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Original Article

## Transition of care: A set of pharmaceutical interventions improves hospital discharge prescriptions from an internal medicine ward

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### ABSTRACT

**Background:** Continuity of care between hospitals and community pharmacies needs to be improved to ensure medication safety. This study aimed to evaluate whether a set of pharmaceutical interventions to prepare hospital discharge facilitates the transition of care.

**Methods:** This study took place in the internal medicine ward and in surrounding community pharmacies. The intervention group's patients underwent a set of pharmaceutical interventions during their hospital stay: medication reconciliation at admission, medication review, and discharge planning. The two groups were compared with regards to: number of community pharmacist interventions, time spent on discharge prescriptions, and number of treatment changes.

**Results:** Comparison between the groups showed a much lower (77% lower) number of community pharmacist interventions per discharge prescription in the intervention ( $n = 54$  patients) compared to the control group ( $n = 64$  patients): 6.9 versus 1.6 interventions, respectively ( $p < 0.0001$ ); less time working on discharge prescriptions; less interventions requiring a telephone call to a hospital physician.

The number of medication changes at different steps was also significantly lower in the intervention group: 40% fewer ( $p < 0.0001$ ) changes between hospital admission and discharge, 66% fewer ( $p < 0.0001$ ) between hospital discharge and community pharmacy care, and 25% fewer ( $p = 0.002$ ) between community pharmacy care and care by a general practitioner.

**Conclusion:** An intervention group underwent significantly fewer medication changes in subsequent steps in the transition of care after a set of interventions performed during their hospital stay. Community pharmacists had to perform fewer interventions on discharge prescriptions. Altogether, this improves continuity of care.

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### 1. Introduction

Continuity of care is defined as “a set of actions designed to ensure the coordination and continuity of healthcare, as patients transfer between different locations or different levels of care within the same location” [1]. The main goals of continuity of care are optimal patient safety and quality of care [2]. Transitions between hospital and community setting can be a major issue and need improvements to ensure medication safety. Indeed, discrepancies which happen after hospital discharge can lead to adverse medical events, increase the length of hospital stays or even lead to hospital readmissions [2–5]. Different

solutions have been shown to improve patient safety during transitions between care providers, such as: discharge planning and written discharge support notes, medication reconciliation, and increasing patient awareness and empowerment [2]. The earlier interventions to prepare for hospital discharge start during hospitalisation, the greater the benefits to patients; those interventions can continue throughout and after hospitalisation [2].

Various studies have shown that clinical pharmacists performing these interventions can improve transition of care by reducing medication discrepancies and thus lower rates of adverse drug events and readmission [5–7].

Medication reconciliation performed at hospital admission allows several limitations in medication history to be identified. Incomplete medication histories at admission are the causes of hospital prescribing errors in almost 30% of cases [8]. Patients cannot always remember or understand their medication, indications or doses. Language and health literacy can be a barrier to this understanding, as can the short amount

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of time spent by physicians on a complete medication reconciliation [9,10]. Moreover, over-the-counter drugs, herbal medicines, eye drops, vitamins and nutritional supplements are often omitted. Several different types of healthcare professionals (physicians, clinical pharmacists, nurse, etc.) may be able to carry out medication reconciliation, but a reconciliation carried out as part of a clinical pharmacist's routine practice is seldom possible, often due to financial constraints.

Besides medication reconciliation, clinical pharmacists can reduce drug-related problems during hospitalisation by performing medication reviews and informing physicians about adverse drug events, drug interactions, therapeutic drug monitoring, pharmaco-economic issues, etc. [2,6].

Another aspect of the transition between hospital and community care concerns treatment changes at each step; these changes occur for more than 95% of hospitalised patients [11]. They can induce misunderstandings for patients, incomplete information and communication at transition steps, and thus induce medication errors and decreases in medication safety [12,13]. Community pharmacists are also concerned by this issue and play an important role after hospital discharge. They perform medication reconciliations between hospital discharge prescriptions and patients' medication histories in order to ensure complete and optimal treatments. One of the most common community pharmacist interventions is contacting a hospital physician to clarify whether a treatment change is intended or not [14]. Telephone calls to hospital physicians may induce disruptions to their work routines that can negatively affect patient safety [15].

## 2. Aim of the study

This study aimed to evaluate whether a set of pharmaceutical interventions to prepare hospital discharge, in close collaboration with the medical staff involved in patient care, facilitates the transition of care, reduces interventions by community pharmacists and decreases the number of medication changes at different phases of the transition.

