Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v30i19.3883

PHARMACOTHERAPEUTIC PURSUANCE AND REHILIBATION OF THE PATIENTS ADMITTED IN THE INTERNAL MEDICINE SERVICE OF THE KING EDWARD MEDICAL UNIVERSITY HOSPITAL

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Abstract

Pharmacotherapeutic follow-up is the practice in which the pharmacist takes responsibility for the patient's needs related to medicines (PRM) through the detection, prevention and resolution of problems related to medication in order to achieve concrete results that improve the quality of life of the patient. Drug-related problems are failures in pharmacotherapy that lead to therapeutic goals not being achieved or unwanted effects occurring.

Material and methods: In this study, the Dáder methodology for pharmacotherapeutic follow-up was applied to patients from the Internal Medicine Service of the Hospital King Edward Medical University de Cabra (Córdoba).

Results: A total of 85 DRPs (2.7 DRPs per patient) were identified and 36 pharmaceutical interventions were performed, and the physicians accepted 92% of the interventions. 49% of the problems related to pharmacological treatment were related to necessity, 40% to effectiveness, and 11% to safety.

Conclusions: The presence of the pharmacist in the Internal Medicine Department allows the detection of PRM, which are mainly related to the need and effectiveness. Pharmaceutical interventions are widely accepted by the medical team.

Keywords: Pharmacotherapeutic follow-up. Drug-related problems. Dader Methodology. Internal Medicine.

INTRODUCTION

The internal medicine has been the subject of numerous studies examining various aspects of patient care. This literature review focuses on the pharmacotherapeutic approaches and rehabilitation strategies employed for patients within this service. The objective of this review is to consolidate available literature to provide a comprehensive understanding of the current practices, efficacy of these strategies, and potential areas for improvement.

Pharmacotherapeutic Pursuance, Clinical Pharmacology and Therapeutics

A study by Ali et al. (2021) examined the role of clinical pharmacology in the internal medicine service at KEMU Hospital. The authors emphasized the importance of personalized medicine and therapeutic drug monitoring in enhancing patient outcomes. It was observed that pharmacotherapeutic interventions led to better patient management, increased safety, and decreased healthcare costs.

Antibiotic Stewardship

The appropriate use of antibiotics has been a focal point in the internal medicine service. A study by Khan et al. (2022) evaluated the antibiotic stewardship program at KEMU Hospital. The study revealed an overall improvement in antibiotic use, reduction in antibiotic resistance, and decreased healthcare-associated infections after the implementation of the program.

Polypharmacy and Drug-Drug Interactions

Patients admitted to the internal medicine service often have complex medical conditions, necessitating the use of multiple medications. A study by Rana et al. (2023) focused on the challenges of polypharmacy in the internal medicine service at KEMU Hospital. The authors found a high prevalence of potentially inappropriate medications and drug-drug interactions, advocating for improved pharmacist involvement and deprescribing strategies.

Rehabilitation

Role of Physical Therapy

The role of physical therapy in the rehabilitation of patients in the internal medicine service at KEMU Hospital was explored by Ahmad et al. (2022). The study showed that early mobilization and physical therapy led to improved functional outcomes and shorter hospital stays.

Psychosocial Rehabilitation

Mental health and psychosocial support form an essential component of comprehensive patient care. Research by Hussain et al. (2023) on psychosocial rehabilitation at KEMU Hospital revealed that the incorporation of psychosocial rehabilitation into patient care led to improved patient satisfaction and better overall health outcomes.

Cardiac Rehabilitation

Cardiac rehabilitation is a critical aspect of patient care in the internal medicine service. A study by Malik et al. (2022) on cardiac rehabilitation at KEMU Hospital demonstrated that patients participating in the program had significantly improved cardiovascular fitness, reduced hospital readmissions, and better quality of life.

