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RESEARCH ARTICLE

Practical evaluation of the drug-related problem management process in Swiss community pharmacies

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Abstract *Objective* To develop and evaluate a coding system integrated into pharmaceutical software to routinely report and assess the process of community pharmacists' interventions related to medical prescriptions. *Setting* A convenient sample of 20 Swiss community pharmacies. *Method* Pharmacists documented their interventions concerning all drug-related problems (DRPs) related to medical prescriptions during four consecutive weeks in 2005. The coding system assesses each step of the DRP management process; that is, the type of problem, possible negative outcomes, pharmaceutical decisions, and individuals involved. In order to be comprehensive, the management process of technical problems related to prescriptions and clinical DRPs was analysed separately. *Main outcome measure* DRP intervention rate and characterization of each step of the process. *Results* Of 38,663 prescriptions, 287 clinical DRPs required interventions. This corresponds to a mean intervention rate of 0.77% per pharmacy (SD = 0.61%). There was a large variability among pharmacies (0–2.6%). Most of the clinical DRPs were associated with dosage problems ($n = 91$) and drug–drug interactions ($n = 45$). The most frequent potential negative outcomes reported were quantitative inefficacy ($n = 101$) and quantitative safety ($n = 94$). Two-thirds of clinical DRPs required a prescription modification ($n = 186$), the most frequent being a change in dosage or drug regimen. In 110 interventions (38%), physicians were immediately contacted to take part in the decision. In 122 interventions (43%), pharmacists managed the interventions alone. However, in 55 interventions (19%), pharmacists managed the DRPs with the patient. From these 287 clinical interventions, 134 different codes were reported. Seven hundred and thirty-six technical problems related to prescriptions required intervention, which corresponded to a mean intervention rate of 1.90% per pharmacy. The main type of problem was a discrepancy with the medication record ($n = 208$). There were 494 instances that required a prescription modification. Pharmacists resolved 45% of all technical problems by themselves. *Conclusion* The developed coding system could describe the management process for DRPs. The observed intervention rate and the frequency of steps involved were comparable to those previously observed for pharmacists' interventions. Data regarding the entire process used to manage drug-related problems can be useful in improving medication safety, education, and collaborative care.

Keywords Coding system · Community pharmacy · DRP-classification · Drug-related problems · Pharmaceutical care · Prescribing · Quality of care · Switzerland

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Impacts of findings on practice

- Pharmacists' interventions related to clinical drug-related problems mainly concern the resolution or prevention of a dosage or regimen problems, drug–drug interactions, and adherence problems.

- More than twice as many reported problems were technical rather than clinical drug-related problems.
- The use of a computerised system, which is accessible at the point of care and has the management process for each drug-related problem, is an important tool for patient follow-up.

Introduction

At the international level, no widely recognized management system yet exists for the definition, collection, documentation, and management of drug-related problems (DRPs) [1]. Although prescription control by pharmacists improves clinical effects [2–4], cost savings [5, 6], and collaborative care [7], the absence of nationwide data based on a well-defined system in Switzerland leads to doubts regarding the reality and effectiveness of prescription control in Swiss pharmacies.

In Switzerland, pharmacist remuneration systems integrate professional fees for basic cognitive services, including the control of medical prescriptions, related patient counselling, and management of medication records [8]. Reimbursement for this service, defined by the term "prescription control," is related to the ability of pharmacists to prevent both clinical DRPs and technical problems in accordance with international quality standards *ISAS QMS-Pharmacy 2010* [9].

The basic principles underlying a system for documenting DRPs are based on a clear definition of a DRP, a focus on the types and management of DRPs, and the integration of hierarchical documentation levels [1, 10]. Higher rates of documentation result from computerized systems, indicating that these systems should be used in future DRP documentation programs [11, 12]. Since the long-term objective is to implement a national intervention reporting system in the daily practice of Swiss community pharmacies, there is a need to develop and implement an adequate system. This system should be simple to use, accessible at the point of care, and informative regarding the whole management process, from the perspective of both local and national monitoring. The system should identify both clinical DRPs and technical problems related to prescriptions, including the rates and types of problems, possible negative outcomes, pharmaceutical decisions, and individuals involved.

Aim of the study

The aim of the study is to develop and evaluate a coding system, integrated into pharmaceutical software, to report and assess routine community pharmacists' interventions process related to clinical DRPs and technical problems related to prescriptions.

