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Identification of medication discrepancies during hospital admission in Jordan: Prevalence and risk factors

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ABSTRACT

Objectives: Medication errors are considered among the most common causes of morbidity and mortality in hospital setting. Among these errors are discrepancies identified during transfer of patients from one care unit to another, from one physician care to another, or upon patient discharge. Thus, the aims of this study were to identify the prevalence and types of medication discrepancies at the time of hospital admission to a tertiary care teaching hospital in Jordan and to identify risk factors affecting the occurrence of these discrepancies.

Methods: A three months prospective observational study was conducted at the department of internal medicine at Jordan university hospital. During the study period, 200 patients were selected using convenience sampling, and a pre-prepared data collection form was used for data collection. Later, a comparison between the pre-admission and admission medication was conducted to identify any possible discrepancies, and all of these discrepancies were discussed with the responsible resident to classify them into intentional (documentation errors) or unintentional. Linear regression analysis was performed to assess risk factors associated with the occurrence of unintentional discrepancies.

Results: A total of 412 medication discrepancies were identified at the time of hospital admission. Among them, 144 (35%) were identified as unintentional while the remaining 268 (65%) were identified as intentional discrepancies. Ninety-four patients (47%) were found to have at least one unintentional discrepancy and 92 patients (46%) had at least one documentation error. Among the unintentional discrepancies, 97 (67%) were found to be associated with a potential harm/deterioration to the patients. Increasing patients' age (beta = 0.195, p-value = .013) and being treated by female residents (beta = 0.139, p-value = .045) were significantly associated with higher number of discrepancies.

Conclusion: The prevalence of unintentional discrepancies at the time of hospital admission was alarmingly high. Majority of these discrepancies were associated with a potential harm to the patients. These findings support the necessity for implementing the medication reconciliation service in the country, engaging healthcare providers in the process of identification and resolution of medication discrepancies.

1. Introduction

Medication errors are ranked the seventh cause of death worldwide (Stelfox et al., 2006), and are considered among the most common causes of morbidity and mortality in the hospital setting (Poornima et al., 2015). Medication error is generally defined as "a failure in the treatment process that leads to, or has the potential to harm the patient" (Aronson, 2009).

Medication errors are classified into three categories: errors of omission, where the drug was completely not given, errors of commission, where the drug was given incorrectly, and discrepancies, reporting differences between medications taken by the patient prior to hospital admission and medications ordered in the hospital (Ferner and Aronson, 2006). Discrepancies have been previously identified during transfer of patients from one care unit to another, from one physician care to another, or upon patient discharge (Mueller et al., 2012; Poornima et al., 2015; Rozich and Resar, 2001). Changing a medication dose, removal or addition of a medication during hospital admission without a justification are

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common examples on discrepancies (Mueller et al., 2012; Quelennec et al., 2013). In addition, medication discrepancies have been identified as either intentional or unintentional (Kwan et al., 2013).

Over the years, pharmacists have become more active in delivery of medicines and patient care in hospitals (Calvert, 1999; Sulaiman et al., 2017). Moreover, the role of pharmacist in providing effective medication reconciliation interventions is becoming more effective (Lo et al., 2013; Mueller et al., 2012). Pharmacists are in a pivotal position to identify discrepancies (Kraus et al., 2017; Stewart and Lynch, 2014) by providing recommendations to physicians to optimize patient treatment (Fernandes and Shojania, 2012). The "process of obtaining a complete and accurate list of each patient's current home medications including name, dosage, frequency, and route of administration, and comparing the physician's admission, transfer, and/or discharge orders to that list (Wong et al., 2008) has been provided through a medication reconciliation service. The medication reconciliation service has been proven successful in revealing most of discrepancies and preventing harm from reaching the patient (Geurts et al., 2012; Kuo et al., 2013; Super et al., 2014; Vira et al., 2006).