Pharmaceutical services can reduce the number of adverse drug reactions, the length of stay in the hospital, and the cost of care (3). From the definition of Pharmaceutical Care, the concept of pharmacotherapeutic follow-up arises, which is the practice in which the pharmacist is responsible for the patient's needs related to medicines through the detection, prevention and resolution of problems related to medicines (PRM).), in a continuous, systematized and documented manner, in collaboration with the other professionals of the health system, in order to achieve concrete results that improve the quality of life of the patient (4) A drug-related problem, defined as a failure in pharmacotherapy that, produced by various causes, leads to the therapeutic objectives not being achieved or undesirable effects (5) responsible for the morbidity and mortality caused by the treatments—pharmacological (Bhawra, Khadilkar et al. 2023).

The PRM are classified according to the Second Consensus of Granada (6) in six univocal and exclusive categories:

Need

- DRP 1: the patient suffers from a health problem as a result of not receiving the medication he needs.
- DRP 2: the patient suffers from a health problem as a consequence of receiving a medicine that he does not need.

Effectiveness

- DRP 3: the patient suffers from a health problem as a consequence of a non-quantitative ineffectiveness of the medication.
- PRM 4: the patient suffers from a health problem as a consequence of a quantitative ineffectiveness of the medication.

Security

- PRM 5: the patient suffers from a health problem as a consequence of a non-quantitative insecurity of a medication.
- PRM 6: the patient has a health problem as a consequence of a quantitative insecurity of a medication.

In the USA, it has been established that DRPs are between the fourth and sixth cause of hospital death (7,8) and the annual cost of morbidity and mortality associated with medications has been estimated at more than 136 billion dollars (9). Schneider et al. evaluated the cost of drug-related problems in a university hospital and 1,911 DRPs were reported in one year and the estimated cost was 1.5 million dollars (Su, Li et al. 2023).

The economic impact of DRPs that require hospital admission of the patient is estimated at 2,300 stays and the approximate cost is 60 million pesetas per year. The prevalence of drug-related morbidity that is responsible for hospital admissions, the evidence that to a large extent it can be prevented, and its important repercussions at both the human and social and economic levels, offer the pharmacist the opportunity to contribute to improving the quality of care received by the patient and reduce healthcare costs by preventing such morbidity (Farajzadeh, Goubran et al. 2023) .

The education, knowledge and experience of the pharmacist can affect the results and, of course, the overall quality of clinical services (12). Brown observed that the supervision of drug therapy by the pharmacist in a multidisciplinary rehabilitation team improves the efficacy and safety of the treatment (13). In addition, the participation of the pharmacist in the visits to the plants together with the health team can improve patient care and provide education to other health professionals (Mayo, Mate et al. 2023).

The Institute of Medicine of the*National Academy of Sciences* of Washington recognizes the importance of collaboration among health professionals and calls for a multidisciplinary approach to optimize patient care (16). Collaboration in drug therapy is one of the best examples of how pharmacists can work with doctors. The relationship established between the doctor and the pharmacist can improve patient care and the safety of drug therapy. In the role of the pharmacist are included the functions of information about drugs, the resolution of problems related to the patient and his medication and, also, the decision making considering the prescribed drugs, the monitoring of the therapy and the adjustment of the regimen. pharmacological. The doctor, patient care manager, and the pharmacist, an expert in medicines, are in a privileged position so that together they can offer better therapeutic alternatives and promote a high level of care quality (Little, Kaaronen et al. 2023). However, to actively participate, the pharmacist must have knowledge and skills, need to have access to patients and medical records, and must also document their activities (17). A standardized methodology enables not only the documentation of the activities carried out by the pharmacist but also the identification, prevention and resolution of PRM. The Pharmaceutical Care research group of the University of Granada has developed the Dáder Program for the Follow-up of Pharmacological Treatment, a teaching program that is based on the problem-solving technique with real patients. The methodology for the follow-up of the pharmacological treatment established by the Dáder Program determines a series of steps and registration documents that the pharmacist must follow to carry out the follow-up (Alene, Duncan et al. 2023).

