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Original Article

Patients with diabetes are at high risk of serious medication errors at hospital: Interest of clinical pharmacist intervention to improve healthcare

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ABSTRACT

Background: Medication errors (ME) are major public health issues in hospitals because of their consequences on patients' morbi-mortality. This study aims to evaluate the prevalence of ME at admission and discharge of hospitalization in diabetic and non-diabetic patients, and determine their potential clinical impact.
Method: This prospective observational study was conducted at the Endocrinology-Diabetology-Nutrition Department. All adult patients admitted were eligible. A total of 904 patients were included, of which 671 (74.2%) with diabetes mellitus. Clinical pharmacists conducted medication reconciliation: they collected the Best Possible Medication History and then compared it with admission and discharge prescriptions to identify medication discrepancies. ME were defined as unintended medication discrepancies if corrected by the physician.
Results: Clinical pharmacists allowed correcting ME in 176/904 (19.5%) patients at admission and in 86/865 (9.9%) patients at discharge. More than half of ME were omissions. Diabetic patients were more affected by ME than non-diabetic patients, both at admission (22.1% vs 12.0%, $p < 0.001$) and at discharge (11.4% vs 5.7%, $p = 0.01$). The diabetic group also had more potentially severe and very severe ME. Diabetic patients had on average twice more medications than non-diabetic patients (8.7 ± 4.5 vs 4.4 ± 3.4, $p < 0.001$). The polypharmacy associated with diabetes, but not diabetes mellitus itself, was identified as a risk factor of ME.
Conclusions: The intervention of clinical pharmacists allowed correcting 378 ME in 25.8% of the cohort before they caused harm. Clinicians, pharmacists and other health care providers should therefore work together to improve patients' safety, in particular in high-risk patients such as diabetic patients.

1. Introduction

Medication errors (ME) and adverse drug events (ADE) are major public health issues in hospitals because of their consequences on patients' morbi-mortality and economic costs [1]. In 2000, a report of the Institute of Medicine indicated that from 44,000 to 98,000 deaths occur each year secondary to medical errors [2]. The most common type of error is ME, responsible for 7000 deaths per year. ME is defined as "any preventable event 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". Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labeling, packaging, nomenclature, compounding and dispensing. ADE is defined as "any undesirable experience associated with the use of a medical product in a patient" [3] and includes harm caused by the drug (adverse drug reactions and overdoses) or due to drug use (including dose reductions and discontinuations of drug therapy). ADE may result from ME.

Patients with chronic diseases and comorbidities are at high risk of ADE and ME [4]. Therefore, diabetic patients with their numerous comorbidities associated with polypharmacy with narrow therapeutic index are at risk of safety issues and could be severely affected by ME [5]. However, studies focusing on diabetic patients mainly evaluated the risk of diabetes therapies, such as insulin or oral hypoglycemic agents, but not the overall patient care [6]. Indeed, in addition to diabetes treatment, diabetic patients have other treatments such as cardiovascular medicines also at risk of medication errors [7]. Efforts should

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therefore focus on such high-risk populations [8–10]. Since 2003, the American Diabetes Association (ADA) has included pharmacists in the list of diabetes care team members [4]. Indeed, the intervention of clinical pharmacists has been associated with improved control of major cardiovascular risk factors in diabetes patients (blood pressure, LDL cholesterol and body mass index) [11]. Further, the clinical pharmacist can also set up a medication reconciliation process, associated with decreased risk of ME. Medication reconciliation is the process that compares a patient's medication order to all medications that the patient has been taking and should take at admission, transfer and discharge of hospitalization. Medication reconciliation can identify and resolve ME and therefore contributes to the safety of medication management during patients' healthcare circuit. Studies of medication reconciliation have mainly been carried out in emergency departments or during hospital admission only [12]. To our knowledge, few studies [13] have focused on medical unit and at the two main points of care transition that are admission and discharge and no study was carried out in an endocrinology unit according to diabetes status.

Consequently, the aim of our study was to evaluate the prevalence of ME according to diabetic status, determine the potential clinical impact of ME and investigate the impact of clinical pharmacists' intervention on medication errors prevalence.