The Joint Commission International (JCI) global organization recommends medication reconciliation to be applied accurately and completely at all care settings for all of its accredited hospitals (Alert, 2006). Accreditation by JCI is granted to hospitals after establishing high standards and policies of patient's care and safety. Among these standards is the application of medication reconciliation service (Alert, 2006). Healthcare providers working in hospitals need to be successfully involved in the reconciliation process to achieve optimal patient care (Geurts et al., 2012) and they are aware of the importance of providing such service (Hammour et al., 2016). However, JCI leaves each hospital the flexibility of determining the way to implement medication reconciliation and which healthcare provider(s) is/are responsible for its implementation (Alert, 2006).

Thus, the present study was conducted to identify the prevalence and types of medication discrepancies identified by pharmacists at the time of hospital admission of patients to a tertiary care teaching hospital in Amman, Jordan. Secondary aim involves the identification of risk factors for the occurrence of these discrepancies.

2. Methods

2.1. Study design, participants and clinical setting

This prospective observational study was conducted over three months (April-June 2017) at an internal medicine department at Jordan university hospital (JUH), a 550 beds tertiary care teaching hospital located in Amman, Jordan.

Patient inclusion criteria included: patients admitted to the hospital recently, whom age $\geq$18 years, using at least 4 regular prescription medications before admission, having an expected length of stay in the hospital (more than 48 h), speaking Arabic, have no apparent cognitive deficiency, and not involved in other clinical trials. Patients were excluded if they were placed in isolation (to avoid unnecessary contact between patients with infectious diseases and the study researcher), discharged within 48 h of hospital admission, discharged against medical advice, unable or unwilling to provide written informed consent.

2.2. Data collection

During each observational day (from 11 am to 5 pm for five days/week), patients' medical files were reviewed to assess patients eligibility for inclusion. Patients were recruited from all internal medicine department subdivisions which include: cardiology, respiratory, hematology/oncology, nephrology, neurology, infectious diseases, gastroenterology, endocrinology, and rheumatology. A written informed consent was obtained from each eligible patient who agreed to participate.

For each recruited patient, a pre-prepared data collection form was used for data collection. Data was collected from (1) the patient's medical records, (2) followed by interviewing the patient/caregiver and (3) interviewing the responsible resident (Fig. 1).

2.2.1. Medical record review

Patients' medical records were reviewed to obtain information regarding demographic data (patients age, gender, educational level, marital status and monthly income), admission data (date of admission, admission department, chief compliant), medical information (patients' acute and chronic medical condition), admission medications list (which includes: medication name (trade and generic), dose, frequency, dosage form, route of administration, time of administration, starting date and stop date), pre-admission medication list (if available), and discharge information (length of stay in hospital).

Based on patient's medical information, Charlson Comorbidity Index (CCI) was calculated for each patient. This index represents a tool that is used to predict the ten year mortality rate in individuals with comorbid conditions (Charlson et al., 1987).

2.2.2. Direct patient/caregiver interview

A comprehensive interview with the patient was conducted to obtain or to verify patient's pre-admission list (if it was obtained from the medical record). For patients who couldn't recall their medications, they or their caregivers were asked either to bring their pre-admission medications or the medications on the next visit, or to send photos of medications using a messaging application, e.g. WhatsApp. Information was requested for all medications including prescription, over the counter medications and herbal supplements.

2.2.3. Responsible resident interview

The characteristics pertinent to patients' responsible residents were obtained directly by interviewing the residents. This information included: residents' gender, years of practice at JUH and whether the resident received any medication reconciliation at JUH. Residents were also interviewed when needed to discuss patients' medication discrepancies as explained in the next section.

2.3. Identification of medication discrepancies

A comparison between patients' current admission and pre-admission medications was performed to identify any discrepancies between the two medication lists (pre-admission and admission lists). Identified discrepancies included, but not limited to, dosage discrepancies, frequency discrepancies, administration route discrepancies, dosage form discrepancies, addition of a drug not previously used, duplication of drugs, omission of a drug previously used, or substitution from one medication to another targeting the same treatment goals.

Identified discrepancies were evaluated by the pharmacists (study researchers LS and RA) to determine whether they were documented within the patients' medical files. All undocumented discrepancies were then reviewed and discussed with the responsible residents, and a clinical judgment was made to determine if there was a justified cause for such discrepancies (intentional discrepancies). Otherwise, discrepancies were reported as unintentional. Unintentional discrepancies were classified based on the

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