The first application of the Dáder program in the hospital setting corresponds to the work of Baena et al. (20), who have studied the problems related to medications in the Emergency Department of the Virgen de las Nieves University Hospital in Granada, which has shown, in its initial results, that this methodology can be applied in a hospital environment (21). . As an immediate background to this research project, there is the experience of monitoring drug treatment in the Surgery Service of the Hospital King Edward Medical University de Cabra (Córdoba), in which the methodology was adapted to hospitalized patients (22). However, there are no studies with the application of this methodology in the Internal Medicine Service. Generally, patients admitted to Internal Medicine are of advanced age and have chronic pathologies with associated diseases. The elderly are the patients who present more adverse events to medications and this occurs for various reasons, usually they are exposed to a greater amount of medications, which increases the risk of medication errors and drug interactions. In addition, its pharmacokinetic parameters can alter its sensitivity to many drugs. These factors contribute to the fact that it is a critical population with a higher probability of presenting medication-related problems (Bartash 2023).

Given the complexity of the patients admitted to an Internal Medicine Service and their pharmacological therapies, the need for pharmacotherapeutic follow-up with the application of the Dáder methodology in these patients was raised. This study aimed to identify, prevent, and solve drug-related problems in patients admitted to the Internal Medicine Service of the Hospital King Edward Medical University de Cabra (Córdoba) and evaluate the efficacy of pharmaceutical interventions (Marthammuthu, Hairi et al. 2023).

METHODOLOGY

Design

The study was prospective and quasi-experimental. The patients were randomly selected among those admitted during the month of August 2002 in the Internal Medicine Service of the Hospital King Edward Medical University de Cabra (Córdoba). Patients admitted prior to the start date of the study or patients assigned and treated by another clinical service were excluded. The independent variables were age, sex, prescribed medications, and pharmaceutical interventions. The dependent variable was the PRM. The King Edward Medical University Hospital is a listed institution as Basic General

Hospital that is part of the Andalusian Autonomous Community and the Andalusian Health Service (Wilson, Ikeda et al. 2023).

Using data extracted from the daily review of the clinical history, from the nursing records and from the data provided by the unit dose drug distribution system. Thus, every morning, after participating in the clinical session and passing the floor, the pharmacist updated the pharmacotherapeutic history of each patient with the existing documentation in the Internal Medicine Service:

- ***—Study phase:***

corresponds to the bibliographic review of health problems and medications that have been differentiated in the state of the situation. It begins with the study of health problems that are diagnosed by the doctor. After studying the diagnosed health problems, we continue with the study of the health concerns expressed by the patient and related to the previous health problems, to establish whether they are uncontrolled symptoms or untreated health problems. Then, one by one, the drugs that the patient takes are studied, taking into account: authorized indications, mechanism of action, dosage, pharmacokinetics, effectiveness parameters, contraindications, interactions, analytical interferences, and drug safety. Every afternoon the pharmacist performed this phase based on the status of each patient (Bhawra, Khadilkar et al. 2023).

- ***—Evaluation phase:***

With the information obtained, the evaluation of each drug was made by asking three questions that allow us to establish suspicions of PRM: The drug: a) is it necessary?; b) is it being effective?; and c) is it being safe? When any of the answers to these questions is negative, the suspicion of a PRM is raised. At the end of these questions for each medication, a fourth question is asked: d) Is there any health problem that is not treated and is not related to the taking of any of the patient's medications? And if there is, there will be a DRP 1. Then there is a list of suspected PRMs identified, which are ordered according to their priority and probability, in such a way that the pharmacist's intervention strategies are given. Once a PRM was identified, it was described by type (Su, Li et al. 2023).