## 3. Ethical approval

This study was reviewed and approved by the Human Research Ethics Committee of the Canton Vaud (approval ID: 358/15). Oral informed consent was obtained from each participant included in the study.

## 4. Material and methods

### 4.1. Setting and participants

The present prospective, interventional, monocentric study with an interrupted time series analysis included a control group followed by an intervention group. It took place in a 70-bed internal medicine ward of a Swiss hospital (the Hôpital Riviera–Chablais Vaud–Valais) and in community pharmacies surrounding it. Patients in the two groups were enrolled and monitored from October 2015 to May 2016.

Patients in the control group were recruited consecutively from October to December 2015 by community pharmacists using the following study inclusion criteria: taking more than 4 drugs for chronic complaints; discharged from the hospital's internal medicine ward (whether followed by a stay in a rehabilitation centre or not); proficient in French; aged 18 years old or above; being followed-up by one of the participating community pharmacies; a hospital stay of at least 3 days; capable of discernment; and patient approval.

Patients in the intervention group were recruited consecutively by the hospital's clinical pharmacist, between January and March 2016, by screening all the patients admitted to the hospital's internal medicine ward and using the same study inclusion criteria.

### 4.2. Outcomes and variables

#### 4.2.1. Control group

Participating community pharmacists were asked to collect data about all the interventions they performed and the time required to deal with the hospital discharge prescriptions handled in their pharmacies. A data collection questionnaire for the study was adapted from Maes et al. [16].

During hospital stay, patients from the control group received usual care, which consisted in hospital admission and discharge prepared by the hospital physician. Medication reviews were not carried out systematically by a clinical pharmacist, but this could happen periodically, during medical ward rounds to which clinical pharmacists from our team participate on a monthly basis.

#### 4.2.2. Intervention group

A set of three pharmaceutical interventions was systematically performed in this group: medication reconciliation at hospital admission; medication review during hospitalisation; and discharge planning, including discharge medication reconciliation.

A pharmacy technician carried out medication reconciliation at admission under the clinical pharmacist's supervision. Three sources of medication history information were used: patients' admission drug regimen, collected from patients' electronic medical records (Soarian® version 4.00 SP08, Cerner Health Services, MO, USA); patient interviews about their medication, using a standard questionnaire; and patient medication histories, obtained from the participating community pharmacies by telephone call. Drugs were recorded by trade name and classified according to the anatomical therapeutic chemical (ATC) classification system (WHO Collaborating Centre for Drug Statistics Methodology) [17].

Demographic data (age, sex) and clinical data (diagnoses, comorbidities) were also collected. Diagnoses and comorbidities were subsequently classified into broader categories. A score for the burden of chronic disease, adapted from Charlson et al., was calculated from any chronic comorbidities listed in the medical record [18].

After comparing the three data sources, medication discrepancies were identified by the pharmacy technician, validated by the clinical pharmacist and then transmitted to the hospital physician.

Medication discrepancies were classified as omissions, dosing changes and galenic formulation changes. Their impact on patient care was assessed according to the potential to cause patient harm, using the classification developed by Cornish et al. [19]. According to these criteria, medication discrepancies were classed as: 1) unlikely to cause harm; 2) having potential to cause moderate discomfort or clinical deterioration; and 3) having potential to cause severe discomfort or clinical deterioration. This classification was made by consensus by three clinical pharmacists.

The clinical pharmacist performed the medication review during the hospital stay, either during medical ward rounds or by informing the physician directly. Patients' medical prescriptions were analysed to identify potential drug-related problems with the following criteria: duplicate or missing therapy, contraindications, adverse events, drug–drug interactions, drug dosage, drug use or others, according to the system for pharmaceutical interventions of the Swiss Association of Public Health Administration and Hospital Pharmacists (GSASA) [20]. These criteria were verified using product information, Micromedex® [21], Lexicomp® [22] and recommendations from available clinical guidelines. Lexi-Interact® [23] was used to check drug–drug interactions. The clinical pharmacist's interventions were then classified according to the same GSASA classification [20].

Finally, the clinical pharmacist drew up a discharge plan for every patient at the end of their hospital stay. This consisted of reviewing discharge medication and a reconciliation with the patient's drug regimen at admission, communicating any prescription changes to the physician,

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