2. Methods

2.1. Context

We conducted this prospective observational study over a 1.5-year period from November 2013 to May 2015 in the Endocrinology, Diabetology and Nutrition Department of the University Hospital of Montpellier - France. All patients aged above 18 years old admitted to the department during the study period and hospitalized for at least 24 h were eligible for inclusion. The population was then divided into two groups according to diabetic status.

2.2. Intervention

At admission, pharmaceutics' team, including a senior pharmacist, one resident and two pharmacy students, conducted medication reconciliation process within 24 h of admission or on the first working day following admission for admissions during week-ends. The medication reconciliation process was conducted according to a validated protocol summarized in Fig. 1 [13]. The first step consists of getting the Best Possible Medication History (BPMH), defined as the most comprehensive list of all medications

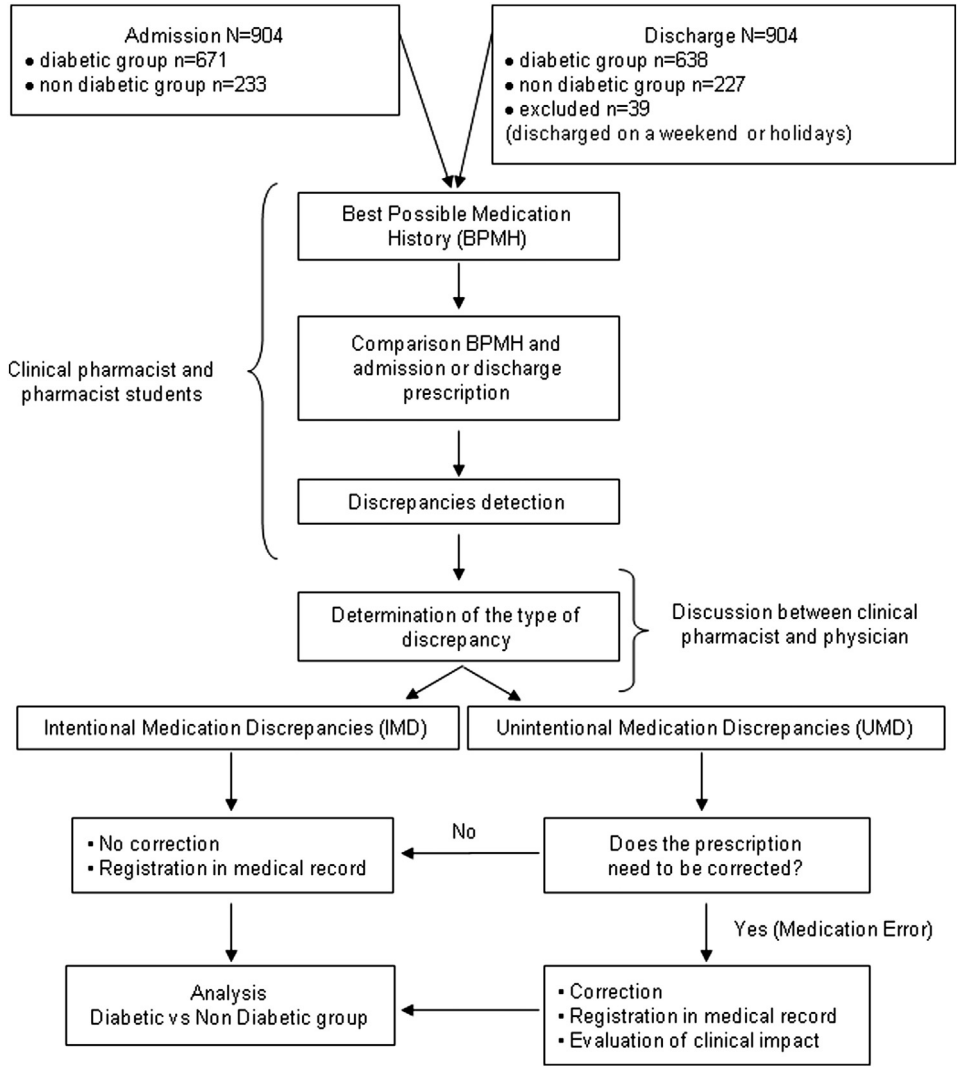

Fig. 1. Principle of medication reconciliation.

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