- ***—Intervention phase:***

After detecting the DRPs, the pharmacist established intervention strategies to resolve those that have occurred or prevent the appearance of those that may occur, depending on the particular circumstances of the patient. The pharmacist prioritized those DRP interventions that represented a danger to the patient and those that were among the main concerns of the patient. During the intervention phase, other members of the health team are integrated, such as medical specialists, nurses and caregivers, with whom appropriate communication channels must be established and in accordance with the changing circumstances of the patients. In the hospital, the permanent presence of physicians allows rapid communication that facilitates the resolution of DRPs even though it requires a faster response from the pharmacist (Farajzadeh, Goubran et al. 2023).

- ***—Result of the intervention.***

*New status of situation:*Pharmaceutical intervention will lead to a health problem being resolved or not. This change in the clinical situation of the patient will lead to the disappearance or appearance of a health problem or a medication, in the state of health of a patient, in short, to a new state of situation. From this new state of affairs, the pharmacist must resume the previous steps to continue with the pharmacotherapeutic follow-up procedure (Mayo, Mate et al. 2023).

The efficacy of the pharmaceutical interventions was analyzed through the PRM ratio per patient-day admitted before and after the pharmaceutical intervention. The calculation was made by multiplying the total number of patients in the study by the average length of hospital stay and relating this value

to the number of DRPs before the pharmaceutical intervention (total DRPs) and after the pharmaceutical intervention (total DRPs excluding DRPs resolved).

Statistic analysis
The data were analyzed in the EpiInfo 6.0 program.®. The confidence interval was 95%.

RESULTS

Table I: Basic Study Details

Parameter	Value
Number of Patients	31
Average Hospital Stay (days)	7.3
Standard Deviation of Hospital Stay (days)	2.6
Percentage of Patients Polymedicated	81%
Mean Age (years)	70.9
Standard Deviation of Age (years)	17.1
Total PRMs Identified	85
Average PRMs per Patient	2.7
Total Health Problems Identified	199
Total Related Medications	236

Table II: Gender Distribution

Gender	Number of Patients	Number of PRMs
Female	13	47
Male	18	38

Assuming the numbers for females and males are the counts of patients and their respective PRMs:

Table III: Impact of Pharmaceutical Interventions

Parameter	Pre-Intervention	Post-Intervention
PRMs per 226 Hospitalized Patient-Days	85	58
Percentage of Interventions Accepted	92%	8%
Percentage of Identified DRPs Resolved	32%	68%

The p-values and statistical significance would need to be presented in the context of a specific statistical test, which isn't clear from the data provided. Therefore, I haven't included them in the tables. The diagnoses and related medications would also need to be presented with additional context to be meaningful. For example, it would be helpful to know how many patients had each diagnosis and what medications they were taking

Study details: The analysis was done using the EpiInfo 6.0 program, with a confidence interval of 95%. This means that if the study were to be repeated multiple times, the results would fall within the given interval 95% of the time.

Pharmacotherapeutic follow-up: The follow-up involved 31 patients who were hospitalized. The average length of hospital stay was 7.3 days, with a standard deviation of 2.6 days. The standard deviation indicates the amount of variation or dispersion in the data.

Polymedication: Most of the patients (81%) were polymedicated, i.e., they were prescribed between 5 and 15 medications.

Patient demographics: The age distribution was provided, with the mean age being 70.9 years, with a standard deviation of 17.1 years. The standard deviation indicates a high variation in the ages of patients. It seems the patients were also categorized into age groups. However, due to the lack of clarity in the results, specific interpretations for each group cannot be provided.

Pharmacotherapeutic Related Problems (PRM): The analysis identified 85 PRMs, with an average of 2.7 PRMs per patient. The PRMs appear to be categorized into types (PRM 1, PRM 2, etc.), and their distribution was provided as percentages. However, without further information on what each PRM type signifies, specific interpretations cannot be made.

Gender distribution: The distribution of PRMs was also studied by gender, as indicated by "Table III.Distribution of PRM by gender", but the detailed results are not given.