Method

Taxonomy and coding system

As defined by the *Pharmaceutical Care Network Europe* (PCNE), "A drug-related problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes" [13]. In this study, the intervention process was divided into two main phases: (A) description, and (B) management of the detected problem. Each of these two phases was divided into two steps, resulting in a total of four steps (Table 1).

Step 1. The *type* of DRP indicates the problem identified by the pharmacist. Clinical DRPs are distinguished from technical problems [14]. Clinical DRPs are those related to knowledge of a pharmacological or disease state. Therefore, wrong dosage, duration or regimen refers to a prescription that is not in accordance with guidelines, compendia or good clinical practice and considering the patient. "Discrepancies with the medication record" reflects writing or transcribing errors from the physician even if the dosage or regimen is concerned.
Step 2. The potential *negative clinical outcomes* (NCOs) describe the risks related to the detected problems [15, 16]. The NCOs focus on the patient rather than on the drug; they can be the consequences of:

- not receiving a needed medication,
- receiving an unneeded medication,
- taking ineffective medication, or
- having a safety problem with the medication.

The last two points (ineffectiveness and safety problems) can be regarded as being quantitative (related to the quantity of the patient's exposure to the medication; e.g. dosage, frequency, and pharmacokinetic interaction problems) or non-quantitative (not related to the quantity of the patient's exposure to the medication, e.g. allergy, contraindication, and pharmacodynamic interaction problems).
Step 3. The *pharmaceutical decision* specifies the action plan implemented by the pharmacist to prevent or solve the clinical DRP. This step has been adapted from the PCNE DRP classification as the "intervention at drug level" [13].
Step 4. The *individuals involved* describe those individuals involved in the search for a solution (e.g. the pharmacist and the patient, the pharmacist and the physician, and the pharmacist alone).

Table 1 Description of the intervention process used to manage clinical drug-related problems and technical problems related to prescriptions

Phase A: "Detection of the clinical drug-related problem"		Phase B: "Management of the clinical drug-related problem"	
Step 1: Type of clinical drug-related problem	Step 2: Potential negative outcome	Step 3: Pharmaceutical decision	Step 4: Individuals involved
Clinical types	Negative clinical outcome	Prescription modified	a. Physician + Pharmacist
a. Adherence problem	a. Not indicated	a. Medication added	b. Patient + Pharmacist
b. Contraindication	b. Indication not treated	b. Formulation changed	c. Pharmacist alone
c. Adverse reaction	c. Non-quantitative ineffectiveness	c. Brand changed[a]	
d. Drug–drug interaction	d. Quantitative ineffectiveness	d. Dosage changed	
e. Wrong dosage	e. Non-quantitative safety	e. Instruction for use changed	
f. Wrong regimen	f. Quantitative safety	f. No delivery	
g. Wrong duration		g. Quantity of drug changed	
h. Duplicate drug		No modification	
i. Medication with no indication		h. Prescription clarified	
j. Untreated condition		i. No change	
Phase A: "Detection of the technical problem related to prescription"		Phase B: "Management of the technical problem"	
Step 1: Type of technical problem (Step 2 not applicable)		Step 3: Pharmaceutical decision	Step 4: Individuals involved
k. Inadequate formulation		Items are identical to those listed for the decision following a clinical DRP	Items are identical to those listed to describe individuals involved to manage a clinical DRP
l. Incompatible with reimbursement regulation			
m. (Temporary) out of sale			
n. Unreadable			
o. Incomplete information			
p. Inadequate quantity of drugs (or tablets)			
q. Discrepancies with the medication record			

[a] A brand change concerns a trademark change (may keep the same active component) or an active component change

The four steps were combined into one code describing the entire clinical DRP management process. Only one element per step was selected. For example, the codification "Interaction—Quantitative ineffectiveness—Medication changed—Pharmacist + Physician" illustrates a lack of effectiveness due to an interaction with another medication, a collaboration between the pharmacist and physician, and a change in at least one medication.

Any problem addressed by both a pharmacist and a physician was assumed to result from a consensus decision, since we assumed that they both had a responsible attitude. Thus, a codification ending with "No change—Physician + Pharmacist" indicates that either the pharmacist warned the physician about the need to monitor drug regimen outcomes or that the pharmaceutical recommendation was not implemented after a discussion between the physician and pharmacist.

