the Descarta CIM project demonstrates that the role of the clinical pharmacist goes beyond patient-centered care, encompassing educational and outreach strategies capable of influencing behaviors, reducing risks to health and the environment, and promoting sustainable changes in the community (2,3,12,20,21).

Keywords

Medicine disposal;Health education;Primary health care;

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Opioid Safety And The Use Of Technology: Monitoring Through Dashboards In A University Hospital

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Introduction

The opioid crisis in the United States, marked by the significant rise in prescriptions, dependency, diversion, and thousands of overdose-related deaths in recent decades, has become a global warning about the risks associated with the inappropriate use of this class of medication (1,2). Although the Brazilian scenario is distinct, hospitals face similar challenges: the need for adequate pain management while preventing the misuse, adverse events, and diversion of opioids. In this context, monitoring the entire chain—from prescription to dispensing and administration—is essential to guarantee patient safety and institutional integrity (3,4). Technologies such as automated dispensing cabinets (ADCs) offer features that ensure controlled dispensing and secure access to opioids, including professional biometric identification, video recording, storage in restricted compartments, blind

inventory counts, and traceability of medication movements (5,6). The vast volume of data generated poses a challenge to developing analytical tools that can transform this data into strategic information for clinical and managerial decision-making (5,7).

Aim

To describe the construction and implementation of dashboards based on data from automated dispensing cabinets (ADCs), focusing on opioid stock movements—withdrawals, cancellations, administration, and returns in a university hospital—with the goal of identifying inconsistencies, atypical behaviors, and potential diversions early.

Methods

This was a methodological study for the development of a monitoring tool, conducted from March to September 2025 at a public, university-affiliated, high-complexity hospital in Porto Alegre, RS, Brazil. Structured data was extracted from the hospital management system AGHUse® and the management system for the 25 installed automated dispensing cabinets (Pyxis Enterprise Server®). The consolidated database included variables related to medication prescription, dispensing (station, quantity, traceability tag, and person responsible for withdrawal), administration (patient administered, type of check, and executing professional), and return (to the pharmacy). The unitization of controlled medications with unique sequential tags was a central element that enabled the traceability and reconstruction of the complete path of each dispensed opioid. Key indicators were defined from this data, including: withdrawal profile, cancellation pattern, and electronic checking performance, stratified globally (entire hospital), by unit, medication, or period. Data modeling and transformation were performed in a relational database (PostgreSQL®), and the dashboards were built on the Apache Superset® platform, an open-source business intelligence software, which allowed the creation of dynamic visualizations, interactive filters, and alerts for atypical patterns in ADC utilization and checking procedures. Institutional authorization was obtained for the dissemination of results.

Results

Three main dashboards were developed for monitoring opioid movements: withdrawals from automated dispensing cabinets, cancellations, and opioid checking. Upon tool implementation, the following initial findings were observed: 6.26% (n=768) of withdrawals made from the ADCs had no corresponding administration record, 1.5% (n=190) of cases were checked for a patient different from the one for whom the medication was withdrawn, and the return rate was 2.5% (n=316). The average time between withdrawal and administration was 15.23 minutes, with variation among units—those without bedside checking showed a greater discrepancy in follow-up, with administration records preceding the withdrawal from the dispensing cabinet. Units that did not implement bedside checking demonstrated lower assertiveness in these records, indicating flaws in the process. Analyses of the cancellation and withdrawal dashboards showed statistically significant variations between opioid types, user groups, and care units, indicating fragilities in dispensing, inappropriate use of technology, and security barrier breaches.

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Discussion

The use of interactive dashboards for opioid monitoring in a hospital setting proved to be an effective strategy for identifying fragilities in prescription, dispensing, and administration processes. The results of this study—including 6.26% of units without an administration record, 1.5% of checks on the incorrect patient, and a return rate of 2.5%—highlight significant safety gaps. These indicators, traditionally difficult to access in health information systems, become visible and traceable through data integration and analytical visualizations, allowing for systematic and evidence-based monitoring. The rates of unrecorded administration suggest potential risks of diversion, documentation failure, or misuse. Previous studies demonstrate that similar gaps are associated with a higher probability of adverse events and medication errors, reinforcing the importance of complete traceability in the medication cycle (8). The finding of administrations recorded for a patient different from the initial recipient from the ADC represents a critical failure, given that patient errors are considered high-risk in care practices and are directly associated with sentinel events (7,9). Another relevant point relates to performance differences between units with and without bedside checking. National literature already describes the implementation of bedside checking as an effective safety barrier in preventing administration errors and ensuring individualized traceability (10). In this study, the absence of this technology in some units correlated with lower assertiveness in documentation, corroborating its relevance as a risk mitigation tool. The analysis of the average time between withdrawal and administration adds an occupational and systemic risk perspective: prolonged intervals between process steps can increase the chance of loss, inappropriate use, or incomplete documentation—critical aspects for high-potential-for-abuse medications like opioids. Similarly, the significant variation in cancellations by medication and unit reinforces the need for institutional training, as repetitive cancellations may indicate inappropriate use of the technology and breaches of security barriers. Additionally, comparing users relative to peers in the same unit proved to be a strategic tool for the early detection of atypical behaviors, enabling individualized interventions. Finally, the relevance of the unique sequential tag for the robustness and validity of the data is highlighted, enabling the reconstruction of the medication's trajectory from dispensing to administration and the practical application of the dashboards.

The development and implementation of dashboards for the active and continuous monitoring of opioid use represent a significant contribution to clinical and occupational safety. These tools transcend simple data collection, establishing themselves as a pillar for evidence-based quality management and proactive decision-making. By transforming complex and dispersed data into intuitive and actionable visualizations, the dashboard made it possible to equip multidisciplinary teams to quickly identify risk situations, evaluate the impact of their interventions, and promote a culture of safety.

Keywords

Opioids; Health Informatics; Patient Safety;

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Medication Organizers And Systematic Follow-Up: Pharmaceutical Consultation Strategies To Improve Pharmacotherapy Adherence In Primary Care

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Introduction

Pharmaceutical Care is a patient-centered clinical practice model comprising actions aimed at health promotion, protection, and recovery. Through services such as pharmacotherapy review and systematic follow-up, the clinical pharmacist seeks to ensure the rational use of medicines, prevent and resolve drug-related problems, strengthen the bond with the user, and promote their shared responsibility (1, 2). Thus, this practice contributes to the control of chronic diseases, the reduction of morbimortality, and the improvement of patients' quality of life.
However, the inappropriate use of medications, marked by self-medication, adherence failures, adverse reactions, and interactions, remains a serious public health problem, leading to high rates of avoidable hospital admissions (3). This scenario highlights the urgent need to better reorganize and manage drug therapies in health services.
In this context, pharmacotherapeutic follow-up emerges as an essential tool to ensure that patients use their medications safely, effectively, and continuously. Evidence shows that pharmaceutical consultation contributes to improving therapeutic adherence, reducing hospitalizations, and optimizing public system resources (3). Pharmaceutical consultation, as a complex clinical activity, employs structured methodologies to achieve these goals.
Despite legislative advances recognizing the clinical role of pharmacists in Brazil, their full integration into Primary Care still faces challenges, such as unit infrastructure and the need for greater recognition of this practice by the team and managers (3).
Therefore, the implementation of pharmacotherapeutic follow-up services in Primary Health Care Units establishes itself as an innovative and high-impact strategy for the quality of care.

Aim

To report the experience of the pharmaceutical consultation service in a Primary Health Care Unit in the municipality of Três Lagoas (MS), highlighting the strategies used, patient selection criteria, obtained results, and the relevance of the pharmacist's clinical role in comprehensive care and the promotion of rational drug use.

Methods

This is an experience report on the pharmaceutical clinical practice developed between June 2024 and June 2025 in a Primary Health Care Unit in Três Lagoas (MS). Consultations were conducted in a private room, ensuring confidentiality and an adequate environment for pharmaceutical appointments. Patient access to the service occurred through prior scheduling, referrals from the multidisciplinary team, or spontaneous demand identified during medication dispensing at the pharmacy counter or upon patient request.
Inclusion criteria were established based on advanced age, polypharmacy, the presence of two or more chronic diseases, recent hospitalization history, difficulties with pharmacotherapy adherence, doubts about medication use, and prescriptions from multiple healthcare professionals.
During the consultations, a structured pharmacotherapeutic follow-up methodology, based on the Dáder method, was followed, assessing four main dimensions: necessity, effectiveness, safety, and adherence. Each consultation was recorded in the unit's electronic medical record, enabling the integration of information with other health team members.
As an additional strategy to improve adherence, the delivery of medication organizers, made from recycled materials by the pharmacy team, was developed and implemented. These devices were delivered during pharmaceutical consultations, accompanied by a detailed pharmacotherapy review and patient counseling. Users were asked to return monthly with the organizer, allowing for the reorganization of medications together with the pharmacist at the time of dispensing, strengthening the bond, and promoting health education.

Results

From June 2024 to June 2025, 762 documented pharmaceutical consultations were conducted and recorded in the patient's electronic medical record. The significant volume of appointments demonstrates the service's consolidation, the pharmacist's integration into the multidisciplinary team, and the high patient demand for this type of care.
The clinical inclusion criteria enabled the selection of more vulnerable users, notably polymedicated elderly individuals and those with chronic diseases such as hypertension, diabetes, and dyslipidemia. Among the main identified drug-related problems, adherence issues, therapeutic duplication, incorrect dosages, potential interactions, and frequent doubts related to the use of continuous medications stood out.
The delivery of medication organizers represented a strategic tool to overcome adherence barriers. Patients reported greater autonomy, a better understanding of the therapeutic regimen, and a reduction in forgotten doses. The monthly reorganization, carried out jointly with the pharmacist during dispensing at the pharmacy, provided constant pharmacotherapy review and an opportunity for reinforcing educational guidance.
Active listening during the consultations allowed for a closer relationship between patient and professional,

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strengthening bonds and contributing to the humanization of care. User reports highlighted increased trust in the health team, improved quality of life, and greater commitment to treatment.

Discussion

The observed results demonstrate that the integration of pharmaceutical consultation into the daily routine of the Primary Health Care Unit is feasible, effective, and aligned with national health policies. The high number of appointments conducted in one year confirms the pent-up demand for this type of service and the positive impact of the pharmacist's clinical practice.

The profile of the attended patients reflects priority groups in terms of the risk of drug-related problems, such as the elderly with polypharmacy. This population requires differentiated attention, as they are more susceptible to adverse events, therapeutic failures, and adherence difficulties. The systematic follow-up conducted by the pharmacist proved essential to prevent complications and optimize the safe use of medications.

The strategy of the medication organizer, made sustainably from recycled materials, proved to be a simple, low-cost, and high-impact intervention for therapeutic adherence. This practice not only assisted in organizing the drug regimen but also stimulated patient shared responsibility in the care process.

Another relevant aspect was the recording of all consultations in the electronic medical record, which expanded multiprofessional integration, favored communication among health team members, and ensured greater visibility for the pharmaceutical work. The systematization of information contributed to the longitudinal monitoring of the patient and strengthened the evaluation of clinical outcomes.

Considering adherence difficulties arising from polypharmacy, interactions, and adverse events, the consultation enables the identification of drug-related problems and the proposal of interventions, contributing to the improvement of users' quality of life through clinical pharmacy in articulation with the multidisciplinary team (3).

Despite the progress achieved, the service still faces institutional challenges, such as the need for greater formal recognition of the pharmaceutical consultation in official registration systems and the expansion of human and structural resources to expand follow-up coverage. Cultural barriers that associate the pharmacist only with the dispensing process persist, limiting the full utilization of their clinical capacity.

In summary, the described experience reaffirms that the presence of the clinical pharmacist in primary care is essential to promote the rational use of medicines, reduce risks, increase therapeutic adherence, and strengthen patient safety. The results demonstrate that pharmacotherapeutic follow-up is an effective, sustainable, and essential clinical practice for consolidating the pharmacist's role in the Brazilian Unified Health System (SUS), with significant gains in adherence, therapeutic organization, and strengthening of the patient-provider bond. Its consolidation, however, depends on the strengthening of public policies, the sensitization of managers, and the continuous engagement of health teams.

