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From Theory to Practice in Pharmaceutical Care: An Algorithm to classify problems related to pharmacotherapy in Ambulatory Settings

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Abstract

Objective: To develop an algorithm that supports the identification and classification of pharmacotherapy-related problems (PRPs) during ambulatory patient care provided by pharmacists. **Methods:** This descriptive, qualitative study involved four sequential steps: (i) conceptual modeling based on PRP categories reported in the literature; (ii) definition of criteria for PRP identification and classification; (iii) construction of a flowchart to guide systematic PRP classification; and (iv) theoretical validation of the algorithm through peer review. **Results:** The algorithm enables structured identification and classification of PRPs through pharmacotherapy review. It begins with the detection of therapeutic duplications, followed by assessment of medication necessity, adherence, effectiveness, and safety. Additionally, it incorporates the identification of untreated health conditions using data from patient anamnesis and medical records, as well as the evaluation of potential drug interactions that may impair treatment effectiveness or safety. **Conclusion:** The algorithm provides a standardized and rational approach to PRP identification, enhancing patient safety and supporting more precise and targeted pharmacist interventions. Moreover, it contributes to the generation of indicators for pharmaceutical clinical practice, reinforcing the pharmacist's role in healthcare.

Keywords: Pharmaceutical Services; Evidence-Based Pharmacy Practice; Drug Therapy; Patient-Centered Care; Health Information Systems.

Da teoria à prática em cuidado farmacêutico: algoritmo para classificação de problemas relacionados à farmacoterapia em nível ambulatorial

Resumo

Objetivo: Elaborar um algoritmo que suporte a identificação e a classificação de problemas relacionados à farmacoterapia (PRFs) durante o processo de cuidado ao paciente realizado por farmacêuticos em nível ambulatorial. **Métodos:** Trata-se de um estudo descritivo com abordagem qualitativa. Para a construção do algoritmo, foram sequencialmente realizadas a modelagem conceitual com a identificação de categorias de PRFs publicadas na literatura, a definição de critérios para a identificação e classificação dos PRFs, a criação do fluxograma para orientar a classificação sistemática dos PRFs e a validação teórica do algoritmo, através de revisão por pares. **Resultados:** A identificação e a classificação dos PRFs devem ser realizadas a partir da revisão da farmacoterapia do indivíduo. O algoritmo inicia-se pela análise de possíveis duplicidades terapêuticas, seguida pela análise da necessidade, adesão, efetividade e segurança de cada medicamento em uso, pela identificação de possíveis condições de saúde não tratadas por meio da contextualização com os dados obtidos durante a anamnese e do prontuário do paciente. Por fim, propõe-se o estudo de possíveis interações medicamentosas que estejam ou possam potencialmente comprometer a efetividade ou a segurança do tratamento farmacológico. **Conclusão:** O algoritmo apresentado torna mais racional a identificação de PRFs e pode, dessa forma, promover maior segurança ao farmacêutico e ao paciente ao permitir que o profissional realize intervenções específicas e mais assertivas. Além disso, fomenta a obtenção de indicadores relacionados à prática clínica farmacêutica, fortalecendo o papel do farmacêutico no cuidado em saúde ao sugerir um processo padronizado de identificação e classificação de PRFs.

Palavras-chave: Serviços Farmacêuticos; Prática Farmacêutica Baseada em Evidências; Tratamento Farmacológico; Cuidado Centrado no Paciente; Sistemas de Informação em Saúde.

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Introduction

Pharmaceutical Care (PC) and the clinical pharmaceutical activities related to it have been recognized as a promising area of Pharmacy since the movement known as Clinical Pharmacy, which emerged in the United States in the 1960s, along with the publication of the first results regarding the pharmacist's clinical practice.[1,2] Since then, PC has become a reality, especially in countries with higher economic development.[3,4] This professional practice is characterized by actions and services performed by pharmacists in an integrated manner with the healthcare team. These actions and services should be directed toward patients, families, and communities, with the goal of promoting the safe and rational use of medicines and achieving the best possible health outcomes, according to the definition provided by the National Guidelines for Pharmaceutical Care.

