



## Original Article

## Medication discrepancies at discharge from an internal medicine service

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## ABSTRACT

**Background:** Medication errors most commonly occur at the time of medication prescribing and particularly at the moment of the transitions of care. The objectives of this study were to identify and characterize the discrepancies between the physicians' discharge medication orders and the medication lists at admission obtained by an internal medicine specialist physician in a general internal medicine service.

**Methods:** This descriptive, retrospective, study was carried out at a tertiary care university teaching hospital in Spain. It was based on the review of non selected, consecutive, hospital discharge reports. Discrepancies were identified, categorized and characterized through the analysis of the information (medication lists, laboratory tests results, diagnosis, and clinical evolution) contained in them.

**Results:** We analyzed 954 discharge reports. In the medication reconciliation process, we find discrepancies in 832 (87.2%) of them. Justified discrepancies were found in 828 (86.8%) reports and unjustified discrepancies in 52 (5.4%). Omission of a medication was the most frequent medication error detected in 86.4% of cases, followed by incomplete prescription (9.6%). The number of diagnosis, the length of hospital stay and the number of permanent medications at admission were the characteristics of cases associated with medication discrepancies in multivariate linear regression ( $P < 0.01$ ).

**Conclusions:** Although considering the limitations in its design, it is remarkable the low number of medication errors detected in our study. Appropriate routines to ensure an accurate medication history collection and a methodical elaboration of the medication list at discharge, when performed by trained internists, are important for an adequate medication reconciliation process.

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## 1. Introduction

Medicines are the major therapeutic weapons at our disposal in dealing with the management of diseases.

However, the use of medications can, in turn, generate unexpected or unwanted problems. These are the so called medication misadventures that occur by mistake, or deliberately, in the process of using drugs and may, or may not, cause harm to the patient [1].

Among medication misadventures, medication errors are defined as 'any preventable events that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient or consumer' [2].

Medication errors result in adverse events in 2% of hospitalized patients and adverse drug events (ADEs, defined as an injuries due to medical treatment) contribute to 20–72% of adverse events around the time of hospitalization, with a significant impact in healthcare costs [3].

The results of studies conducted in Spain show that medication errors have a medical and economic impact similar to that in the USA.

Thus, different studies have reported rates ranging between 2.2% and 4% of hospital admissions in Spanish medical services due to medication errors, also bringing high costs [4].

Medication errors most commonly occur at the time of prescribing medication, and chart reviews reveal that over one half of all hospital medication errors occur at the moment of transitions of care [5,6]. One study indicated that 54% of patients admitted to an inpatient unit had at least one unintended medication discrepancy between the patient's home medication regimen and the admission orders [7]. The experience from some hospitals in the USA has shown that poor communication of medical information at transition points is responsible for as many as 50% of all medication errors in the hospital, and up to 20% of ADEs [8].

These facts underline the importance of the practice of the so called medication reconciliation, which has been defined as 'the process of creating the most accurate list possible of all medications a patient is taking – including drug name, dosage, frequency, and route – and comparing that list against the physician's admission, transfer, and/or discharge orders, with the goal of providing correct medications to the patient at all transition points within the hospital' [9].

The aim of reconciliation is to guarantee that patients receive all necessary medicines adapted to their clinical and social situation [10]. The medication reconciliation process starts when the patient is admitted to the hospital, with the creation of the medication list,

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continues whenever the patient is transferred to a different level of care, and occurs again when the patient is discharged from the hospital (identifying variances, and rectifying medication errors). In this procedure, changes in medication can be included: some of them are intended therapeutic changes (intentional discrepancies in reconciliation), whereas others are the consequence of unintended changes (unintentional discrepancies) and can be considered as medication reconciliation errors [11].

Several reports have described the discrepancies in reconciliation that occur when the medication use histories obtained by pharmacists are compared with admission medication orders in hospitalized patients [7,12]. Other studies have specifically investigated the type, frequency, and severity of medication discrepancies for hospitalized older patients [13].

The objectives of our work were retrospectively to identify and to characterize the unintended discrepancies between the physicians' discharge medication orders and the medication lists at admission obtained by an internal medicine specialist physician through the analysis of the hospital discharge reports of patients admitted to a general internal medicine hospital ward.