Keywords

Clinical Pharmacist; Primary Care; Treatment

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Development Of A Posology Calendar For Marevan® As Asafety Strategy In The Use Of Oral Anticoagulants In Acardiology Hospital

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Introduction

The use of vitamin K antagonist oral anticoagulants, such as warfarin sodium (Marevan®), remains effective in the management of high-risk cardiovascular conditions like atrial fibrillation, valvular heart disease, and prophylaxis of thromboembolic events in patients undergoing mechanical valve replacement (1). Despite its efficacy, warfarin requires individualized therapy due to its narrow therapeutic index and potential adverse effects, such as an increased risk of bleeding. This necessitates rigorous monitoring of the International Normalized Ratio (INR) to ensure effectiveness and reduce hemorrhagic or thrombotic complications (2). The complexity of the therapeutic regimen, marked by frequent dose adjustments and vulnerability to multiple drug and

food interactions, especially with foods rich in vitamin K, poses a challenge to patient awareness regarding adherence and treatment safety (3).Evidence indicates that failures in this process contribute to INR instability, increased morbidity and mortality, and the consequent burden on healthcare services (4). In this context, the role of the clinical pharmacist is strategic, involving
pharmacotherapy monitoring, health education, and the implementation of tools that promote patient commitment to self-care. Pharmacist-led educational interventions have demonstrated a positive impact on adherence, INR stability, and the reduction of adverse events, establishing themselves as low-cost measures with high potential for optimizing anticoagulant therapy management (5).

Aim

To report the application of a Marevan® posology calendar, developed by resident pharmacists, as a patient support tool and a safety strategy in the use of warfarin in a cardiology hospital.

Methods

This is a descriptive study, specifically an experience report, conducted in the cardiology ward of a philanthropic hospital in João Pessoa-PB, from January 2024 to December 2024. The study included adult patients using warfarin (Marevan®) during hospitalization, who required dose adjustments monitored by INR. The intervention consisted of the development and application of an individualized posology calendar, created by resident pharmacists from the Multiprofessional Health Residency. The calendar contained the prescribed daily doses, the equivalent number of tablets, space for recording INR, and observations, serving as an easy-to-interpret visual guide. The material was presented to the patient and reviewed daily by the residents in conjunction with
the multiprofessional team. Information was collected during clinical follow-ups conducted by the resident pharmacists, considering the patients' use of the posology calendar and their spontaneous feedback related to the understanding of the dosage, perceived safety, doubts, and autonomy in the use of warfarin.

Results

During the analyzed period, 23 patients on Marevan® therapy received the individualized posology calendar. The intervention resulted in positive observations reported during clinical follow-ups. Patients highlighted greater ease in following the prescribed dosage, especially in cases where dose
adjustments were complex. The calendar acted as a clear visual guide, contributing to the reduction of difficulties, anxiety, and doubts related to the treatment. Furthermore, it promoted greater safety and autonomy, as patients appeared more confident and empowered to proactively manage the use of the medication. The received feedback reinforced the utility of the calendar as an effective visual reminder, strengthening adherence to anticoagulant therapy and favoring communication between the patient and the healthcare team.

Discussion

The application of the posology calendar proved to be a practical and effective tool, consistent with the literature that highlights the importance of health education and patient involvement in care (3,5). These visual calendars simplify the Marevan® dosing regimen, which can vary daily, providing a clear, daily representation of the dose to

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be administered, thereby reducing errors and increasing treatment safety (6). Moreover, it is an effective communication tool, bringing safety to pharmacotherapy within the multiprofessional team context. It becomes an accessible record shared by all professionals and family members involved in patient care, thereby strengthening the continuity of care and risk management. In situations of adverse events or INR instability, the clarity of the posology history recorded in the calendar allows the team to identify possible adherence failures or administration errors as causal factors. The calendar not only facilitates the understanding of the cause but also optimizes case discussions and aids clinical decision-making in a safer and more evidencebased manner, reinforcing the value of integrated pharmaceutical care in patient safety. The results observed in this experience, such as the improvement in treatment understanding and the perception of safety, corroborate broader studies showing that pharmacist-led interventions promote greater adherence, reduce adverse events, and optimize pharmacotherapy, reinforcing the pharmacist's role in promoting the rational use of anticoagulants (3, 5). Thus, the findings reinforce the positive impact of simple educational materials in clinical pharmacy practice, especially in high-risk therapies such as oral anticoagulation. The experience suggests that individualized educational strategies are viable, financially low-cost, and potentially effective for optimizing the safety and quality of pharmacotherapeutic care (6).

Keywords

Clinical Pharmacy; Oral Anticoagulant; Safety.

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Role Of The Resident Pharmacist In Preventing Medication Errors In The Inpatient Unit: An Experience Report

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Introduction

Adverse drug events are a significant topic in patient safety, as medication errors are recognized as an international concern. Early interventions and careful monitoring can serve as barriers to their occurrence. Within this context, pharmacists are capable of identifying and preventing drug-related risks, such as concentration, physicochemical compatibility, drug interactions, dosage, pharmaceutical form, administration route and administration schedules. Thus, resident pharmacists, in their clinical practice, must develop these skills, contributing to patient safety. From this perspective, the aim of this study is to describe the experience of resident

pharmacists in the inpatient unit of a hospital in Alagoas, with emphasis on strategies adopted for the prevention of medication errors.

Aim

The present work aims to describe the experience of resident pharmacists regarding the prevention of medication errors in an inpatient unit.

Methods

This study is an experience report developed by resident pharmacists between March and July 2025, within the inpatient care context of a hospital unit. The activity focused on monitoring the clinical pharmacist's role, emphasizing patient health status assessment, critical analysis of medical prescriptions and pharmacotherapy review, aiming to prevent errors across different stages of the care process. The process began with the systematic analysis of medical prescriptions, an essential step for identifying potential inadequacies such as incorrect dosages, incompatible administration schedules, inappropriate treatment duration, therapeutic duplications, and potential drug interactions. When identified, pharmaceutical interventions were discussed and communicated directly to the prescriber, with the purpose of promoting the safety and efficacy of drug therapy. After validation of the prescription, medications were separated and dispensed to the nursing team. Subsequently, the administration of medications was monitored to ensure it occurred correctly, safely, and in accordance with the validated prescription, thereby minimizing risks and contributing to the continuity and quality of patient care.

Results

In the inpatient unit, a diversity of patients was observed, classified by age group: pediatric, adult, and elderly and by clinical condition, such as trauma and chronic diseases. Through the routine analysis of prescriptions, it was possible to identify several issues, including dosage inadequacies, drug interactions, therapeutic duplications, and incompatibility of administration schedules. In the analysis of laboratory tests, some patients were found to have reduced glomerular filtration rates, as determined by creatinine clearance calculation. During the monitoring of dispensing and administration, some errors related to drug preparation and dilution were identified, particularly with antibiotics.

Discussion

Based on the results obtained, the relevance of the clinical pharmacist within the hospital context becomes evident, as inconsistencies found in prescriptions reinforce the potential risk of failures in the care process. The identification of inadequacies related to dosage, drug interactions and therapeutic duplications is consistent with findings in the literature, which highlight these issues as recurrent causes of adverse events in hospitalized patients (2).

The application of glomerular filtration rate (GFR) calculation is an effective strategy to ensure safer dose adjustments, particularly in patients with impaired renal function. This practice reinforces individualized dosing and prevents overdose-related toxicity, especially in the use of antibiotics and anticoagulants.

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Important particularities were also observed, such as the follow-up of patients transferred from the ICU, who frequently require nasoenteral tubes. These cases demand special attention regarding the dilution of solid medications and the risk of tube obstruction. Thus, the practical experience of the multidisciplinary residency provides valuable opportunities for continuous learning, contributes to error prevention, and promotes the development of more prepared and skilled professionals. It is worth emphasizing that this experience was enriched by the constant support of tutors and preceptors, who assisted in daily clinical decision-making. Finally, resident pharmacists play an essential role in identifying and preventing errors, as they maintain direct and frequent contact with patients and with the various contexts of care.

Keywords

Medication Errors; Pharmaceutical Care.

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Enhancement Of Medication Reconciliation Skills Through Realistic Simulation

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Introduction

Medication reconciliation identifies and assists in resolving medication-related problems among patients' pharmacotherapy throughout care transitions (1). A multidisciplinary team approach to medication reconciliation that includes physicians, pharmacists, and nurses is recommended, especially the pharmaceutical practice that seeks to interview the patient in order to identify discrepancies between past and current pharmacotherapies (2). In this context, realistic health simulation is a pedagogical strategy for improving clinical practice, with the aim of developing fundamental skills for patient-centered care and achieving the objectives and results proposed in this learning and improvement process (3).

Aim

To evaluate the effectiveness of using realistic simulation in developing and improving the practical skills of clinical resident pharmacists in medication reconciliation.

Methods

This is a teaching-learning activity based on realistic simulation, carried out in the pharmacists' room with first-year (R1) and second-year (R2) pharmacy residents specializing in onco-hematology (OH), transplantation (TX), and intensive care unit (ICU) at a university hospital. The realistic simulation was designed by two pharmacy preceptors (OH/TX) who planned the activity, focusing on the central objective of "how to conduct a pharmaceutical anamnesis," and developed three clinical scenarios inspired by real situations. Before the activity, the TX preceptor gave a brief lecture to the R1 residents, addressing the concepts of medication reconciliation and clarifying doubts, while the OH preceptor instructed the R2 residents on how to conduct the simulation with their groups. Subsequently, the simulation activities were structured in four stages: briefing, realistic simulation, debriefing, feedback and evaluation. The initial briefing was conducted by the pair of preceptors, followed by the division of participants into three groups, each responsible for staging a clinical situation for 10 minutes. After the activity, there was a debriefing (structured post-simulation discussion with the actors and their impressions) and feedback from the evaluators. A questionnaire with five questions (answered with "yes" or "no") about the benefits of this activity was given to participants, who assessed whether the simulation offered: 1) safe and controlled learning, 2) improved professional performance, 3) increased confidence in clinical practice, 4) development of essential skills, and 5) promotion of patient safety. Each item included a space for recording observations, ideas, or suggestions, aiming to gauge the residents' perception of the experience and improve future activities. This study was approved by the Research Ethics Committee under opinion number 7.694.041.

Results

In total, six R2 pharmacists and seven R1 pharmacists participated in the activity. In evaluating the questionnaire responses, it was observed that 100% of the statements received a "yes" response, evidencing a collective agreement on the benefits of realistic simulation in the context of clinical practice experienced by these professionals. In the space for residents' observations, ideas, or suggestions about realistic simulation, question number two about improving professional performance in clinical practice through repeated practice in simulated scenarios was identified and recorded by four residents (30.76%) as being extremely important, since it is possible to visualize possible behaviors, based on scientific evidence, in different contexts that occur in real life. When asked if simulation can help increase confidence in clinical practice (question number three), two residents (15.38%) wrote that, in addition to being a safe space to practice clinical skills, it reinforced knowledge and improved the direction of the behaviors to be adopted, such as when making pharmaceutical recommendations to the prescribing professional or identifying any medication-related problems that require appropriate guidance for the patient. Regarding the first question, which asked whether the simulation provided a safe and controlled environment for practicing clinical skills without putting real patients at risk, one resident (7.69%) answered "yes" and added that the activity allowed for an enriching exchange of experiences between pharmacists from different

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areas of specialization, given that each unit of the hospital there are complex and distinct patient profiles. The other questions (four and five) did not receive additional comments.