Although professional experience and intuitive practice are relevant aspects, it is recommended that PC be conducted according to a clinical method. In this regard, the Person-Centered Clinical Method (PCCM) is a systematic, structured, and patient-centered process through which interventions are implemented to potentially improve people's quality of life. PCCM should involve the planning of therapeutic goals in collaboration with the assisted individual, with respect for their preferences and their experience with the disease.[5]

PC, when structured through a clinical method, comprises steps such as patient reception, collection of demographic and socioeconomic data, anamnesis, collection of objective and subjective clinical data, review of pharmacotherapy, and identification of drug-related problems (DRPs), which result in pharmacotherapeutic interventions, monitoring of interventions, development of the care plan, and pharmacotherapeutic follow-up, among other actions or services.[5] Pharmacotherapeutic follow-up methods such as the Pharmacist's Workup of Drug Therapy (PWDT) or Pharmacotherapy Workup (PW), in addition to the Dáder Method, suggest tools to document actions and types of drug-related problems (DRPs).[6-8]

In this article, the term DRP was chosen because it represents a broader, patient-centered concept that takes into account social and access-related aspects impacting pharmacotherapy outcomes, and it is also consistent with documents published by the Ministry of Health.[5] In this sense, it expands the pharmacist's role beyond the drug itself, encompassing the entire therapeutic process.

Especially in developing countries, such as Brazil, where PC is not yet a widely established area of practice,[9] it is essential that pharmacists be trained or have access to documents that provide the foundation for the development of clinical reasoning, with a focus on identifying potential and actual DRPs. In general, these countries lack a clear and widely accepted reference to support a rational process of pharmacotherapy review that culminates in the classification of problems and the proposal of interventions based on them. The lack of uniformity in the terminology used to describe identified DRPs undermines the standardization of practices, communication among professionals, and the dissemination of results.

In this context, this article proposes the construction of an algorithm to support clinical reasoning during pharmacotherapy review. By proposing a structured and systematized classification, this work aims not only to overcome existing conceptual barriers but also to contribute to standardization, the advancement of pharmaceutical practices, and the integration of PC into interdisciplinary care.

Methods

Type of Study

This was a descriptive study with a qualitative approach, based on scientific literature addressing methods of pharmacotherapeutic follow-up that classify drug-related problems (DRPs).

Algorithm Development

The first step in building the algorithm was identifying previously published categories of DRPs (Adherence, Need, Effectiveness, and Safety) (conceptual modeling).[6-8] From this starting point, the sequence of steps for clinical reasoning was defined, to be developed through contact with the medication user or their caregiver, collection of data from a medical record, and review of a medical prescription. Subsequently, criteria for classifying DRPs and creating the algorithm for their systematic identification were established. The algorithm was submitted to theoretical validation by subject matter experts through peer review to assess the clarity, relevance, and consistency of its components. Since medication adherence is a fundamental aspect of the algorithm, it is essentially an instrument designed for the pharmacotherapy review of outpatients.

Results

Pharmacotherapy review involves analyzing each prescribed or currently used medication, considering its necessity, adherence, effectiveness, and safety. It is recommended that, after patient reception and collection of clinical data, including pharmacotherapy information, the review should begin with an analysis of possible therapeutic duplications. Examples of therapeutic duplication include: situations in which the same active ingredient is prescribed twice; two different drugs from the same class (e.g., two beta-blockers prescribed for a cardiac condition); or two drugs from different classes but with similar mechanisms of action, whose combination should be avoided (e.g., angiotensin-converting enzyme inhibitors combined with angiotensin II receptor antagonists). In cases of duplication, the issue should be classified as a DRP of need/indication, and an intervention should be planned to propose discontinuation of at least one of the medications or one of the formulations.

Next, for each medication, the need for its use should be analyzed, taking into account diagnosed diseases, health conditions, or complaints. If medication use is not justified by the data collected, there is a potential DRP of need, and an intervention with the prescriber may be appropriate, particularly when discontinuation of the medication is considered. If the prescriber justifies the prescription based on a situation not reported by the patient or not recorded in the medical record, the DRP should be disregarded, and the pharmacotherapy review should proceed.