Technical problems related to a prescription are those not related to knowledge of the pharmacological or disease state. Its management involves a drug-centred consideration rather than a patient-centred consideration. For example, a technical problem can result from an unreadable prescription as well as nationwide supply problems for a prescribed drug. Availability problems at the pharmacy were not reported since they represent a logistical problem for the pharmacy.

The description of the management process of technical problems included Steps 1, 3, and 4 (Table 1). Step 1 contained seven items describing the problems [14]. Step 2 was not used because negative clinical outcomes only refer to clinical issues. The management (pharmaceutical decisions and individuals involved) of a technical problem or a clinical DRP can be identical; therefore, Steps 3 and 4 have been kept without any modification.

Participating pharmacies

Twenty community pharmacies from the French-speaking part of Switzerland participated in the study during four consecutive weeks of April and May 2005. All pharmacies directly documented all DRPs related to prescriptions at the point of care. All interventions were computerized by the pharmaceutical management software programs GoldenGate® (Pharmatic AG, Bern, Switzerland) or ProPharma® (ProPharma Systems AG, Wettingen, Switzerland). An average of 81 (Sx = 29) patients per day with a prescription visited the participating pharmacies, reflective of the medium- to large-size Swiss pharmacies [8]. The support provided to the pharmacies consisted of an on-site integration of the system into the pharmaceutical software, individual explanations and demonstrations of its use, a booklet including a detailed manual and exercises, and a memo pocket card. A hotline (e-mail and phone) was also offered.

Statistical analysis

The intervention rate was defined as the number of documented interventions divided by the number of patients who had at least one prescription. The system only permitted one problem (the most clinically significant problem from the pharmacist's point of view) to be documented per prescribed item.

To determine the percentage of the elements included in each Step, we divided them by the total number of problems. Analyses were conducted in parallel for clinical DRPs and for technical problems related to the prescription.

Results

Intervention rate

Of the 38,663 patient visits during the 4 weeks of the study, 287 clinical DRPs required pharmaceutical interventions. This corresponded to a mean intervention rate of 0.77% per pharmacy (SD = 0.61%). The intervention rate at individual pharmacies ranged from 0 to 2.6%, indicating a large variability among individual pharmacies. Over the 4 weeks of the study, the mean rate of interventions decreased, from 1.04% during the first week to 0.45% during the last week. This decrease was observed in 15 of the 20 pharmacies.

A total of 736 technical problems related to prescriptions required an intervention, corresponding to a mean intervention rate of 1.90% per pharmacy (SD = 1.60%). A large range between pharmacies was also observed (0.28–5.7%), as well as a decrease from 2.30% during the first week to 1.48% during the last week.

Description of Step 1: types of clinical DRPs and technical problems

The major type of clinical DRP was a wrong dosage (Step 1/e, see Fig. 1), which was responsible for 91 (31.7%) of the clinical interventions. This was followed by drug–drug interactions (Step 1/d), which were responsible for 45 (15.7%) interventions; wrong drug regimens (Step 1/f), which were responsible for 33 (11.5%); and adherence problems (Step 1/a), which were responsible for 27 (9.4%). In one pharmacy, adherence problems were associated with