Discussion

Medication reconciliation is a practice that aims to reduce errors in pharmacotherapy related to omission, duplication, or inappropriate timing of medications, as well as drug interactions, by creating a complete and concise list of the patient's previous medications, making it an invaluable tool in promoting patient safety (4). The realistic simulation activity was developed primarily to improve the clinical skills of resident pharmacists at the University Hospital in performing medication reconciliation. The results obtained from the activity developed with the resident pharmacists are similar to the results observed by Komperda and Lempicki in a simulated medication reconciliation learning exercise with third-year pharmacy students, in which the participants' perception of the experience in the activity as a whole was very positive (2). An increase in confidence in reconciliation skills was reported by the residents evaluated, highlighting the effectiveness of simulations in the context of skill improvement, as observed in a study conducted in Jordan with 49 pharmacy students in which, after watching a tutorial video on reconciliation, 44 (89.8%) reported satisfaction with the activity, with the students' average score increasing significantly (5). This Jordanian study also found that the students evaluated were able to identify more discrepancies in prescriptions after the tutorial (5), clearly demonstrating the application of theoretical knowledge in practical activities. Given the relevance of medication reconciliation in the work of clinical pharmacists, continuing education on this subject is necessary to improve the services provided by pharmacists.

Keywords

Pharmacotherapy; Medication Reconciliation; Pharmaceutic Education

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Clinical Pharmacist's Role In Smoking Cessation Groups With Auriculotherapy At A Primary Care Unit

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Introduction

Integrative and Complementary Health Practices (ICHP) have established themselves as relevant strategies for promoting comprehensive care, disease prevention, and increasing user autonomy within the Brazilian Unified Health System (SUS). Instituted by the National Policy on Integrative and Complementary Practices (PNPIC) through Ordinance No. 971/2006, they encompass techniques such as acupuncture, herbal medicine, homeopathy, auriculotherapy, yoga, meditation, and reflexology (1). Auriculotherapy, derived from Traditional Chinese Medicine, is based on the stimulation of reflex points on the auricle related to organs and systems. It is a simple, safe, and non-invasive technique with described effects on pain relief, emotional balance, and support for managing chronic conditions (2). The pharmacist, working in primary care and involved in clinical care activities, finds in auriculotherapy a tool that strengthens their role as a clinical pharmacist. Studies show that the population accepts these complementary practices when offered accessibly and supported by educational information (3). Smoking is considered by the World Health Organization to be one of the greatest public health challenges, being a leading cause of hospital admission and the leading preventable cause of death today (4). In the context of smoking cessation, strategies require a multifactorial approach, and pharmaceutical care contributes significantly to treatment adherence, identification of medication-related barriers, and behavioral support. In this scenario, auriculotherapy can be used as a complementary resource, aiding in the control of anxiety, compulsion, and withdrawal symptoms (2,3).

Aim

To report the experience of the clinical pharmacist's role in smoking cessation groups at a Primary Health Care Unit in the municipality of Três Lagoas (MS), Brazil, highlighting the pharmacist's role in integrative and complementary practices within the SUS and demonstrating the feasibility of implementing auriculotherapy as a complementary strategy in smoking management.

Methods

Patient selection for the smoking cessation group at the Primary Health Care Unit occurred either by spontaneous demand from interested individuals or by invitation from the unit's health professionals to tobacco users, always respecting the number of available spots based on the physical space for collective activities. Patients underwent a clinical interview, which included the Fagerström Test to assess the degree of nicotine dependence, and were then referred for a medical consultation for prescription of necessary medications according to their identified clinical profile. The pharmacist was responsible for organizing the groups and providing individual care, conducting continuous monitoring of pharmacotherapy with nicotine replacement and/or bupropion, in addition to weekly consultations. Auriculotherapy was incorporated as a complementary strategy and applied weekly during pharmaceutical consultations. Mustard seeds were used to stimulate the Shenmen, Lung, Hunger, Sympathetic, Liver, Endocrine, Subcortex, Muscle Relaxation, Kidney, Anxiety, Thirst, and Addiction points to manage symptoms such as withdrawal and anxiety. The evaluated period was from February to June 2025. Ten tobacco users were attended, totaling 63 pharmaceutical consultations and 46 auriculotherapy sessions. All patients enrolled in the unit's smoking cessation program who expressed interest in the offered practice participated in the sessions.

Results

In the experience developed by the pharmacist at the health unit in Três Lagoas (MS), patients followed in the smoking cessation group reported a reduction in withdrawal symptoms, mainly anxiety and compulsion. The users reported greater ease in dealing with moments of crisis. Active listening during the pharmaceutical consultation and the auriculotherapy sessions proved to be fundamental for maintaining commitment to smoking cessation and for changing patient behavior in the face of daily triggers, contributing to greater treatment adherence and reduced relapses.

Discussion

The literature evidences benefits of auriculotherapy in cases of anxiety and stress, with broad population acceptance due to low cost and non-invasive nature (1). The results of this report are consistent with these findings, demonstrating the effectiveness of the technique as an adjuvant in smoking management. The experience reinforces the relevance of auriculotherapy as a practice applicable to primary care. From a management perspective, the need for training professionals and raising awareness for the implementation of ICHP is highlighted (3). The clinical pharmacist expands their role by integrating complementary practices into their clinical work, aligning with World Health Organization recommendations (4). In the smoking cessation groups, their role was strategic, integrating different knowledge domains and increasing care resoluteness and humanization (1,3). In summary, the integration between pharmaceutical care and auriculotherapy presents itself as a promising and viable tool for primary care, with both physical and emotional benefits, strengthening multiprofessional approaches and enhancing outcomes in the cessation process.

Keywords

Clinical Pharmacist; Smoking Cessation; Auriculotherapy.

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Pharmacy In Color: Pharmacists Driving Public Health Themes To Reinforce Patient-Centered Care

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Introduction

Pharmacists play a pivotal role in strengthening Primary Health Care, extending their practice beyond medication dispensing to include the promotion of rational drug use, therapeutic adherence, and health education (1). At the Jardim Planalto Primary Health Unit, in Paulínia, São Paulo, the Pharmacy in Colors initiative was created to integrate pharmacists into monthly community health actions aligned with national awareness campaigns (2). Each month, a specific color highlights a priority theme, such as White January (mental health), Golden August (breastfeeding), Yellow September (suicide prevention), Pink October (breast cancer prevention), and Blue November (prostate cancer prevention) (2).

Within these activities, pharmacists collaborate with multiprofessional teams to provide guidance on safe medication use, adherence strategies (3), photoprotection, and integrative and complementary practices such as auriculotherapy and Reiki, while also encouraging healthy lifestyle habits. Since 2023, their participation has expanded beyond seasonal campaigns to include permanent health education groups, such as discussion circles on medicinal plants, healthy aging, and diabetes. This evolution has consolidated pharmaceutical care, strengthened multiprofessional integration, and deepened bonds with the community.

Aim

To describe the actions of pharmacists at the Jardim Planalto Primary Health Unit through the Pharmacy in Colors project, highlighting its expansion since 2023 in promoting rational drug use, improving therapeutic adherence, and fostering community participation in health education initiatives.

Methods

This experience report describes activities carried out at the Jardim Planalto Primary Health Unit, Paulínia, São Paulo, between 2023 and 2025. The Pharmacy in Colors project organized monthly actions aligned with national health campaigns. During these events, pharmacists delivered educational lectures, facilitated discussion circles, conducted practical workshops, and distributed informational materials.
In addition, they participated in permanent support groups, including medicinal plants discussions (Farmácia Viva), healthy aging circles, and meetings focused on hypertension and diabetes management. Data were collected from internal reports and professional accounts, allowing a qualitative analysis of the evolution of pharmaceutical practice, multiprofessional collaboration, and community engagement.

Results

Since 2023, pharmacists' participation in community health activities has increased substantially. Initially, their role was limited to technical and managerial responsibilities, such as coordinating pharmaceutical services and dispensing medications. Over time, as visibility and trust grew, their contributions expanded to include active participation in health campaigns and large-scale monthly events such as Yellow September, Pink October, and Blue November.
Their involvement also extended to permanent support groups, strengthening bonds with the community. Service users and the multiprofessional team began to recognize pharmacists as key references not only for dispensing and logistics but also for therapeutic adherence, health education, and disease prevention. Participation in clinical meetings and the implementation of pharmacotherapeutic follow-up through consultations further reinforced their relevance. These activities enhanced multiprofessional integration, expanded access to qualified health information, and promoted rational medicine use, thereby fostering user autonomy and improving therapeutic outcomes.

Discussion

The experience at the Jardim Planalto Primary Health Unit highlights the pharmacist's role as an active agent in community health promotion. The Pharmacy in Colors project increased the visibility of this professional,

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demonstrating that their contribution extends beyond dispensing to encompass health education, disease prevention, and the promotion of therapeutic adherence. Since 2023, consistent participation in monthly campaigns and thematic groups has fostered greater user engagement, raising awareness of rational medicine use, adherence, and Integrative and Complementary Health Practices.

Integration within a multiprofessional team enabled a comprehensive and humanized approach, positioning the pharmacist as a vital link between patients, healthcare providers, and the community. This experience suggests that incorporating pharmacists into regular educational activities strengthens primary care effectiveness, consolidates pharmaceutical care, and aligns with public health policies aimed at promoting equity, prevention, and user autonomy.

As an experience report, this case may serve as a reference for other health contexts, illustrating how structured pharmacist participation in community-based initiatives can enhance health outcomes and reinforce the role of pharmaceutical services within the Unified Health System (SUS).

Keywords

Pharmaceutical care, Health education, Pharmacotherapy

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Implementation Of Pharmaceutical Care Into A University Specialty Outpatient Clinic

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Introduction

Secondary-healthcare at the Amadeu Puppi University Outpatient Clinic, affiliated with the State University of Ponta Grossa, is characterized by the provision of specialized services in different areas of healthcare, covering patients with diverse and often complex clinical conditions. This level of healthcare is marked by a high pharmacotherapeutic demand, especially in the management of chronic diseases, which require long-term therapies, multiple medications, and continuous monitoring to ensure adherence, effectiveness, and safety (1). To address this scenario, the outpatient clinic adopts an integrated, multidisciplinary model of care, in which different areas of knowledge converge to provide comprehensive, continuous, and humanized care. In this

context, the inclusion of the pharmacist in the outpatient setting assumes strategic importance for the quality of care (2,3), with responsibilities in the identification, prevention, and resolution of drug-related problems. This contribution directly favours the optimization of pharmacotherapy and the reduction of risks associated with inappropriate or unsafe medication use (4). Their role supports therapeutic adherence, monitoring of clinical outcomes, and the strengthening of communication between patients and the healthcare team (1,5). The implementation of this care model at Amadeu Puppi therefore represents not only progress in consolidating the role of the pharmacist in secondary care, but also an opportunity for practical clinical teaching and experiential learning.

Within this framework, pharmacy students, under faculty supervision, are integrated into the service alongside the outpatient clinic pharmacist, developing activities focused on systematizing pharmaceutical consultations and building a structured care model (6). This proposal seeks to address the clinical needs of patients and strengthen the training of future professionals, reinforcing the inseparability of teaching, research, and extension (2).

Aim

To describe the experience of implementing Pharmaceutical Care in a University Outpatient Clinic.

Methods

This experience report describes the implementation of Pharmaceutical Care within the scope of the extension project Education and Health, initiated in April 2024. Initially, the pharmacist worked in the university outpatient clinic as support for the multidisciplinary team, providing occasional assistance according to clinical demands (6). With the expansion of the project's activities, a partnership was established with the cardiology specialty, which allowed pharmaceutical care to become broader, more systematic, and more personalized (2,4).

From this integration, patients began receiving clinical services provided by pharmacists according to guidelines established by the Federal Pharmacy Council (CFF) (2), promoting a patient-centered approach aligned with pharmaceutical care practices (4,5).

This study is characterized as cross-sectional with a quantitative design, based on the analysis of data extracted from electronic health records. The data analyzed refer to interventions carried out during pharmaceutical consultations, recorded in the electronic system for patients under specialized medical follow-up, focusing on the areas of cardiology and endocrinology.

Data collection and systematization were carried out in July 2025 using Google Sheets. Pharmaceutical interventions were grouped and quantified, allowing for a descriptive analysis of the results obtained during the follow-up period. The study protocol was approved by the Human Research Ethics Committee of the State University of Ponta Grossa (number 6,271,547/2023).