In situations where the medication is indicated for a health condition, adherence should be assessed. At this stage, the pharmacist must investigate whether the patient takes the medication at the correct times and administers it properly. If the patient is non-adherent, this represents an adherence-related DRP, the cause of which should be investigated and addressed with the patient and the healthcare team. It is important to note that non-adherence may be intentional, when the individual has access to the medication but deliberately does not take it, or unintentional. In the latter case, adherence-related DRPs may result from adverse reactions or difficulties in access.

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Based on this assessment, the pharmacist is better equipped to carry out a more effective intervention to resolve the problem identified. Adherence should be assessed at this point in the pharmacotherapy review, after the analysis of the need for use, since inadequate adherence would make the evaluation of effectiveness and safety unreliable.

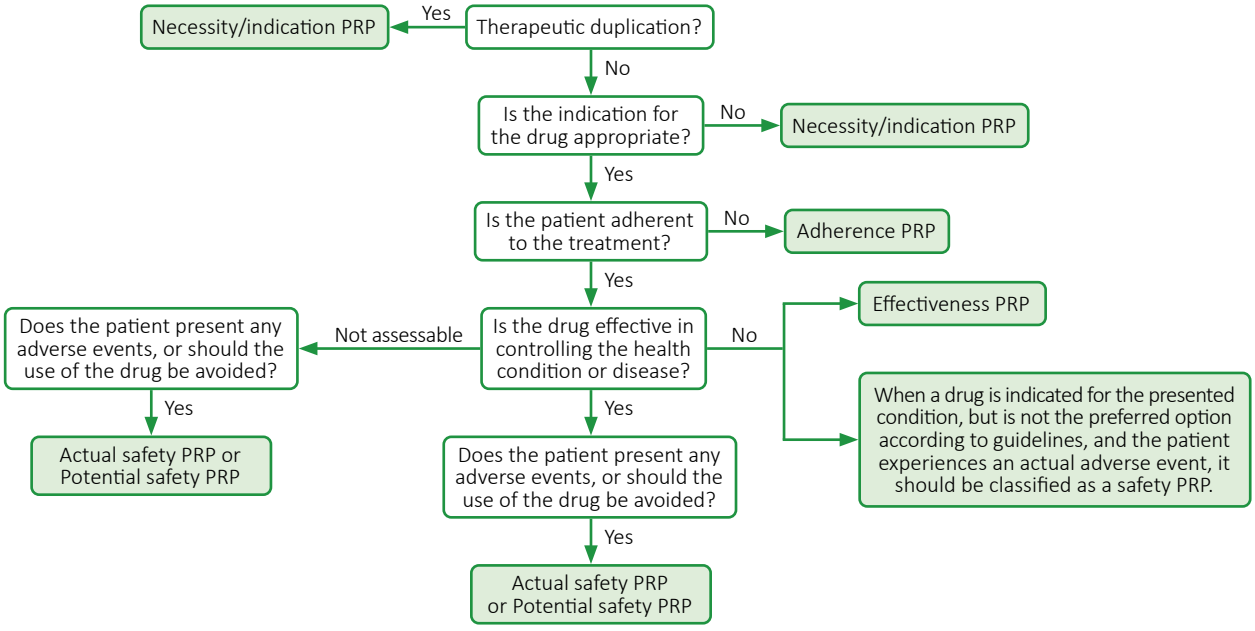
If adherence is adequate, preferably assessed through direct or indirect methods, it is recommended that treatment effectiveness be evaluated. At this point, three possible situations may arise: the impossibility of assessing effectiveness (for example, the patient has diabetes mellitus, but there are no available blood glucose or glycated hemoglobin values to evaluate the effectiveness of metformin); the treatment is effective; or the treatment is ineffective. In all three situations, a safety assessment should follow. In the first situation, when it is not possible to assess effectiveness, a safety-related DRP may still exist due to an adverse drug reaction (ADR) or overdose. In cases where the treatment is effective but an adverse event occurs, it should be classified as a safety-related DRP. As in the first situation, the pharmacist should analyze the "risk versus benefit" balance and consider possible interventions through guiding questions: Are there safer and more accessible therapeutic alternatives? Is it possible to reduce the dose of the current medication while maintaining it within the therapeutic range? In cases of overdose, the pharmacist must necessarily intervene to recommend dose adjustment. If the treatment is ineffective, the issue should be classified as an effectiveness-related DRP, except when the prescribed medication is not the best therapeutic option (according to the literature and clinical protocols) and, at the same time, a real adverse event is associated with the drug.