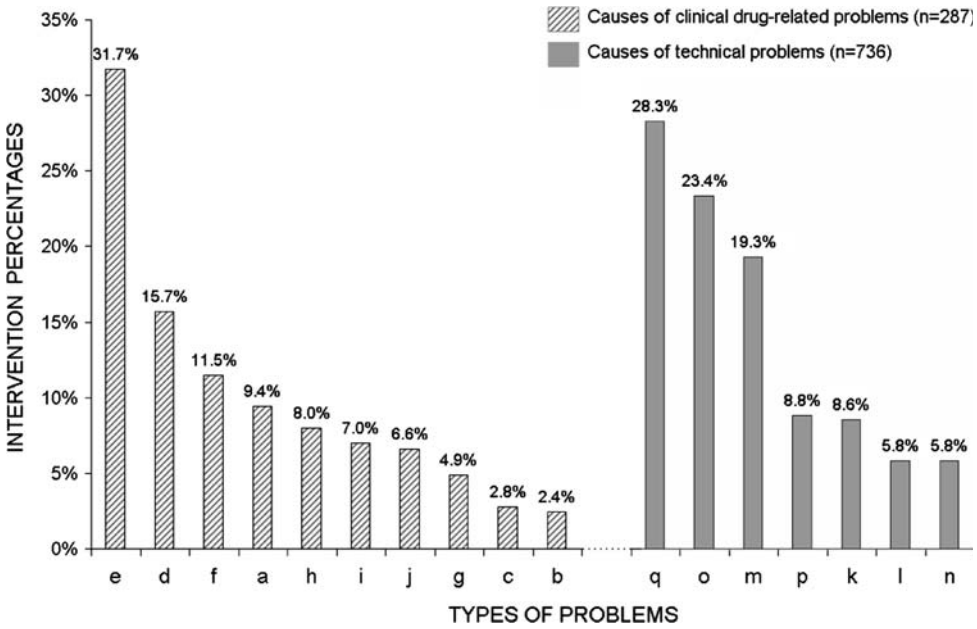

Fig. 1 Description of the types of drug-related problems. a, Adherence problem; b, Contraindication; c, Adverse reaction; d, Drug–drug interaction; e, Wrong dosage; f, Wrong regimen; g, Wrong duration; h, Duplicate drug; i, Medication with no indication; j, Untreated condition; k, Inadequate formulation; l, Incompatible with reimbursement regulation; m, (Temporarily) out of sale; n, Unreadable; o, Incomplete information; p, Inadequate quantity of drugs (or tablets); and q, Discrepancies with the medication record

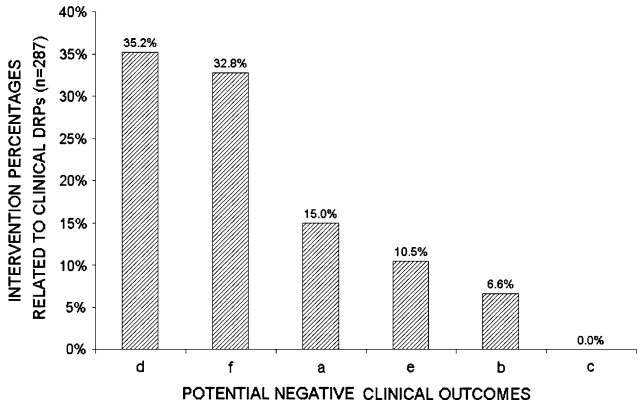

Fig. 2 Description of the potential negative clinical outcomes associated with the drug-related problems prevented by pharmaceutical interventions (Step 2, $n = 287$). a, Not indicated; b, Indication not treated; c, Non-quantitatively ineffective; d, Quantitatively ineffective; e, Non-quantitatively safe; and f, Quantitatively safe

52% of the interventions related to clinical DRPs. In a local physician—pharmacist—patient partnership program, suspicion of benzodiazepine overuse was screened and the physicians were informed.

The most frequently detected technical problem ($n = 208$, 28.3%) was a discrepancy between the prescription and the medication record (Step 1/q). In 130 patients (62%), this was due to a physician error and was most often linked to drug dosage ($n = 77$). In 78 cases, the physician modified the treatment, but the patient was not aware of the modification. Two frequently observed technical problems were incomplete information about the prescription (Step 1/o) and drugs that were temporarily out of sale (Step 1/m).

Description of Step 2: potential negative outcomes

Among the 287 interventions related to clinical DRPs, quantitative problems (ineffectiveness and safety, Step 2/d, f, see Fig. 2) were the predominant problems (66%, $n = 195$). Of these, 124 were associated with a wrong drug dosage or regimen.

Description of Step 3: pharmaceutical decisions

Hundred and eighty-six interventions (64.8%) resulted in a change of the prescription. The two most frequent changes involved the dosage or drug regimen. In contrast, about one-third of the interventions related to clinical DRPs did not require any modifications (35.2%, $n = 101$, items i + h, see Fig. 3). An intervention not needing any change of the prescription (item i) refers for example to patient counselling or patient monitoring.

The same trend was observed for pharmaceutical decisions following a technical problem related to the prescription: 32.9% ($n = 242$) needed no change (Fig. 3). The most frequent modification was a change in brand.

Figure 4 details the main types of clinical DRPs at the beginning of prescription modifications and illustrates the links between the steps of the documentation method.