Results

During the analyzed period, 107 pharmaceutical consultations were conducted at the Amadeu Puppi University Outpatient Clinic, 47 (43.9%) in the Cardiology specialty and 60 (56.1%) in Endocrinology. On average, two services per patient/consultation were recorded. In 100% of the consultations, health education actions were carried out, focusing on guidance regarding clinical conditions and the correct use of medications (1,5). Educational practice was reinforced by the distribution of support materials, such as a dosing schedule, which

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assisted in the organization of pharmacotherapy (9).
Pharmacotherapy review was performed in all consultations, allowing for critical analysis of prescriptions and the identification of situations such as inappropriate drug use, non-optimized doses, drug interactions, and contraindications (3,4). Medication reconciliation was recorded in 60 consultations (56.1%), all in Endocrinology (7).
A total of 128 pharmaceutical interventions were documented, mainly focused on counseling patients and/or caregivers regarding appropriate medication use. Of these, 45 (35.2%) involved general guidance on proper medication use, with 35 specifically related to insulin management, including administration techniques, site rotation, homogenization, and storage (8). Another 39 interventions (30.5%) reinforced changes previously defined in the medical prescription, such as inclusion, substitution, or suspension of medications (4). In 31 cases (24.2%), guidance was provided on dosage adjustments determined by the physician, and 13 interventions (10.1%) addressed the adequacy of administration schedules (8).
Regarding access to medications, all patients were advised about the different components of Pharmaceutical Assistance and Farmacia Popular Program (10). In 19 consultations (17.8%), the necessary documentation for access to the Specialized Component of Pharmaceutical Assistance (CEAF) was reviewed (10).

Discussion

The results obtained highlight the consolidation of pharmaceutical care as an integrated practice within specialized care, with a direct impact on the quality of outpatient services (2,3,5). The balanced distribution between the specialties of Cardiology and Endocrinology demonstrates the versatility of pharmaceutical practice in different clinical contexts, especially in chronic conditions that require continuous follow-up and educational interventions (4,6).
The implementation of health education actions in 100% of the consultations reinforces the role of the pharmacist as a promoter of patient knowledge and autonomy (1,5). The provision of a dosing calendar as a support tool for adherence reveals a simple yet effective strategy to facilitate understanding and organization of drug therapy, particularly for patients with complex treatment regimens (9).
Medication reconciliation indicates a proactive role in identifying risks and preventing therapeutic failures (7). This practice contributes to patient safety and optimizes medical consultation time by anticipating possible inconsistencies in prescriptions (3).
The 128 documented interventions demonstrate both the breadth and depth of pharmaceutical activity. The emphasis on insulin-related guidance underscores the importance of the pharmacist in the management of diabetes mellitus, a condition that requires technical expertise and educational sensitivity (8). Counseling on administration techniques, site rotation, and storage not only enhances treatment effectiveness but also prevents clinical complications and reinforces adherence.
Interventions related to medical prescriptions and dosage adjustments reflect the integration of pharmaceutical care with the multidisciplinary team, fostering a collaborative, patient-centered approach (2,4). This articulation strengthens treatment personalization and enhances patient understanding of therapeutic plans (6).
Adjustments in medication administration schedules, although less frequent, have a significant impact on therapeutic effectiveness and patient routines, particularly in treatments requiring specific timing to ensure proper absorption and pharmacological action (8).
Finally, guidance on access to medications, especially the verification of documentation for CEAF, reveals an

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administrative dimension of pharmacy practice that is often underappreciated, yet crucial to ensuring continuity of therapy (10). The pharmacist's intervention reduces bureaucratic barriers, prevents redundant processes, and ensures greater efficiency in medication access, promoting equity in healthcare (1,10).

These findings reinforce the importance of incorporating pharmacists into specialized outpatient settings, demonstrating their contribution to clinical resolution, health education, and therapeutic effectiveness (2,3,5,6). Structured and integrated pharmaceutical care enhances health outcomes and strengthens the bond between patients and the multidisciplinary team (4,6).

The experience at the Amadeu Puppi University Outpatient Clinic highlighted the strategic role of the clinical pharmacist in outpatient care, with a positive impact on therapeutic adherence and care safety. Multiprofessional integration and the strengthening of educational actions sustain the continuity and expansion of the initiative, with a focus on improving documentation and consolidating care protocols (2,6).

Keywords

Pharmaceutical care; Patient Care Team

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Pharmaceutical Care In A Patient With New-Onset Refractory Status Epilepticus Admitted To An Intensive Care Unit: A Case Report.

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Introduction

New-onset refractory status epilepticus (NORSE) is a presentation of refractory status epilepticus in a patient without prior epilepsy or relevant neurological disorder, characterized by continuous or recurrent seizures lasting more than 5 minutes and not responding to first- or second-line anticonvulsant medications (1). Due to the complexity of this condition, the integrated approach of a multidisciplinary team is essential to ensure both diagnostic accuracy and effective treatment, positively impacting clinical outcomes.
The daily presence of pharmacists in the intensive care unit (ICU) is essential, as they actively participate in the care of critically ill patients through systematic and continuous monitoring of pharmacotherapy (2). They are responsible for monitoring all stages of medication use, from selection and dosage to administration and assessment of therapeutic response, always with the goal of ensuring treatment efficacy and promoting patient safety (2). Clinical pharmacists analyze medical prescriptions, identifying potential drug interactions, adverse

events, necessary dose adjustments, therapeutic duplications, or other inconsistencies that could compromise therapy. Based on these analyses, pharmacists make changes to medical prescriptions, promoting safer and more rational medication use. Furthermore, pharmacists also play an educational role within the team, providing guidance and technical clarification to other healthcare professionals involved in the medication administration process(2).

Aim

The aim of this study is to describe the role of the pharmacist in the ICU in the management of neurological patients with NORSE.

Methods

Pharmacotherapeutic monitoring of a patient with NORSE was performed in the ICU of a tertiary hospital for a period of 34 days. Pharmaceutical monitoring and pharmacotherapy interventions were recorded in the institutional electronic system, and the data were compiled to obtain the number of interventions and acceptability by prescribers.

Results

Five pharmaceutical interventions were performed during the observation period: three related to fluid restriction, one related to therapeutic substitution, and one related to therapeutic duplication. The drug classes involved in the interventions were antimicrobials (three interventions) and anticonvulsants (txo interventions). Due to the large volume of intravenous infusions and the need for fluid restriction, three medication compatibility and dilution management tables were created. Furthermore, the pharmacist participated in multidisciplinary discussions during bedside rounds and actively screened for adverse reactions related to the medications in use. Through the active search for adverse reactions to medications, a possible correlation was identified between the patient's hyperchloremic acidosis and the use of high doses of ketamine and midazolam (3). This observed association was discussed with the medical team, contributing to more precise and effective management of this potential adverse reaction and reinforcing the need for strict monitoring during the use of these drugs at high doses.

Discussion

The management of NORSE requires a complex and individualized therapeutic approach (1). In this context, the integrated approach of a multidisciplinary team is essential. Collaboration between different specialties, jointly discussing both treatment strategies and investigating possible underlying causes, significantly increases the chances of a favorable clinical outcome. The inclusion of a pharmacist in the ICU multidisciplinary team contributes to the prevention of medication errors and the optimization of clinical management and pharmacotherapy, reinforcing the importance of pharmaceutical care in highly complex hospital settings (2).

Keywords

Pharmacy; Nervous System Diseases;

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Pharmaceutical Care In A Chronic Kidney Disease Patient Using A Herbal Medicinal Product: A Case Report

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Introduction

In Brazil, the use of medicinal plants is a traditional practice, supported by their wide availability, low cost, and the belief in natural therapeutic benefits. Although phytotherapy is recognized by the World Health Organization as a relevant complementary resource, empirical use without scientific evidence or professional monitoring may entail significant clinical risks, particularly in individuals with multiple comorbidities (1,2).
In this context, Costus spicatus – commonly kown in Brazil as “caninha-do-brejo” and also referred to by several popular names such as “cana-do-brejo”, “cana-de-macaco”, “cana-do-mato”, “cana-branca”, “cana-roxa” and “jacuacanga” – is a widely used medicinal plant in Brazilian tradicional medicine. It is empirically attributed

diurectic, anti-inflammatory and depurative properties and is commonly used in the management of conditions associated with fluid retention, such as arterial hypertension and renal diseases (3).
Chronic kidney disease (CKD) is characterized by a gradual and irreversible decline in kidney function, requiring highly therapeutic management (4). The use of herbal medicines by patients with CKD may interfere with both hepatic drug metabolism and residual renal function, compromising therapeutic efficacy and increasing the probability of adverse events. Thus, it is essential that pharmacists, within clinical practice, actively investigate the use of natural products to prevent risks and promote the rational use of medicines (5).
This case report describes the experience of a pharmacy resident in a high-complexity hospital attending a chronic kidney disease patient on hemodialysis who reported empirical use of “caninha-do-brejo”. The case highlights the importance of clinical listening, multidisciplinary integration, and critical analysis of herbal medicine use in critical care scenarios.

Aim

To report the experience of a pharmacy resident in the clinical care of a chronic kidney disease patient undergoing dialysis therapy, and empirically using Costus spicatus, contextualizing the potential risks, drug interactions and clinical implications associated with the use of medicinal plants in patients with severe comorbidities and polypharmacy.

Methods

This is a case report developed during practical activities of a multidisciplinary residency in adult and elderly health, carried out in a philanthropic tertiary care hospital located in the southeastern region of Mato Grosso, Brazil. The setting was the Intensive Care Unit (ICU), a care environment for patients with complex clinical conditions under continuous multidisciplinary monitoring.
Data collection was conducted during bedside clinical rounds through a structured pharmaceutical interview. The interview guide included questions regarding previous clinical history, comorbidities, allergies, chronic medication use, lifestyle habits and the use of herbal medicines, supplements or other non-conventional therapies. In addition, documentary analysis of the current medical prescription and the patient's electronic medical records was performed.
The investigation of Costus spicatus was based on the patient's spontaneous report supplemented by a bibliographic serach in virtual databases such as PubMed, SciELO and Google Scholar. Phytochemical, pharmacological, and drug interaction studies involving flavonoids and phenolic compounds present in the species were considered.
Findings were systematized descriptively, emphasizing the clinical implications of concomitant herbal and conventional drug use in chronic kidney disease patients.

Results

A 60-year-old male patient with a history of systemic arterial hypertension, chronic arterial disease, previous acute myocardial infarction, and coronary artery bypass grafting in 2019, had been undergoing hemodialysis therapy for 10 months due to chronic renal failure, with only one functional kidney. During a hemodialysis session, he presented with supraventricular tachycardia refractory to adenosine, progressing to atrial fibrillation with rapid

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ventricular response, initially treated with metoprolol and deslanoside. Subsequently, he was admitted to the ICU of a high-complexity hospital in good general condition, lucid, oriented, with sinus bradycardia on electrocardiogram.

During the pharmaceutical interview, the patient reported empirical use of “caninha-do-brejo” tea, describing occasional consumption to increase diuresis, without specifying dose or frequency. This information was not recorded in the medical chart. Pharmacological analysis revealed that Costus spicatus contains flavonoids such as quercetin and kaempferol, as well as saponins and phenolic compounds, which may act as diuretics, anti-inflammatories, and antioxidants. However, studies demonstrate that these metabolites inhibit cytochrome P450 isoenzymes (CYP3A4, CYP2C9), interfering with the metabolism of statins, beta-blockers and antiplatelet agents (6).

Given the clinical presentation, the hypothesis was raised that empirical consumption of the plant could have contributed to hemodynamic alterations, reduced therapeutic safety, and potential interactions with prescribed drugs.

Discussion

This report undercores the risks associated with the empirical use of medicinal plants in chronic kidney disease patients, particularly in polypharmacy contexts. Although popularly considered beneficial for renal function, Costus spicatus contains bioactive compounds capable of interfering with the metabolism and bioavailability of drugs essential to the clinical management of these patients.