In such cases, the problem should be classified as a safety-related DRP. It is worth noting that some drugs may be potentially effective for certain health conditions according to the literature, but contraindicated for the patient in use. In these cases, the pharmacist should both classify the problem as a potential safety-related DRP and consider an intervention.

After the preceding steps, it is recommended to evaluate, based on the collected information, whether there is any untreated health condition or morbidity for which pharmacological treatment would be indicated. If so, this represents a need/indication-related DRP (Figure 1). Drug interactions may also be the cause of effectiveness- or safety-related DRPs, either real or potential. It is suggested that, when evaluating a drug interaction and considering an intervention, factors such as the severity of the event caused by the interaction, the level of evidence, temporality, and therapeutic alternatives should be considered. In this regard, the algorithm proposes that pharmacotherapy review be finalized with an analysis of drug interactions that may cause DRPs (Figure 2).

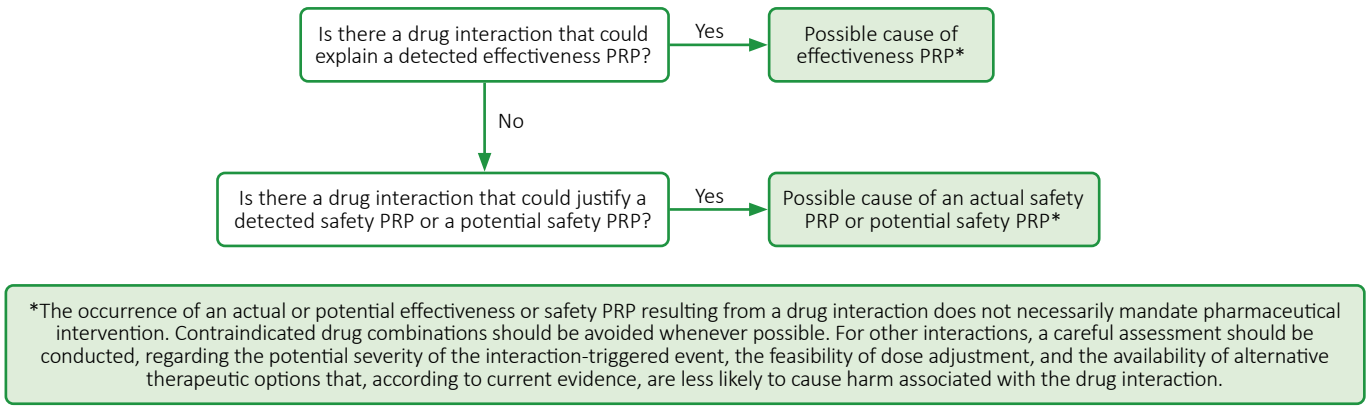
There are situations in which the same medication may be involved in two problems (for example, an inappropriately indicated medication that is also causing an ADR). Nevertheless, this article recommends that, for the purpose of consolidating indicators, a single medication should be linked to only one DRP (Need, Adherence, Effectiveness, or Safety), according to the sequence of reasoning described in the algorithm. In the example above, the problem would be classified as a need-related DRP, since the analysis of need/indication precedes the analysis of safety. Finally, in any proposed intervention, the pharmacist should take into account all issues related to the medication in order to guide their approach.

Figure 1. Flowchart for pharmacotherapy review and classification of drug-related problems (DRPs) in outpatients.



PRP: pharmacotherapy-related problem.

Figure 2. Flowchart for the evaluation of drug interactions as possible causes of drug-related problems (DRPs).



PRP: pharmacotherapy-related problem.