Description of Step 4: individuals involved in managing the DRPs

More than one-third of the pharmacists' interventions related to clinical DRPs ($n = 110$) involved direct contact with the physician (Fig. 5). Contraindications (Step 1/b) and adverse reactions (Step 1/c) were generally solved by

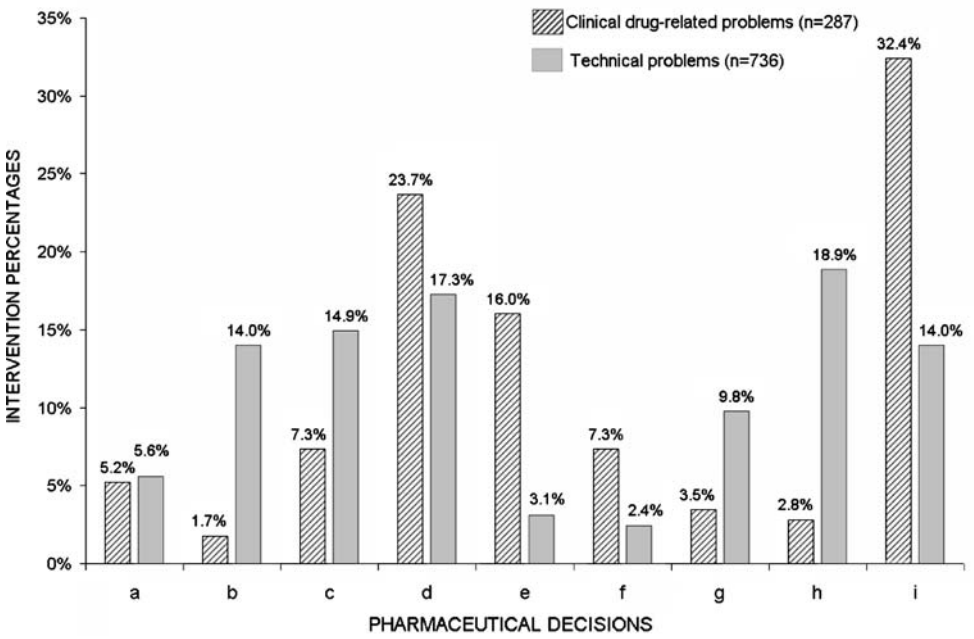

Fig. 3 Description of the decisions related to pharmaceutical decisions (Step 3). a, Medication added; b, Formulation changed; c, Brand changed; d, Dosage changed; e, Instruction for use changed; f, No delivery; g, Quantity of drug changed; h, Prescription clarified; and i, No change

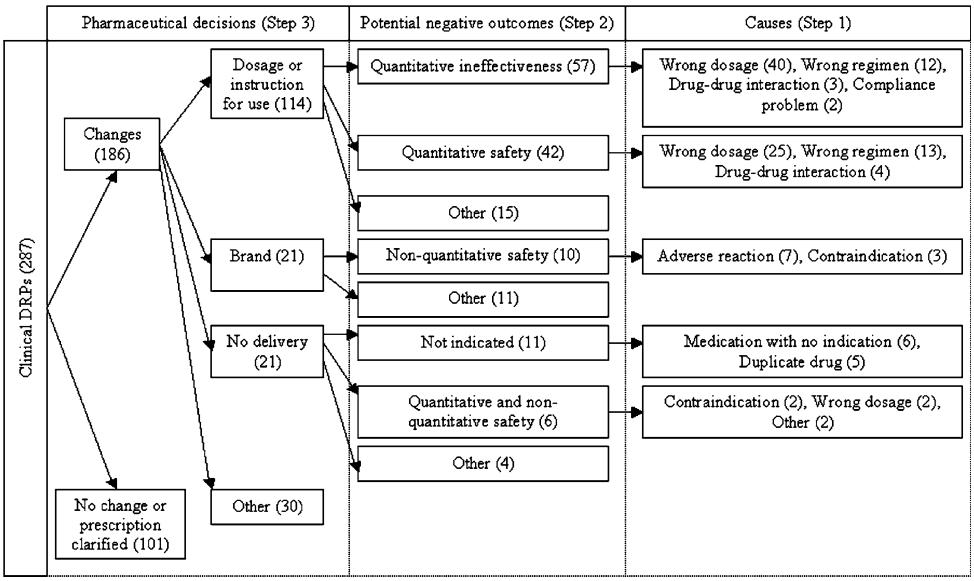

Fig. 4 Description of the intervention process related to clinical drug-related problems (DRPs)

immediate contact with the physician. Pharmacists reported managing 43% ($n = 122$) of the clinical DRPs by themselves, primarily those related to adherence problems (Step 1/a, 16 of 27, 59.3%), wrong regimens (Step 1/f, 18 of 33, 55%), and medications with no indication (Step 1/i, 10 of 20, 50%). Pharmacists also reported managing 19% ($n = 55$) of the clinical DRPs with the patient. The patient was most often involved in the resolution of duplicate drugs (Step 1/h, 9 of 23, 39%).