Phytochemical studies demonstrate the presence of flavonoids and saponins with antioxidant, anti-inflammatory and diuretic activities in this plant, which justifies its traditional use. However, these same compounds have a significant potential for drugs interactions by modulating hepatic metabolism. Compounds such as quercetin, luteolin and fisetin have demonstrated inhibitory on CYP3A4, CYP2C9 and CYP2C19 isoenzymes, potentially increasing the bioavailability of drugs metabolized through these pathways and raising the risk of toxicity and adverse effects, such as hepatotoxicity and myopathies, especially in patients on multiple medications (7). Furthermore, structurally related flavonoids, particularly their colonic metabolites, exert inhibitory effects on CYP450 isoenzymes and may affect efflux transporters such as P-glycoprotein, altering drug absorption and elimination. These pharmacokinetic interactions are particularly relevant in prescriptions involving statins, beta-blockers or cardiac agents, whose therapeutic margins are narrow (8).

In the present case, although it is not possible to establish a direct causal relationship between herbal cmedicine onsumption and the cardiac events observed, the pharmaceutical evaluation revealed a practice with the potential to compromise therapeutic safety, highlighting the importance of Pharmaceutical Care. This reinforces the need for a comprehensive anamnesis by clinical pharmacists, encompassing not only prescribed medications but also natural products, supplements and complementary therapies.

From a professional practice perspective, the case emphasizes the necessity of active pharmacovigilance and multidisciplinary integration, allowing for the early identification of risks and the implementation of monitoring strategies. It also underscores the importance of health education, guiding patients on the safe use of medicinal plants and discouraging potentially harmful empirical practices.

Thus, this report contributes to broadening the discussion on the role of clinical pharmacists in bridging popular knowledge and scientific evidence, emphasizing that the recognition of traditional practices must be

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accompanied by critical, evidence-based analysis in order to maximize benefits and minimize risks, ensuring therapeutic efficacy and quality of life for patients, especially those with complex chronic diseases.

Keywords

Pharmaceutical care; Medicinal plants;

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Role Of The Clinical Pharmacist Resident In The Vancocinemia Protocol: Experience Report

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Introduction

Clinical pharmacy is an area of knowledge and professional practice that aims to optimize pharmacotherapy and promote patient safety through systematic monitoring of therapeutic outcomes (1). Therapeutic drug monitoring (TDM) is an essential tool in clinical practice, especially for drugs with a narrow therapeutic window, such as vancomycin (2). This glycopeptide is widely used in the treatment of severe gram-positive coccal infections, but its use requires strict monitoring due to the risk of nephrotoxicity and ototoxicity (3). Vancocinemia, defined as the determination of serum vancomycin concentration, is a fundamental strategy for individualizing antimicrobial therapy, allowing dosage adjustments based on pharmacokinetic parameters and individual patient characteristics (4). Multidisciplinary health residency programs provide an environment conducive to the development of clinical pharmacy skills, including the application of institutional therapeutic monitoring protocols (5). The role of the clinical pharmacist in this context involves systematic evaluation of prescriptions, analysis of renal function, determination of the appropriate time for laboratory collection, and proposal of dosage adjustments (6). This collaborative practice among healthcare professionals has a significant impact on reducing adverse events related to medication and improving clinical outcomes (7).

Aim

To report the experience of a clinical pharmacy resident in applying the institutional vancomycin protocol, highlighting the importance of therapeutic monitoring in preventing drug toxicity and optimizing antimicrobial pharmacotherapy in a hospital setting.

Methods

This is an experience report developed during a multiprofessional health residency program, focusing on pharmacotherapeutic monitoring activities performed in medical and intensive care units. The care routine included daily evaluation of medical prescriptions, analysis of renal function through serum creatinine and estimated creatinine clearance parameters, application of the institutional vancocinemia protocol to define the appropriate time for serum level collection, and proposal of dosage adjustments according to clinical guidelines (8). The institutional protocol followed international recommendations for vancomycin monitoring, establishing serum trough (minimum concentration) collection 30 minutes before administration of the subsequent dose, after reaching steady state, usually between the fourth and fifth dose in patients with normal renal function (9). The interpretation of the results considered therapeutic serum trough values between 15-20 µg/mL for severe infections and 10-15 µg/mL for less complex infections, according to the guidelines of the Infectious Diseases Society of America (10). The multidisciplinary approach involved systematic integration between the medical team, nursing staff, clinical laboratory, and pharmacy, promoting effective communication and shared decision-making to optimize antimicrobial therapy.

Results

During the residency period, a clinical case of an elderly patient, 78 years old, with acute renal failure (estimated creatinine clearance of 25 mL/min), admitted to the intensive care unit for treatment of nosocomial pneumonia, was followed up. Laboratory tests revealed a serum vancomycin level of 72 µg/mL, which significantly exceeded the recommended therapeutic parameters and indicated a high risk of nephrotoxicity (11). The multidisciplinary investigation identified multiple contributing factors: severely impaired renal function without adequate dosage adjustment, error in the timing of laboratory collection (performed 2 hours after infusion instead of serum trough) (12). The pharmaceutical intervention consisted of immediate notification of the medical team, recommendation for temporary suspension of vancomycin, guidance to the nursing team on the correct collection technique, and serial monitoring of renal function. After 48 hours of suspension, a new test revealed a serum level of 28 µg/mL, allowing therapy to be restarted at a reduced dose (500 mg every 48 hours) and intensive monitoring. The patient progressed with stabilization of renal function and resolution of the infection, without developing irreversible nephrotoxicity. This case demonstrated the importance of systematic monitoring and integr

Discussion

The reported case illustrates frequent challenges in vancomycin therapy in critically ill patients, especially those with impaired renal function (13). The scientific literature shows that high serum concentrations of vancomycin are associated with a significant increase in the risk of nephrotoxicity, with studies showing an incidence of 15-43% when levels exceed 20 µg/mL (14). Early identification of these critical values and timely pharmaceutical intervention are essential to prevent irreversible damage to the patient (15). Experience has highlighted the importance of continuing education for the multidisciplinary team, especially regarding the technical aspects of laboratory collection. Errors in collection timing are a common source of misinterpretation of results, which can lead to incorrect dosage adjustments (16). The implementation of standardized protocols and the presence of the clinical pharmacist as a facilitator of interprofessional communication have demonstrated a positive impact on

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the quality of care (17). The role of the clinical pharmacist resident proved to be essential as a link between the different stages of the therapeutic process, from prescription analysis to clinical outcome monitoring. This role is in line with national and international guidelines that recognize pharmacists as key professionals in promoting the rational use of medicines and patient safety (18). The experience reinforces the need to invest in specialized training programs in clinical pharmacy, contributing to the strengthening of this practice in the Brazilian healthcare system and to the continuous improvement of hospital care quality (19).

Keywords

Vancomycin; Therapeutic Drug Monitoring; Clinical

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Health Education On Rational Use Of Medicines: An Experience Report On The Production Of An Informational Brochure In A Polyclinic In Recife

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Introduction

The irrational use of medication is currently considered the largest global public health problem. In most cases, irrational medication use is strongly associated with therapeutic failures, increased adverse reactions, interactions between drug classes, and wasted resources. Among the main factors involved are self-medication, early discontinuation of medication, incorrect use of antibiotics, and improper storage of medications in the patient's home. In this context, health education strategies are essential to increase public awareness of rational medication use and, consequently, contribute to patient safety. This involves transmitting knowledge in a clear and accessible manner, in addition to fostering active participation by users in pharmacotherapy-related care (1,2).

Aim

The objective was to develop and evaluate patients' perceptions in an educational action through a waiting room with the distribution of an informative folder, aiming to increase the population's knowledge about the rational use of medicines and provide an open and free space to clarify any possible doubts that patients may have.

Methods

The activity in question was carried out in the second half of 2024 at a polyclinic located in the city of Recife. Initially, the pharmacy students responsible for developing the activity conducted a bibliographical survey of official Ministry of Health documents and scientific articles to provide the theoretical basis for the brochure. The material developed by the students addressed three important aspects of correct medication use: 1. correct adherence to medication treatment; 2. inherent risks of self-medication; and 3. correct disposal of expired or unused medications. The brochure in question was designed in simple, accessible language, using visual aids such as icons, colors, and illustrations to facilitate comprehension, especially for patients with low educational levels. A sufficient quantity was printed for distribution to the users present. During the activity, the students led a brief discussion group, explaining the main topics of the material. The brochures were then distributed, and participants were encouraged to ask questions and share experiences related to medication use. The activity was conducted in a dialogical format, seeking to value popular knowledge and promote an exchange of knowledge between professionals and the community.

Results

The event reached approximately 30 patients and their caregivers. The audience was very receptive, showing interest in the topic and engagement throughout the activity. Many participants reported that they usually discontinue medication treatment when they notice improvement in symptoms or self-medicate based on previous experiences or recommendations from family members. These comments highlighted the importance of educational interventions that clarify the risks of such practices. Another highlight was the lack of knowledge about proper medication disposal. Most participants reported that they often dispose of leftover medication in the trash or sewer, unaware of the associated environmental and health risks. Guidance on returning expired medications to pharmacies and healthcare facilities was, therefore, one of the topics most valued by the audience.

Discussion

The results indicate that educational initiatives in primary care settings, such as waiting rooms, represent strategic spaces for promoting the rational use of medications. Direct interaction with patients fosters the exchange of knowledge, expands access to information, and contributes to the prevention of inappropriate practices, such as self-medication and improper disposal. Furthermore, the experience reinforces the scientific literature, which highlights the importance of pharmacists as health educators, capable of guiding the population on the safe and effective use of medications within the Unified Health System (3). Thus, the development of the brochure and its use in an educational setting proved to be a viable, low-cost practice with great potential for a positive impact on the community served. The experience demonstrated that health education in waiting rooms is a viable and effective strategy for promoting the rational use of medications. Direct interaction with patients enabled not only the dissemination of relevant information but also the clarification of doubts and the raising of awareness about safe practices in the use of pharmacotherapy. The development of the brochure, combined with the dialogic approach, enhanced the educational process, making it accessible and attractive to the public. Furthermore, the initiative strengthened the relationship between the university and the community, offering students practical

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experience in health communication, empathy, and social responsibility. Thus, it can be concluded that initiatives such as these contribute not only to health promotion but also to the training of professionals who are more sensitive to the needs of the population, prepared to act critically and committed to patient safety and quality of care within the SUS (2, 3).

Keywords

Drug Utilization; Waiting Rooms

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Experience Report Of Interprofessional Action In A Community In The City Of Recife

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Introduction

Maintaining healthy habits, such as ensuring good hydration and adopting a balanced diet, is essential to promoting health and preventing disease (1). Despite this, many people have difficulty drinking the amount of water recommended by health agencies throughout the day and tend to avoid medicinal plant infusions due to their taste. In this context, suchás, combinations of natural juices with medicinal plant infusions, stand out as a practical and tasty alternative to encourage both fluid consumption and the intake of bioactive compounds (2).

Aim

The present study aims to report an educational action of the interprofessional extension of Pharmacy and Nutrition students on the benefits of suchás as a healthy alternative for hydration and nutrition of the population, integrating the knowledge of Nutrition and Pharmacy courses on medicinal plants and natural fruit juices.

Methods

The activity in question was conducted interprofessionally at a Peace Community Center (COMPAZ). Initially, the participants were presented with a definition of suchás, their nutritional and functional benefits, and their correlation with hydration were discussed, as well as practical guidance on the recommended ingredients.

Immediately following, there was a tasting session and the distribution of informative material in the form of a folder prepared by the group members containing information on the presentation, along with the recipe for each preparation.