## 2. Materials and methods

We carried out a descriptive, retrospective, study between January and July 2008 at the University Hospital of Salamanca, a tertiary care university teaching hospital in Spain, with more than 1000 hospital beds. The work was carried out in the internal medicine unit 'The Montalvos' where, during 2008, more than 1700 patients were treated in its fifty hospital beds.

The study was based on a review of the patients' discharge reports which were produced by the service's specialist physicians during the first seven months of the year, without any selection criteria.

### 2.1. Discharge reports

All the evaluated reports included a list of the medicines the patients were receiving before hospitalization. The service's medical specialists have incorporated into their everyday clinical practice the careful completion, by means of an interview, of a comprehensive list of the medications that the patients are taking at the time of their admission to hospital. The list (recorded in a word processing program) includes all prescription and non-prescription medications, investigatory therapies, vitamins, herbal remedies and any other products used to supplement the patient's health. The interview also includes a complete allergy assessment, classifying reported allergies as 'immune-mediated reactions', 'sensitivities or intolerances', or 'no known allergies' [12].

Special attention is given to the completion of this pharmacotherapeutic part of the patient's history. With this purpose, the medical specialists ask the patients (who often bring their prescription vials to the hospital), their relatives or other accompanying persons, about their medication, as well as using the patients' own medical reports (from their primary care physicians or hospital specialists), and those filed in the archives of the service, or in the hospital records. If necessary, information is obtained through telephone contact with a reference person (family member, surrogate decision maker, primary care physician, nursing home personnel...). The source of this information is also included in the history. At the time of writing the discharge report and when specifying the list of medications that the patient should receive from that point, the medical specialists consider both the admission medication list and the list of medication that the patient received during hospitalization.

Despite the fact that special attention is usually paid to the completion and transcription of the patient's pharmaceutical history in our service, when evaluating the discharge reports, in some cases this information was considered to be incomplete. Those reports in

which the list of the medicines that the patient was receiving before hospitalization was not correctly gathered were not used to evaluate discrepancies.

### 2.2. Main measurements

To complete the survey, a research team member (always the same person) – a specialist in internal medicine and member of the staff of the service – reviewed each discharge report and compared the list of medications the patient was receiving before admission with the list of medications at discharge, in order to identify discrepancies. In this process, the diagnoses contained in the discharge report were also taken into account, with the purpose of recognizing whether the detected discrepancies were justified or not.

From all the analyzed discharge reports the following variables were collected: sex, age, admission date, length of stay, number of diagnoses, cognitive impairment (dementia, mental retardation, and advanced incapacitating psychiatric illness) if any, source of the patient (home and nursing home), number of drugs received at admission (permanent and temporary medication) and number of drugs given at discharge (permanent and temporary medication).

### 2.3. Assessment of medication reconciliation

We compared the list of the medications obtained by the internal medicine specialist who received the patient (which was included in the discharge reports) with the listing of medications at discharge, determining the existence, or absence, of discrepancies between the two lists.

In those cases where discrepancies were detected, we categorized them as justified or unjustified, through the analysis of the additional information (diagnosis and clinical evolution) included in the discharge report.

Finally, we established the number and type of unjustified discrepancies between treatment at admission and at the time of hospital discharge (errors in medication reconciliation).

Ethics approval was obtained from the hospital's ethics committee.

### 2.4. Definitions (based on the classification included in the Appendix A of the Note by Gleason KM, et al.) [12]

A. No discrepancy: no change. The medication at discharge was the same as that at admission.

B. Medication discrepancy: any difference between medication lists at admission and at discharge. Discrepancies include: omission or addition of a medication, substitution of an agent within the same pharmacological class, and change in dose, frequency, or route of administration.

1. Unintentional (or unintended) discrepancy, unjustified discrepancy or medication reconciliation error. This includes:
  - a. Omission of a medication: the patient was receiving, before admission, medication that was not prescribed at discharge, with no clinical explanation for the omission.
  - b. Prescription, at discharge, of a medication using different dosage, route of administration or frequency from that which the patient received before admission, when this difference was not justified by a change in the patient's clinical condition.
  - c. Commission of a medication. A medication was ordered at discharge which the patient did not take before hospitalization. There was no clinical explanation for adding the medication to the patient's therapy.
  - d. Incomplete prescription: when dosage, frequency or duration of treatment were not included for one medicine on the discharge medication list.

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