Pharmacists independently resolved 45% of technical problems related to prescriptions ($n = 330$). Pharmacists resolved incomplete information independently in 67% of cases (Step 1/o, 130 of 215). The patient was most often involved in the resolution of reimbursement problems (Step 1/l, 22 of 43, 51%). A total of 51% of interventions involved direct contact with the physician in the case of readability problems (Step 1/n, 22 of 43).

Most frequent codes documented

We found that 134 different clinical DRP codes were reported. The 10 most frequent codes accounted for the management of 31% ($n = 89$) of the 287 interventions (Table 2). The most commonly observed situation was low

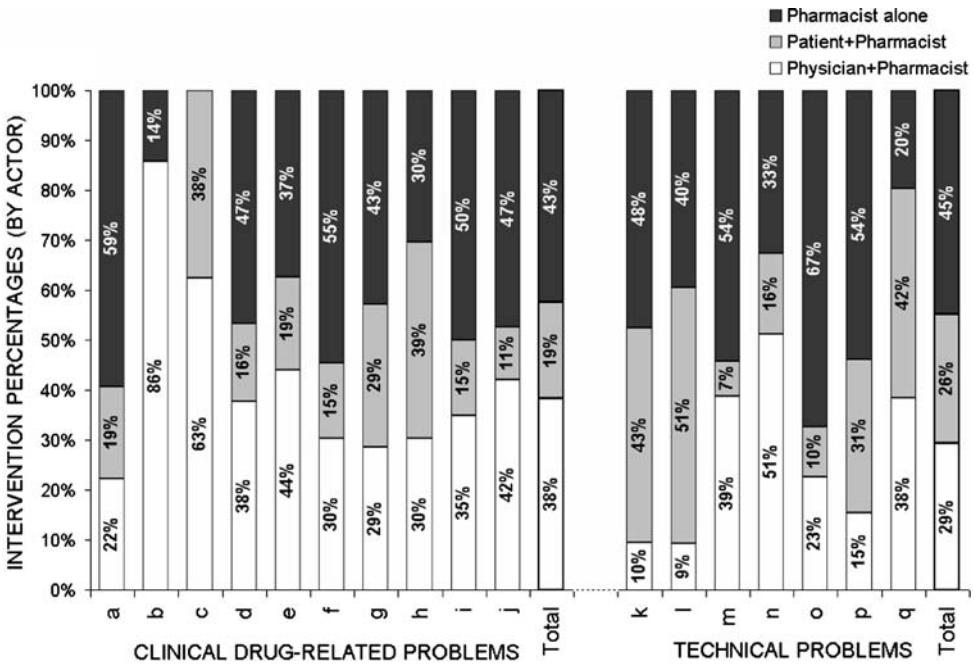

Fig. 5 Individuals involved in management of drug-related problems (Step 4). a, Adherence problem; b, Contraindication; c, Adverse reaction; d, Drug–drug interaction; e, Wrong dosage; f, Wrong regimen; g, Wrong duration; h, Duplicate drug; i, Medication with no indication; j, Untreated condition; k, Inadequate formulation; l, Incompatible with reimbursement regulation; m, (Temporarily) out of sale; n, Unreadable; o, Incomplete information; p, Inadequate quantity of drugs (or tablets); and q, Discrepancies with the medication record

Table 2 The ten most commonly reported codes from clinical drug-related problems management processes related to the control of prescriptions