Results

Community members who participated in the activity demonstrated great interest and engagement with the proposal, recognizing suchás as a practical, accessible, and tasty alternative to increase daily fluid intake (2,3). Many participants reported not drinking water regularly, whether due to forgetfulness, lack of habit, or disliking its neutral flavor, but stated that the combination of natural juices and teas provided a more pleasant sensory experience, making the hydration process more attractive (3). In addition to encouraging fluid consumption, the activity also fostered understanding of the functional benefits of compounds present in fruits and medicinal plants, such as vitamins, minerals, antioxidants, fiber, and other bioactives, expanding the community's knowledge of the role of these elements in disease prevention and health promotion (1). This learning was reinforced in a practical and experiential way, allowing participants to combine theory and practice in the very act of tasting suchás. Another relevant aspect was the awakening of curiosity and appreciation for medicinal plants, often present in families' daily lives but little explored in their consumption (4). The activity contributed not only to encouraging hydration but also to reviving and valuing popular wisdom, integrating it with scientific knowledge in an accessible way. Thus, the event was a moment of health education based on dialogue, experimentation, and the collective construction of knowledge, enabling participants to become protagonists in adopting healthier and more conscious practices.

Discussion

The educational initiative had a significant positive impact on the community, encouraging practices aimed at adopting healthier lifestyle habits and encouraging critical autonomy in daily food choices. Through the dialogic and participatory approach, it was possible not only to convey information but also to spark participants' interest in reflecting on their own relationship with food and health, fostering sustainable behavior changes. The interprofessional experience proved to be a unique advantage, integrating different knowledge and practices in the health field toward a common goal. This integration strengthened the bond between the university and the community, enabling a mutual exchange of knowledge and aligning academic training with real social demands. Furthermore, the experience provided students with a space for practical learning, expanding skills in communication, teamwork, and social responsibility. Thus, the initiative contributed to the development of professionals in training who are more sensitive to the needs of the population and committed to promoting health in its multiple contexts, reaffirming the transformative role of the university in society (1, 3).

Keywords

Organism Hydration Status; Juices

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Judicial Pharmacy In The Brazilian Unified Health System: An Experience Report

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Introduction

In the Brazilian “Sistema Único de Saúde” (SUS), pharmaceutical care is an integral part of healthcare and is strategic for public health in Brazil. Patient-centered pharmaceutical care promotes the rational use of medications and involves selection, acquisition, storage, distribution, dispensing, and monitoring of use. The phenomenon is supported by the 1988 Constitution, Article 196, which defines health as "a right of all and a duty of the State," allowing citizens to seek legal recourse to obtain essential therapies, even when not included on official lists(1). In this context, Judicial Pharmacies emerged, created by state or municipal administrators of the SUS to meet the demands of judicial decisions(2). They serve as dispensing points for court-ordered, ensuring greater control over logistics, storage, and delivery, in addition to offering pharmaceutical guidance to patients. Recent data shows the magnitude of the judicialization: in several states, spending on medications resulting from lawsuits already represents a significant portion of the pharmaceutical care budget, exerting pressure on public finances and compromising equitable resource distribution(3). In this way, the creation and maintenance of these pharmacies became an important strategy for reducing financial and organizational impacts, although they do not address the structural causes. Discussing the experience of a pharmacy linked to judicialization of medicine access is important for understanding its daily routine and reflecting on its impact on access to healthcare, the

sustainability of the SUS, and the training of pharmaceutical professionals. This case report seeks to share experiences, challenges, learnings, and ways to improve management in the face of growing legal demands.

Aim

This work aims to present an internship experience in the Pharmaceutical Assistance environment within the Public Health field, highlighting the importance of the pharmacist in the legal action process for patient access to medication.

Methods

A pharmacy student completed a 100-hour internship at a public health facility in a city in southern Brazil. This experience will provide practical experience focused on pharmaceutical practice in legal proceedings related to the drug enoxaparin. It should be noted that no case described here will be identifiable, and the data will be treated anonymously and in accordance with ethical principles.

Results

The organization of a public pharmacy encompasses essential areas to guarantee universal access to healthcare, divided into storage, dispensing, quality control, and specialized pharmaceutical care sectors. Within specialized pharmaceutical care, the management of high-cost medications and those arising from legal claims emerges as a complex challenge, which requires an evidence-based multidisciplinary approach(4). The judicialization of health presents one of the greatest challenges faced by these services, where court decisions can indicate medications that are then included in the protocols of the Unified Health System (SUS), imposing significant pressure on the public budget and supply logistics(5).

A case experienced during the internship period involved enoxaparin sodium, known by Clexane®, a fundamental and widely used medication for deep vein thrombosis and pulmonary embolism, frequently requested in court for off-label indications, which are not supported by national clinical protocols(6). A pregnant woman presented clinical proof for the use of the medication and requested the use of enoxaparin sodium from the state's judicial pharmacy. However, her request was denied because she did not meet the state criteria for requesting the medication. According to Joint Ordinance No. 23/2021, the state of Santa Catarina stipulates that, to obtain state-funded medication, the patient must meet specified clinical and laboratory criteria and the ordinance also specifies criteria for inclusion and exclusion from the medication request(7).

With demand increasing within the municipality, the health unit itself sought to purchase the medication to serve the population in need, as the legal proceedings were compromising the treatment and quality of life of the people who need the medication. The purchase of medication then ensured greater accessibility for patients without the need to go through more bureaucratic issues, given that it is a high-cost medication.

Discussion

The role of pharmacists in public pharmacies goes well beyond simply dispensing medications. They are essential professionals in ensuring the efficacy, safety, and quality of medication use, promoting rational and conscientious

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use by users. Their presence is essential to guide, clarify, monitor treatments, prevent drug interactions and contribute to therapeutic adherence (8).

Clexane® (a low molecular weight heparin, also known as enoxaparin) is widely used in medicine for the prevention and treatment of thrombotic conditions, as it effectively inhibits coagulation in a controlled manner (9). It reveals that the process of obtaining medications through legal means within the Brazilian Unified Health System (SUS) is time-consuming, bureaucratic, and requires careful attention throughout the entire process analysis. To obtain high-cost medications, it is necessary to undergone a medical consultation and have clinical and laboratory evidence that attests to the need for the medication and government funding. If the request is denied even after fulfilling the necessary criteria, there is a need to take appropriate legal action with a lawyer (10).

The need to comply with Clinical Protocols and Therapeutic Guidelines (PCDT) highlights certain shortcomings in the context of universal healthcare, where a patient must demonstrate a clinical condition to access medication. According to the National Commission for the Incorporation of Technologies of the Unified Health System (CONITEC), pregnant women are prioritized due to their high risk of developing venous thrombi, which pose serious risks during pregnancy. However, other conditions also require medication, and patients often face difficulties obtaining it through the Brazilian healthcare system (11). The Brazilian justice system faces a range of lawsuits regarding high-cost medication.

An analysis conducted between 2015 and 2021 by a university in southern Brazil revealed that there are 38,249 registration lines related to enoxaparin requests. This data, especially post-pandemic data, reveals a decline over the years, highlighting difficulties in obtaining the medication through legal proceedings. It should be noted that the COVID-19 pandemic occurred between 2020 and 2021, which led to the suspension of numerous legal proceedings (12).

The judicialization of medication is a means to provide patients with limited financial resources access to quality treatment. This approach not only ensures health but also improves the quality of life of those requiring expensive medications. Despite structural challenges in the treatment policies offered by the SUS, it remains an exemplary healthcare system.

CONCLUSION

Access to high-cost medications remains a public health challenge in Brazil. However, patients may undertake measures to obtain this assistance from the government. Pharmacists in the public sector play a crucial role in guiding patients in successfully obtaining the necessary medications, contributing to the improvement of patients quality of life and reducing the risk of health complications.

Keywords

Keywords: high-cost medication, enoxaparin.

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A Pharmacist-Led Interprofessional Outpatient Clinic: An Experience Report In Telehealth

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Introduction

The implementation of an interprofessional outpatient clinic at the Federal University of Paraíba introduced teleconsultations as a health promotion strategy, extending beyond the university's walls and reaching remote populations. The interprofessional team provides patients with personalized care grounded in a welcoming and humanistic approach. Furthermore, pharmacist leadership plays a key role in ensuring therapeutic need, adherence, effectiveness, and medication safety. In this context, the clinic has generated positive outcomes both in patient care and in the training of healthcare professionals and extension program participants (1,2,3).

Aim

This report aims to share the experience of a student participating in the pharmacist-led Interprofessional Outpatient Clinic at the Federal University of Paraíba (UFPB) and to demonstrate its operations, challenges, and impact. The project, integrated with the clinical services provided by an interprofessional team under pharmacist leadership, highlights how such an initiative can benefit society and contribute to the development of more competent healthcare professionals.

Methods

This paper presents an experience report from the pharmacist-led Interprofessional Outpatient Clinic, which delivers pharmacist-led clinical services focused on mental health. Consultations are conducted via telehealth and involve an interprofessional team comprising a pharmacist, psychologist, physician, and extension students. Patients are recruited either through self-referral or formal referral and are all assessed using a standardized evaluation form that includes the PHQ-9 and GAD-7 instruments. Patient contact is initially mediated by the extension student, who, together with the pharmacist, conducts a triage consultation to collect essential information and determine whether the patient remains in the service or is referred to the appropriate level of care. Subsequently, the interprofessional team conducts a comprehensive consultation, providing management tailored to individual needs. All clinical records are documented in the Clinicarx® platform, including patient histories and interventions performed. Follow-up assessments are scheduled biweekly after the initial consultation and monthly thereafter, with re-administration of the evaluation instruments (4,5).

Results

During this period, the outpatient clinic primarily served female patients, with a predominance of young adults, although a wide age range was represented. The teleconsultation model expanded access to users from multiple municipalities and reduced transportation-related barriers. The main demands involved safe medication use—including dosage, drug combinations, and adverse effects—along with adherence challenges related to daily routine, tolerability, and cost. Consequently, the interprofessional approach, led by pharmacists, resulted in individualized therapeutic plans, user-friendly educational materials, and strategies to enhance treatment effectiveness, thereby promoting self-care and continuity of follow-up.

Discussion

The project provided extension students with supervised practice under the guidance of pharmacists, including participation in clinical procedures, triage, and patient history-taking. In addition, students engaged in medication counseling and health education initiatives. The experience highlighted the benefits of interprofessional care, including shared therapeutic plans, improved communication among professionals, and enhanced medication safety. Key challenges included high service demand, which risked overburdening the team; socioeconomic barriers to medication access; scheduling incompatibilities; and loss to follow-up due to patient withdrawal or discontinued contact. Nevertheless, participating in team-based consultations proved to be both formative and innovative for students, serving as an entry point to clinical pharmacy practice and supporting the advancement of pharmaceutical care (6,7).

Keywords

Telehealth; Pharmaceutical Care; Interprofessional Team

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Management and Distribution of Etonogestrel in the SUS of Recife: The Role of the Horus System in Improving Pharmaceutical Services

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Introduction

Etonogestrel is a long-acting contraceptive that offers high efficacy, safety, and convenience to patients. As it is a subdermal implant, it is an important strategy for family planning and the prevention of unplanned pregnancies. Its inclusion in the list of strategic medicines and supplies of the Unified Health System (SUS), according to Ordinance SCTIE/MS No. 13, of April 19, 2021, reflects the recognition of its relevance to public health, especially among vulnerable populations.

The availability of a contraceptive method such as this, which is high-cost and has several particularities in terms of application and monitoring, requires a well-articulated information system to enable controlled and efficient distribution; therefore, the incorporation of technological resources becomes essential for better control. In this context, the Hórus/Recife system stands out, developed for the management and qualification of pharmaceutical care within the SUS. It contains information such as SUS user data and the National Register of Health Establishments, entered through the National Health Register (Unified Health System Card) (1). The main function of this tool is to improve the management of medicines, from their acquisition to their delivery to the patient. In general, this system allows for the management of expiration dates, traceability, dispensing records, and data generation. As a result, patient care will be more effective, and the work of professionals at the Recife City Hall's Pharmaceutical Supply Center (CAF) will be optimized, with better coordination with health program coordinators and other sectors such as epidemiological surveillance. Therefore, it can be inferred that the absence of this system represents a significant challenge to the pharmaceutical logistics process.

Aim

Analyze the rational distribution of etonogestrel in the municipal health network based on criteria defined in a technical note, using Horus as an essential tool.

