Original article

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Pharmaceutical analysis of high-risk prescriptions: Should we be going there?

Analyse pharmaceutique des prescriptions à haut risque iatrogène : si on commençait par-là ?

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Summary

Aims. The action of a hospital pharmacist can improve drug management and should focus on high risk drugs, services or patients. The aim of this study was to identify risk factors in medical files and thus identify patients with high iatrogenic risks.

Method. This multicenter study was based on a search for iatrogenic risk factors during prescription analysis. An analysis of pharmaceutical interventions and medical acceptance was performed in relation to the presence or absence of risk factors.

Results. In three hospital centers, 1813 patients were included. For these patients, 5866 prescriptions were included, with at least one risk factor in 1567 of these prescriptions. The rate of pharmaceutical interventions was significantly different between the patients with and without risk factors (30.4% vs 9.5%, respectively, $P < 10^{-6}$). Acceptance was 79% vs 71%, respectively, according to the presence or not of risk factors ($P < 0.01$).

Discussion/conclusion. This study shows that biological or clinical factors can be used to identify prescriptions with a high iatrogenic risk. This must be confirmed by further studies with a larger number of prescriptions.

Keywords : Medical acceptance, Pharmaceutical analysis, Pharmaceutical interventions, Clinical pharmacy, Iatrogenic risk, High risk medication, Data analysis

Résumé

Objectifs. Les actions du pharmacien hospitalier pour améliorer la prise en charge médicamenteuse doivent s'orienter sur les patients, services ou médicaments à risque. L'objectif de cette étude est d'identifier des facteurs de risque dans les dossiers et ainsi repérer des patients à risque iatrogène élevé.

Méthode. Cette étude multicentrique s'appuie sur la recherche de facteurs de risque iatrogène lors de l'analyse pharmaceutique. L'étude des interventions pharmaceutiques et de l'acceptation médicale est effectuée selon la présence ou non de facteur de risque.

Résultats. Dans trois centres hospitaliers, 1813 patients ont été inclus dans l'étude. Pour ces patients, 5866 prescriptions ont été prises en compte dont 1567 présentaient au moins un facteur de risque. En comparant les groupes avec et sans facteur de risque, les taux d'interventions pharmaceutiques étaient significativement différents (30,4 % vs 9,5 %, $p < 10^{-6}$). L'acceptation était respectivement de 79 % vs 71 % selon la présence ou non de facteurs de risque ($p < 0{,}01$).

Discussion/conclusion. Cette étude montre que des facteurs biologiques ou cliniques permettent faire ressortir les prescriptions à haut risque iatrogène. Elle doit être confirmée par une étude complémentaire sur un plus grand nombre de prescription.

Mots clés : Acceptation médicale, Analyse pharmaceutique, Intervention pharmaceutique, Pharmacie clinique, Risque iatrogène

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Introduction

According to the ENEIS study, 40% of the serious adverse events responsible for a hospitalization in France are owed to drugs and half of them may be avoided [1–3]. The improvement of the patient's healthcare quality is a priority [4]. The pharmaceutical analysis of the prescriptions is one of the preferred shares to decrease the number of these medicinal errors [5,6]. The first objective is to find the unrefined errors, which can be bound, for example, to the computing, but especially to run the pharmaceutical expertise with the medical and paramedical teams [7,8]. A reflection must be led to integrate this activity with an important level of relevance into the everyday life of the hospital pharmacists. In the context of the Order of April 6, 2011 when the French hospital pharmacists have to analyze necessarily the containing prescriptions of the "drugs at risks" or those of the "patients at risk," a reflection is to concentrate the activity toward this type of prescriptions. The objective of this multicenter study is to identify if elements of the patients' record allow to spot prescriptions with an important iatrogenic risk.

Material and method

This pilot study is based on the preliminary and exhaustive pharmaceutical analysis of the prescriptions. The exploitation of the data allowed to look for parameters characterizing a risk factor for a pharmaceutical intervention.

Inclusion criteria

The patients included in the study were all identified from the units of care studied in three non-teaching hospital complexes. The units of care chosen corresponded to the services, which have implemented systematic pharmaceutical analysis before the beginning of the study. They are distributed by type of stay: medicine (5), short geriatric stay (3) and surgery (1). The period of inclusion was of 6 months.

Pharmaceutical analysis

The pharmaceutical analysis is made according to the method and level of analysis 2 as defined by the French Society of Clinical Pharmacy (SFPC) [9]: i.e., documented analysis centralized via the CrystalNet® software for management of the patients records. The information allowing the validation of prescriptions was the current complete prescription, the biological analysis results, the medical record and the Electronic Healthcare File. Analyses were made by senior clinical pharmacists, assistants' specialists and residents in hospital pharmacy having already conducted pharmaceutical analysis of the prescriptions in the considered services. The therapeutic problems and the optimizations proposed during the analysis were classified according to the classification of the SFPC [9]. The pharmaceutical intervention (PI) was considered as accepted by the physician when the medical doctor modified the prescription according to the emitted pharmaceutical opinion.

The interventions emitted for the substitutions of drugs "off hospital medicine list" were not included because it was considered that they were not linked to a pharmacological problem.

Useful parameters for defining a high-risk patient or high-risk prescription

For every prescription, a search is made in the Electronic Medical Record to identify the presence of one or several indicators of a prescription and/or a patient with an elevated iatrogenic risk. These indicators were defined from the literature and by their capacities in an application to everyday life [10,11].

Biological results

Biological results indicators are as follows:

- creatinine clearance, according to the formula MDRD [12], inferior to 30 mL/min;
- INR $>$ 4 for patients handled by antivitamin K;
- serum potassium disorders, lower than 3.2 mmol/L or superior to 5.2 mmol/L.

Medical orders

Medical orders indicators are as follows:

- presence of a drug with narrow therapeutic window, which can be the object of a plasmatic dosage (digoxin, gentamicine, teicoplanin, vancomycin, carbamazepine, valproic acid, immunosuppressive, antiretroviral);
- drug prescribed above to the maximal licensed dose;
- presence of an absolute contraindication.

Statistical analysis

The percentages of emitted IP and their acceptance by the physicians in two groups of prescriptions (with and without risk factors) were compared by using the Khi^2 test. A *P*-value of $<$ 0.05 was considered as significant.

Results (profits)

Patients and prescriptions

One thousand eight hundred thirteen patients were included for all the sites. For these patients, 5866 prescriptions were analyzed. Among these prescriptions, 1567 (26.7%) presented at least a risk factor among which 215 (3.7%) presented several. The three criteria most often found are the dyskaliemia (50.4%), the presence in the prescription of a drug requiring a therapeutic drug monitoring (25%) or the severe renal insufficiency (18.7%). Other criteria (INR $>$ 4, overtaking of maximal dose and absolute contraindication) represent less than 10% of the prescriptions with risk factors (*fig. 1*).