Rank	Type of clinical DRP	Potential negative outcome	Pharmaceutical decision	Actors involved	Percentage (%)
1	Dosage problem	Quantitative inefficacy	Dosage changed	Pharmacist alone	5.3
2	Adherence problem	Quantitative safety	No change	Pharmacist alone	3.9
3	Drug–drug interaction	Quantitative safety	No change	Pharmacist + Physician	3.2
4	Dosage problem	Quantitative toxicity	Dosage changed	Pharmacist + Physician	3.2
5	Dosage problem	Quantitative inefficacy	Dosage changed	Pharmacist + Physician	3.2
6	Dosage problem	Quantitative toxicity	Dosage changed	Pharmacist alone	2.8
7	Regimen problem	Quantitative inefficacy	Regimen changed	Pharmacist alone	2.5
8	Drug–drug interaction	Non-quantitative toxicity	No change	Pharmacist alone	2.5
9	Drug–drug interaction	Quantitative inefficacy	No change	Pharmacist alone	2.5
10	Duplicate drug	Not indicated	No change	Pharmacist + patient	2.5

dosage, followed by the pharmacists' independent dosage adjustment. This code, however, was reported in the management of only 15 interventions (5.3%). This was followed by notification of the physician of drug abuse (3.9%), and pharmacokinetic drug–drug interactions leading to potential toxic effects, with no change in regimen after a consensus between the pharmacist and the physician (3.2%).

Analysis of drugs involved in the interventions

The 287 interventions related to clinical DRPs involved 191 different brands. Nervous system drugs ($n = 76$) were most often involved, followed by cardiovascular drugs ($n = 39$), alimentary tract and metabolism drugs ($n = 38$) and anti-infectives for systemic use ($n = 37$).

Discussion

The DRP documentation system developed here can describe the entire process of interventions that is related to the control of medical prescriptions in community pharmacies. The system fulfilled the quality objectives (simple to use, accessible at the point of care, integrated into a computerized system, and informative about the whole management process), was based on published methods, and described both the types and management of problems detected [1, 11, 12]. Moreover, the system could also easily describe technical problems related to the prescription.

Following its dissemination into community pharmacies, this system reflected the reality of clinical DRPs and technical problems related to prescriptions in primary care settings. The use of a computer-integrated system to

document pharmacist interventions could be easily implemented in many community pharmacies after some ergonomic improvements are made. The present results confirm the added value of pharmacists in preventing or solving clinical DRPs and technical problems related to prescriptions.

Present findings should be prudently compared with those in the literature. The definition of DRP is the main issue. Some documentation systems consider technical problems to be DRPs and give them the same level of importance as clinical problems [10, 14, 17]. Other systems only give technical problems a small place by having one or two items such as "prescribing error," "logistical problem," or "other" [13, 18]. Non-clinical problems are rarely well-defined. Comparison with six convenient studies (see Table 3) shows that our findings are consistent with findings from those studies. It should be remembered, however, that each of these studies was made in a different setting, and one concerned interventions after hospital discharge [19].

The patient also plays a key role (Step 4). About one-third of DRPs were found to be directly reported by the patient [18]. We found that about 20% ($n = 55$) of clinical DRPs were solved by discussions between pharmacists and patients. These findings show that pharmacists should integrate the patient into prescription control and DRP management.

Limitations and perspectives

The findings reported here, however, may only be partially representative of reality. For example, some DRPs may have been underestimated. First, it may be difficult to detect contraindications, medications with no indication, or untreated conditions without access to each patient's medical chart. Second, the rate of identified DRPs is often low, as emphasized by many pharmacovigilance systems [23]. In this study, the amount of time spent documenting incidents was probably the main barrier to the documentation process, since pharmacies did not receive any incentives (financial or human resources) to aid in documentation. This trend of underevaluating DRPs is confirmed by the decrease in the reporting rate over the 4 weeks of the study. Finally, pharmacies that participated had volunteered rather than being randomly selected. Pharmacists often document interventions related to DRPs when they are concerned about the importance of the assessment [12].

Willingness to document DRPs and the maintenance of routine documentation must be optimized. One incentive may be a training program, since the level of training of the pharmacist and staff tends to increase the intervention rate [22]. Intensive training can increase the number of interventions without increasing the time spent on documentation [6, 24]. Specific continuing education programs could maximize the uniformity in codification among pharmacists. Finally, a user-friendly computer interface could decrease the time spent documenting the interventions.

In order to comprehensively evaluate the system, two things can be done. First, the views of the pharmacists who used the system can be evaluated with a questionnaire. Second, the documentation can be validated where one pharmacy reviews the documented clinical DRPs from another pharmacy and vice versa.