Methods

This is a descriptive study using secondary data from the Horus/Recife system for the period from February 2024 to August 2025. A survey was conducted of users eligible to receive the implant. Data such as patient name, date of birth, CPF (Individual Taxpayer Registration Number), SUS (Unified Health System) card, health unit, gender identity, date of insertion, and prescriber were entered into spreadsheets to allow for better organization of the information.
The inclusion criteria, according to technical note 04/2021, were: adolescents aged 11 to 19, homeless women with a uterus, and postpartum women from municipal maternity wards in Recife who meet the criteria mentioned above. Based on these criteria, two instruments were used for data collection and analysis: the etonogestrel insertion form and the patient history report from the Hórus/Recife system. Thus, based on the information collected, it was possible to perform a comparative analysis of the two instruments mentioned, allowing for better management of the flow of this medication and assisting pharmaceutical care management in its work activities.

Results

During the period mentioned, 8,396 68 mg etonogestrel implants were distributed to the eight health districts of Recife. The unit price was R$482.00, and the total cost was R$4,046,872.00, which was fully financed by the Recife municipal government. The analysis of the users covered was carried out by health district, comparing the insertion form with the registration in the Hórus/Recife system. Regarding the registration forms of users who met the criteria, 8,121 forms were approved, but only 3,560 users were registered in Hórus. Given this, it appears that 4,561 patients were included even though they were not effectively registered in the system. This finding led to the need to improve guidelines and carry out educational actions, culminating in a webinar aimed at clarifying doubts about the dispensing flow and emphasizing the importance of registering users in Hórus. Subsequent analyses demonstrated the effectiveness of the action, as it led to an increase in the registration of users in Horus by more

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than 90%.
Given the relevance of the project, other user groups were subsequently included through technical note 04/2025, including people with immunodeficiency of the uterus, drug addicts, and people with uterine conditions following abortions provided for by law.

Discussion

The choice of etonogestrel as a strategic contraceptive method by the SUS is a remarkable advance for women's health, offering a long-lasting, highly effective option that promotes adherence (2). However, the effectiveness of a public health program is not measured solely by the availability of supplies, but by the robustness of the logistics and care chain that supports it. The high cost of this product and its high effectiveness as a method of contraception highlight the importance of information systems for optimizing resources, thus ensuring stricter control and avoiding waste (3).
Thus, the intervention carried out—the creation of a spreadsheet for manual control of users—although elementary, was a clinical pharmacy action with a direct impact. It transcended the simple organization of data, constituting a risk mitigation tool.

The lack of user registration in the Horus system exposes the program to serious flaws, such as duplicate dispensing, which not only generates unnecessary costs for the system but also poses a health risk to patients. Additionally, the difficulty in tracking implants prevents effective pharmacotherapeutic follow-up, hindering pharmacovigilance and the monitoring of clinical results on a large scale (4).

The manual data collection process, as described in the methodology, simulates the essential functionalities that Horus should provide: single patient registration, dispensing records, and inventory control. It is worth noting that this activity, although it has solved an immediate need, exposes the inefficiency and vulnerability of the process, since reliance on manual spreadsheets is susceptible to human error, does not allow real-time consultation of information by different points in the healthcare network, and hinders the generation of reliable management reports for planning future acquisitions. The effective implementation of Hórus, on the other hand, allows for the strategic management of medications, the scheduling of acquisitions based on consumption, inventory, and batch traceability. This reinforces that, despite the challenges of implementation, information systems are essential for controlling work processes and improving health management (5).

Therefore, this experience report serves as a case study that justifies, in practice, the importance of properly feeding the Horus System in all health units, as well as the relevance of investing in technology to provide qualified pharmaceutical care and ensure the sustainability of high-cost programs. In addition, Horus is essential for the sustainability of all components of Pharmaceutical Care, including strategic and specialized ones, as it provides support for data analysis and, consequently, more assertive and evidence-based decision-making (1). Thus, modern clinical pharmacy depends on data to ensure the safe and rational use of medicines, and the Hórus System is an essential tool to assist in this process.

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Keywords

Etonogestrel; pharmaceutical assistance; Horus.

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The Role Of A Resident Pharmacist In Medication Reconciliation Of Hospitalized Patients Using An Artificial Intelligence Tool

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Introduction

Medication reconciliation is a crucial strategy to improve patient safety during transitions of care, particularly at hospital admission. Hospitalized patients frequently present polypharmacy and chronic conditions, making them more susceptible to prescription discrepancies (1,2). In this context, pharmacists are essential for preventing therapeutic errors, reducing adverse drug events, and optimizing pharmacotherapy (3,4). Technological tools, including artificial intelligence (AI) platforms, have been increasingly adopted to support automated prescription analysis, identifying potential drug interactions, duplications, inappropriate dosing, and toxicities, which enhances the efficiency and safety of pharmacist interventions (5,6).

Aim

To describe the experience of a resident pharmacist performing medication reconciliation in hospitalized patients with the support of an AI-based tool.

Methods

This experience was conducted within a multiprofessional residency program in oncology care at a private hospital. Medication reconciliation was performed within the first 48 hours of patient admission, including collection of medication histories from patients or caregivers and critical analysis of prescriptions. An AI platform was used to identify inconsistencies, such as drug interactions and dosing errors. Discrepancies were discussed with the healthcare team, and pharmaceutical interventions were implemented when necessary (5,6).

Results

The process allowed the detection of several prescription discrepancies, including omission of chronic medications, dose inconsistencies, and potential drug interactions. Common interventions included reintroduction of medications, dose adjustments, and substitution with safer alternatives. Use of the AI tool improved the speed and accuracy of prescription review. The presence of the pharmacist enhanced communication with the care team and supported evidence-based clinical decision-making (3,4).

Discussion

This experience demonstrates that medication reconciliation supported by AI technology is an effective practice to increase prescription safety, prevent medication errors, and potentially reduce healthcare costs (2,6). Beyond improving the efficiency of prescription review, the tool enhanced the pharmacist's ability to prioritize high-risk patients, leading to more targeted interventions and better allocation of clinical resources. The integration of AI into hospital pharmacy practice has the potential to minimize human error, standardize reconciliation processes, and create reliable documentation that supports continuity of care (5,6).c

Furthermore, the multiprofessional context in which the reconciliation took place highlights the relevance of the pharmacist's contribution to interprofessional communication and clinical decision-making (3,4). By providing accurate medication histories and identifying discrepancies early, pharmacists can strengthen patient safety culture within healthcare institutions. From an educational perspective, incorporating technological tools into residency programs equips new professionals with digital competencies that are increasingly required in modern clinical practice.

Although this experience was limited to a specific oncology setting, its outcomes suggest that similar approaches could be applied across different hospital units. Systematic implementation of AI-assisted medication reconciliation may serve as a scalable model to promote safer pharmacotherapy, optimize healthcare resources, and support evidence-based clinical practice in diverse contexts.

Keywords

Pharmacy; Reconciliation; Intervention

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Implementation Of The Fasthug-Maidens Checklist By A Clinical Pharmacist To Enhance Medication Safety In Oncology Inpatients

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Introduction

Pharmacotherapy for hospitalized oncology patients is particularly complex due to polypharmacy, frequent comorbidities, and the narrow therapeutic index of many anticancer and supportive drugs. These factors increase the risk of drug-related problems (DRPs), including therapeutic omissions, duplications, inappropriate dosing, and inadequate renal or hepatic adjustments (1,2). Clinical pharmacists are increasingly recognized as essential members of the healthcare team, contributing to safer prescribing and improved clinical outcomes by systematically identifying and resolving DRPs (3,4). One strategy to support this process is the FASTHUG-MAIDENS mnemonic checklist, which provides a structured framework to review key aspects of medication therapy, such as pain control, nutrition, anticoagulation, electrolyte balance, potential interactions, and monitoring needs (5). By standardizing clinical reasoning, this tool can improve communication within multiprofessional teams and enhance the safety and quality of patient care (6).

Aim

To report the experience of applying the FASTHUG-MAIDENS checklist in daily prescription review by a clinical pharmacist and its impact on the optimization of pharmacotherapy in hospitalized oncology patients.

Methods

This experience was developed during a multiprofessional residency program in oncology at a tertiary hospital. A clinical pharmacist applied the FASTHUG-MAIDENS checklist during routine prescription review for inpatients.

Each domain of the tool—including analgesia, nutritional support, prophylaxis for venous thromboembolism, laboratory monitoring, dosing adequacy, renal and hepatic adjustments, and drug interactions—was systematically assessed. Identified DRPs generated pharmacist interventions, which were subsequently discussed with physicians and the healthcare team. Accepted recommendations were documented in the patients' electronic medical records.

Results

Use of the checklist enabled the early identification of clinically relevant problems, such as therapeutic omissions, duplicate prescriptions, overdosing, lack of renal dose adjustments, and significant drug–drug interactions. The structured approach also helped prioritize complex cases and provided consistency in the pharmacist's clinical reasoning. Interprofessional communication improved, and medical teams showed high acceptance of pharmacist recommendations, reinforcing the pharmacist's role in the safe management of pharmacotherapy for oncology inpatients.

Discussion

The experience demonstrated that the FASTHUG-MAIDENS checklist is feasible and beneficial for clinical practice in a high-demand oncology setting. Its use facilitated greater patient safety, standardized the clinical pharmacy process, and supported the optimization of drug therapy (3,6). The tool also contributed to developing more systematic reasoning skills among pharmacists, reducing practice variability and promoting consistency in interventions (7). High acceptance by the healthcare team highlights the importance of collaborative work and strengthens the integration of pharmacists into multiprofessional care. Beyond practical application, FASTHUG-MAIDENS may serve as an educational strategy, guiding the training of future pharmacists and healthcare providers in structured, evidence-based approaches to pharmacotherapy (5,7). Broader use of the tool could contribute to safer care transitions and better clinical outcomes for patients with complex medication regimens, especially those in oncology (2,4).

Keywords

Clinical Pharmacy; FASTHUG-MAIDENS; Pharmaceutical Care

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Experiential Report: A Swift And Collaborative Approach To Public Health In Ouro Preto Do Oeste

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Introduction

The Sistema Único de Saúde (SUS) in Brazil is founded on the principles of universality, equity, and integrality, aiming to provide comprehensive health care to all citizens (1). The implementation of these principles relies heavily on robust public health policies, including the Política Nacional de Medicamentos (PNM) and the Política Nacional de Assistência Farmacêutica (PNAF) (2, 3). The PNM, established in 1998, ensures the quality, safety, and rational use of medicines while guaranteeing public access to essential drugs (4). Meanwhile, the PNAF, approved in 2004, integrates pharmaceutical assistance as a core component of the national health policy, guiding the formulation of sectoral policies related to medicines, science and technology, and human resource development (2, 3). A key instrument for rationalizing pharmaceutical actions within the SUS is the Relação Nacional de Medicamentos Essenciais (RENAME), a periodically updated list of essential medicines (2, 3). Federal law and decrees mandate the SUS to provide comprehensive therapeutic and pharmaceutical assistance (5, 6). Following this, states and municipalities are empowered to create their own specific and complementary lists of medicines, known as Relações Estaduais de Medicamentos Essenciais (RESME) and Relações Municipais de Medicamentos Essenciais (REMUME), respectively, to address local health needs (6). The creation of a REMUME is a crucial step towards standardizing and optimizing the prescription, dispensing, and rational use of medications, particularly in primary health care settings (7). The municipality of Ouro Preto do Oeste, Rondônia, recognized the urgent need for a standardized list of essential medicines to improve public health services and resource management. This report details the expedited process undertaken to establish the REMUME for the municipality.

Aim

To describe the methodology and outcomes of establishing the Relação Municipal de Medicamentos Essenciais (REMUME) in Ouro Preto do Oeste, Rondônia, within a compressed timeframe, highlighting the interdisciplinary collaboration that was essential for its successful implementation.