Discussion

There is robust evidence in the literature regarding the clinical and economic benefits of Pharmaceutical Care (PC). A systematic review with meta-analysis, which included randomized clinical trials conducted in different settings, demonstrated that the implementation of interdisciplinary programs involving pharmacists improves patients' quality of life and reduces hospital admission rates.[10] Although the objective of the present article essentially focuses on proposing a tool for the identification and classification of drug-related problems (DRPs), without any economic analysis of PC, it is worth highlighting that studies—including two systematic reviews—have shown the positive economic impact of PC in healthcare services of varying complexity, including community pharmacies that serve outpatients.[11-13]

The authors of this article consider that the proper and rational identification of DRPs is the main pillar of a pharmacotherapy review that leads to improved outcomes related to medication use. It is important to emphasize that this pharmaceutical service may involve both prescription medications and non-prescription medications. For reviews involving non-prescription drugs, it is essential that pharmacists exercise their autonomy in promoting the rational use of medicines and responsible self-medication, as part of the self-care process of the assisted individuals.

From the correct identification of real or potential DRPs, the causes of these problems can be investigated, and interventions can be proposed effectively, respecting, from a holistic perspective, the characteristics, social conditions, and perceptions of the medication user regarding their health status.

As mentioned earlier, although this article may serve as guidance for clinical pharmacists in hospital settings, it is especially intended for pharmacists in primary and secondary care, given the relevance of assessing adherence to pharmacological therapy. This focus underscores the need for proactive management of adherence problems, based on clinical reasoning that guides specific strategies to address the underlying causes of inadequate adherence. The assessment of adherence, which is imperative as it represents a transversal issue impacting both the effectiveness and safety of drugs, can be based on direct and indirect methods.

Examples of direct methods include laboratory analytical techniques that quantify the drug or its metabolites in biological fluids. In routine healthcare services, however, indirect methods—such as patient self-reports obtained through previously validated questions—are generally more feasible. The Morisky Green Adherence Scale is an example of a structured questionnaire that characterizes an indirect method.[14,15]

The absence of documents that systematize the identification and classification of DRPs contributes to subjectivity in the evaluation process, hindering the standardization of clinical practices and limiting the comparison of results across different healthcare contexts. Thus, the proposal of a specific clinical algorithm represents an innovative and necessary contribution, as it strengthens pharmaceutical clinical practice and promotes greater quality and safety in pharmacotherapy evaluation. By providing a tool that simplifies and rationalizes the identification of DRPs, this work has the potential to enhance safety for both pharmacists and patients, while also enabling pharmacists to carry out more specific and assertive interventions.

The publication of indicators—such as the number of interventions performed to resolve identified DRPs and the acceptance rate of such interventions—may contribute to building evidence on the role of pharmacists in healthcare. These indicators not only strengthen pharmaceutical practice but also support the consolidation of interprofessional practices and the achievement of better clinical and humanistic outcomes.[16]

Furthermore, the standardized identification of DRPs, grounded in rational clinical reasoning, may facilitate the integration of information systems, both public and private, particularly with regard to patients' medication histories within healthcare networks. In addition, this article is aligned with the National Curriculum Guidelines for Undergraduate Pharmacy Programs, as it proposes a strategy for pharmacotherapy evaluation within the scope of the Unified Health System (SUS) and community pharmacies. Finally, this work may be used as a strategy for curricular extension activities in undergraduate pharmacy education, as well as for the continuing education of practicing pharmacists involved in outpatient care.

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Conclusion

The proposed algorithm has the potential to optimize the role of pharmacists in clinical practice, providing support for the development of clinical reasoning during the process of identifying and classifying possible DRPs. In doing so, it promotes the translation of theoretical concepts into professional practice, overcoming barriers to the harmonization and integration of clinical practices carried out by pharmacists.

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Contributors

VDL: (1) Project conception, data analysis, and interpretation; (2) Manuscript drafting and critical revision for intellectual content.

JPVR: (1) Project conception, data analysis, and interpretation; (2) Manuscript drafting and critical revision for intellectual content.

LRLP: (1) Project conception, data analysis, and interpretation; (2) Critical revision for intellectual content.

Conflict of Interest Statement

The authors declare no conflicts of interest related to this article.

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