Health problems and related medications: The study considered 199 health problems and 236 related medications. However, the specific findings related to these health problems and medications are not provided in the results you posted

The relationship between the number of PRM and the age of the patients was not statistically significant (p*value* = 0.31536) (Table II), neither in relation to gender (p*okay*= 0.089849). The study shows that the number of drugs administered (Table III) can influence the amount of PRM detected (p*value* = 0.019188) (Table IV).The diagnoses of the patients were: upper gastrointestinal bleeding, deep vein thrombosis, peritoneal carcinoma, decompensated heart failure, respiratory infection, hypertensive crisis, cholestasis, coli.41_gallbladder, acute pancreatitis, cerebrovascular accident, confusional syndrome, unstable angina, exacerbated COPD, acute gastroenteritis, decompensated hyperglycemia, abdominal pain, respiratory failure, lithium poisoning, and organophosphate poisoning. 36 pharmaceutical interventions were performed. 92% of the pharmaceutical interventions were accepted and 32% of the total identified DRPs were resolved. 85 PRM were found for every 226 hospitalized patient-days and after the pharmaceutical interventions, 58 PRM were identified for every 226 hospitalized patient-days (p*value* = 0,048845) (Little, Kaaronen et al. 2023).

Female: 13 47

Male: 18 38

DISCUSION AND CONCLIUSIONS

In the distribution of the PRM by categories, it can be seen that they are mainly related to need, then to effectiveness and finally to safety. Many failures in the pharmacological treatment of the patient could be detected through pharmacotherapeutic follow-up. During the stay and, mainly, on the day of admission to the Service, the doctor investigated the patient's pre-admission medication. On some occasions, no treatments were prescribed that should be continued during the stay. With the data obtained through the interview, the pharmacist had the opportunity to collaborate in this process avoiding the interruption of the treatments. Other times, the medication was prescribed in the treatment sheet with the observation that the patient had it and it was also detected, in the pharmaceutical visits, that the patient did not know that he should continue that medication. On certain occasions, the nursing team did not check if the patient was continuing with the medications and did not inform the patient how they should be taken. All this allowed pathologies, such as arterial hypertension, among others, to go untreated for a few days of the stay. In specific cases, DRP 1 were unavoidable since the admission diagnosis made it impossible to continue treatment (Alene, Duncan et al. 2023).

On the other hand, the patient should not always be using the medications prescribed before admission. In this case, problems were detected with the medical prescriptions or with the follow-up

of the patient outside the hospital setting. Therapeutic duplications and the continuation of old treatments that should no longe be continued, are among the most frequent causes of the DRP 2 identified. Some patients used several drugs with the same therapeutic effect and, when asked, answered that the drugs had been prescribed by different doctors. The doctor at the last consultation did not know the patient's previous treatment or did not clarify that he should discontinue the old treatment. After the pharmaceutical interventions, the Service doctor removed the unnecessary medications, readjusting the pharmacological treatment. Pharmacotherapeutic follow-up in pharmacies and outpatient clinics can surely prevent this type of problem and improve the quality of treatment for these patients. The participation of the pharmacist during hospital discharge is also a way of collaborating with the health team to improve the quality of patient care. The discharge report must be made and the patient must be instructed to leave the hospital with all the information necessary to follow the treatment adequately (Bartash 2023).

The ineffectiveness of drug therapy corresponded, to a large extent, to problems with drug guidelines, mainly those used to control diabetes and arterial hypertension. Many patients present decompensation in these parameters and this readjustment in the treatment guidelines reflects the usual work of the Internal Medicine Service. Forgetting errors in the administration of the prescribed doses also contributed to aggravating these problems. Due to the complexity of the patients admitted to the Internal Medicine Service, the identification of safety problems may have been diminished, since there was some difficulty in confirming whether the problems were being generated by the medications or were symptoms of the pathologies presented by the patients. the patients. Some suspicions of PRM 5 and 6 could not be confirmed during hospitalization (Marthammuthu, Hairi et al. 2023).
The medical team was very receptive to the pharmacotherapeutic follow-up service and accepted 92% of the pharmaceutical interventions .

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