Methods

The process began with the institution of a multidisciplinary commission through Portaria Nº 17.091 on April 7, 2025, by the Municipal Health Secretariat of Ouro Preto do Oeste (8). The commission was tasked with conducting the necessary studies, technical meetings, and analyses to draft the REMUME proposal, in accordance with the guidelines of the Ministry of Health (8). The commission, composed of six members including pharmacists, a physician from the Mais Médicos Program, and other professionals, was formally appointed to this task (8). This group was responsible for creating a standardized list of essential medicines based on local health needs and the RENAME (9). Their work was guided by the Federal Law nº 8.080 and the Federal Decree nº 7.508, which regulate the SUS and pharmaceutical assistance (10, 11). The commission's deliberations led to the final proposal for the REMUME (12). The proposal was then approved by the Municipal Health Council via memorandum 633/SEMSAU/2025 (7). Following this, the REMUME was formally instituted by Decreto Nº 18.679 on May 15, 2025 (12). This decree established the REMUME, and also the Política Municipal de Medicamentos, which limits prescriptions by Primary Health Care professionals to the medicines listed in the RENAME and REMUME (13). The entire process, from the creation of the commission to the formal decree, was completed in just over 30 days.

Results

Within a period of 38 days, a multidisciplinary commission was established and successfully created the Relação Municipal de Medicamentos Essenciais (REMUME) for Ouro Preto do Oeste (8, 12). The commission was composed of six dedicated public health professionals, including pharmacists, physicians, and other staff members (8). Their work culminated in the publication of Decreto Nº 18.679 on May 15, 2025, which formally instituted the REMUME and the Municipal Medicines Policy (12). The new policy dictates that prescriptions by primary health care professionals must adhere to the RENAME and REMUME lists (13). The decree also created a Municipal Committee for Health Technology Assessment (CMATS) to provide technical support for REMUME management (14). This committee is composed of representatives from the Municipal Health Secretariat, medical and pharmaceutical professionals, nursing professionals, the Municipal Health Council, and other relevant professional categories (15). The CMATS is responsible for reviewing and approving inclusions, exclusions, or changes to the REMUME every two years, or as needed on an extraordinary basis (16). The document includes a detailed list of approved medicines and their forms, categorized under the Basic Component of Pharmaceutical Assistance (17). Additionally, a list of inclusions approved by the REMUME-2025 Commission was provided, which includes new medicines like bupropion, acetylcysteine, and tadalafil (18). The new REMUME also contains a list of basic health care supplies such as water for injections, insulin pen needles, alcohol, and various diaphragms and IUDs (19, 20).

Discussion

The rapid and effective implementation of the REMUME in Ouro Preto do Oeste demonstrates a successful model for enhancing local public health through collaborative governance and evidence-based practice. The accelerated timeline, from commission formation to the official decree, was made possible by the dedicated efforts of an interdisciplinary team. This model aligns with the principles of the SUS, particularly decentralization and social participation, by empowering the municipality to tailor its pharmaceutical services to the specific needs of its

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population (1). The establishment of the CMATS ensures the sustainability and continued relevance of the REMUME by providing a formal mechanism for regular review and technical assessment based on efficacy, safety, and cost-effectiveness (14, 16). This structured approach not only optimizes the use of public funds but also promotes the rational use of medicines, a core tenet of the PNM and PNAF (2, 3, 4). The new policy addresses potential issues of judicialization in health care by clearly defining the scope of medications available at the primary care level, with a structured process for handling exceptional cases (13, 21). The REMUME is now a cornerstone of pharmaceutical assistance in the municipality, guaranteeing equitable access to essential, safe, and effective medicines for all citizens (22). The experience of Ouro Preto do Oeste serves as a valuable case study for other municipalities seeking to improve their pharmaceutical assistance programs and strengthen the principles of the SUS at the local level.

Keywords

REMUME; RENAME; HEALTH PUBLIC

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Monitoring Of Insulinized Patients In Family Health Units In The Municipality Of Atibaia

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Introduction

Chronic Noncommunicable Diseases (NCDs) are a global public health problem. In Brazil, 74% of deaths in 2016 were caused by NCDs (WHO, 2018). Among NCDs, Diabetes Mellitus (DM) stands out due to its high prevalence and risk of serious complications. According to the Ministry of Health, approximately 10.2% of the population (approximately 20 million people) have some type of DM (SBD, 2024). When not treated properly, DM can cause several chronic complications, such as kidney failure, limb amputation, blindness, cardiovascular disease, among others. These complications interfere with quality of life and impair the individual's functional capacity, autonomy, and independence (COSTA et al., 2017). Therefore, monitoring by healthcare professionals, including pharmacists, is essential to improve control and/or reduce complications of the disease. The Pharmaceutical Assistance Department (DAF) of the Atibaia Municipal Health Department (SMS) has been implementing and consolidating Pharmaceutical Care (PC) services since 2018. The Family Health Units (USF) in the Maracanã and Imperial neighborhoods are some of the units offering this service, where insulin-treated diabetic patients are monitored by pharmacists. This study demonstrates the impact of PC on these patients' adherence to treatment and the results obtained.

Aim

The present study aims to quantify the improvement in laboratory tests of people with diabetes on insulin therapy monitored by the pharmaceutical care service.

Methods

Data monitoring will be conducted between August 2022 and December 2024 at the Maracanã Family Health Unit (USF) and from March 2023 to December 2024 at the Imperial Family Health Unit (USF). A total of 64 patients were monitored (USF Maracanã – 33; USF Imperial – 31).
The study conducted at USF Maracanã used Continuous Glucose Monitoring (CGM), performed by the patients themselves at home, for a 30-day measurement period. Data were collected using the Glicosys software, offered by the glucometer manufacturer.
The study conducted at USF Imperial used Fasting Glucose and Glycosylated Hemoglobin (Hb1AC) for the 31 patients enrolled in the study. Information was obtained from Electronic Medical Records (E-SUS) and test reports. In both units, the results recorded in the first and last pharmaceutical consultations were compared. Whenever necessary, cases were discussed with the respective USF teams. The guidelines of the Brazilian Diabetes Society (SBD) were used as a reference.
Patients were monitored through pharmaceutical consultations. These consultations included: guidance for patients initiating or continuing insulin use; guidance and training on GCM and hypoglycemia; evaluation of tests; assistance with adherence for polymedicated patients and those with comorbidities other than DM; identification and management of DRPs; and encouragement to improve lifestyle habits, such as initiating physical activity and healthy eating.

Results

The results obtained at each family health unit are described below.
USF Maracanã:
45% of patients (15 people) achieved their therapeutic goal; Among the patients who did not achieve their goal, 67% (12 people) had poor treatment adherence;
Of the patients who did not achieve their goal, 72% (13 people) still showed improvement in their glycemic control;
USF Imperial:
Patients were numbered 1 to 28 because, of the 31 patients evaluated, only 28 had updated data for this test.
Fasting blood glucose levels were compared between the first and last visits. The variation in the group's average fasting blood glucose levels between the beginning and end of follow-up was analyzed. The average ranged from 201 mg/dL to 133 mg/dL, as illustrated in the graph below, with an average reduction of 68 mg/dL.2
A comparison was also made between the Hb1AC levels measured at the first and last visits. Patients were numbered 1 to 31, as all patients included in the study had data from this test.
The variation in the group's average Hb1c between the beginning and end of follow-up was analyzed. The average ranged from 9.4% to 7.5%, as illustrated in the graph below. The average reduction recorded was 1.9%.
On average, each patient had six pharmaceutical consultations. Of the patients analyzed, 93.5% achieved a reduction in Hb1c and 100% achieved a reduction in fasting blood glucose.

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Discussion

Pharmaceutical care applied to diabetic patients, especially those on insulin with other aggravating factors, ensures a better chance of a successful therapeutic outcome, providing these patients with better understanding and control of their treatment. The pharmacist, as the professional who monitors the patient monthly during the delivery of medications and supplies, can act as a guide, making corrections and providing guidance, answering questions, and training the patient. They can also act as a bridge between the patient and the physician and other professionals, identifying the need for assistance and adjustments in the patient's treatment.
It is crucial to establish partnerships within the team, as it is with the support of health agents, nursing technicians, pharmacy assistants, doctors, and nurses that the best possible results will be achieved.
Considering the impact of diabetics on the public health system and people's lives, this work shows the importance of including pharmaceutical professionals in the clinical care of patients in the territory, a role that should be considered and encouraged by municipal, state, and federal administrations to promote a better quality of life for the population served, as well as to avoid expenses with decompensation of clinical conditions that should be controlled and managed in primary health care.

Keywords

diabetics; pharmaceutical care; public health

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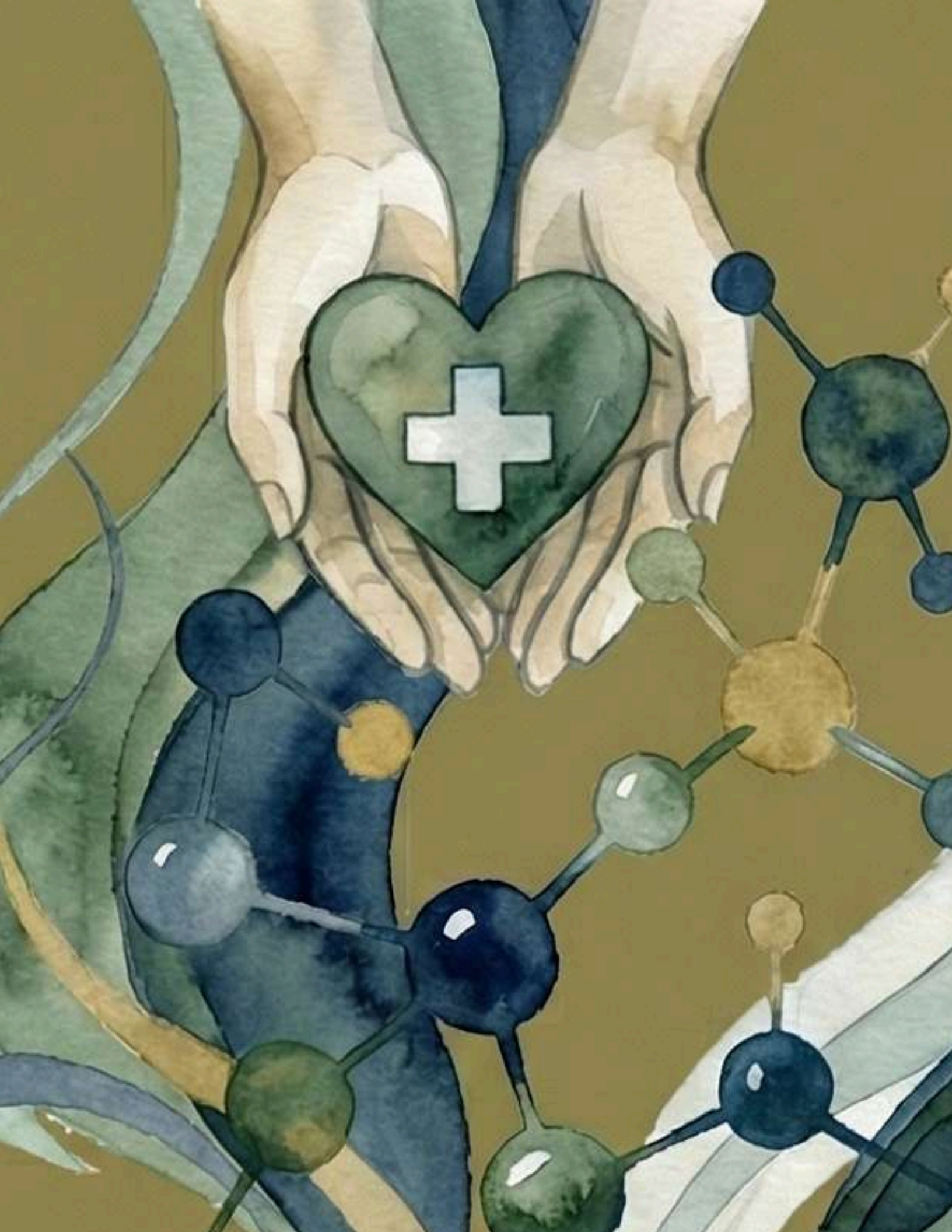

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