This system could be more comprehensive. It does not distinguish potential DRPs from those already affecting the patient. Our documentation system also did not report the cause of the problem or the outcome of the intervention, two items that are included in the PCNE DRP classification system [13]. Increasing the complexity of the system may increase the time spent in documentation and thus decrease pharmacies' willingness to participate. Improved ergonomics of system computerization is needed to facilitate immediate and systematic documentation at the point of care.

Another possibility consists of setting up a monitoring centre to benchmark DRP data provided by pharmacists. This centre could identify the priorities that are needed to continuously improve patient safety (e.g. educational programs for healthcare professionals, public or professional information campaigns, and pharmaco-epidemiologic research) on individual and global scales. Used in this way, a monitoring centre could act as an expert system to coach individual pharmacists according to their own DRPs' documentation profile. For example, pharmacists reporting a significantly lower rate of drug–drug interactions than other pharmacists can be administered targeted exercises.

DRP data collected by community pharmacists can also be regarded as indicators of medical prescribing activity. In this way, the specific control of prescriptions constitutes the constructive participation of pharmacists in collaborative care. DRP data could be used to coach individual pharmacists or in a quality circles approach, which are both proactive measures that can improve drug safety. The pedagogic effect of pharmaceutical cognitive services (e.g. quality circles programs) has been demonstrated with respect to cost savings [25].

Conclusion

The developed documentation system was effective in daily practice, showing that pharmacists can prevent and solve both clinical DRPs and technical problems related to prescriptions. The large and sustained implementation of a

Table 3 Comparisons of DRP related indicators observed in this study and in earlier studies

	Present findings. In order to allow comparisons, percentages refer to overall DRPs identified (clinical DRPs + technical problems related to prescription, $n = 1{,}023$)	Knapp[a], USA [17]	Leemans[c], Belgium [14]	Paulino[d], Europe [19]	Westerlund, Sweden [18]	Andersson[h], Sweden [20]	Hämmerlein, Germany [21]
Intervention rate per patient related to prescriptions	0.77% (clinical DRPs) + 1.90% (technical) = 2.67%	0.7%	4.05%[c]	104%[d]	2.8%	1.4%[i]	0.93%
Variability (range) of the intervention rate between participating pharmacies	0.3–7.8%	0–4.1%	n.r.	74–194%[e]	0–13.3%[f]	n.r.[f]	n.r.
Percentage of clinical problems	28%	30.4%	29%	n.r.	n.r.	n.r.	n.r.
Type of DRP (Step 1)							
Drug–drug interaction	4.4%	3.5%	4.2%	4.0%	3.4%	5.3%	7.7%
Dosage or regimen	12.1%	5.8%	16.6%	5.5%	n.r.	11%	1.5%
Adherence problems	2.6%	2.6%[b]	1.5%	n.r.	8.6%	7.8%[j]	4.1%[b]
Duplicate drugs	2.2%	2.2%	1.6%	2.2%	<4%[g]	2.5%	2.2%
Pharmaceutical decision (Step 3)							
Modification (drug, dosage...) or clarification of the prescription	80.8% (all interventions, $n = 1{,}023$) 67.6% (only clinical DRPs, $n = 287$)	89.1%	n.r.	n.r.	n.r.	n.r.	n.r.
Modification of the brand	12.8% (all interventions, $n = 1{,}023$) 7.3% (only clinical DRPs, $n = 287$)	n.r.	n.r.	9.2%	>10%[g]	n.r.	n.r.
Individuals involved (Step 4)							
Immediate contact with the physician to solve the DRP	32% (all interventions, $n = 1{,}023$) 38% (only clinical DRPs, $n = 287$)	n.r.	n.r.	n.r.	27%	38.9%	60.5%

Percentages refer to overall DRPs identified; n.r., Not reported or not interpretable

[a] Pharmaceutical interventions in a capitation program. Drug selection issues were prevalent (50%) and concerned economical issues

[b] Overuse (1.9%) and underuse (0.7%) problems

[c] Intervention rates are expressed as the percentage per prescription, not per patient

[d] This study focused on patients discharged from hospitals in European countries. Therefore, high-risk patients were included and more than one DRP per patient was documented

[e] Variability between countries

[f] It corresponds to a rate between practitioners, available from a study concerning the same documentation method in Swedish pharmacies [22]

[g] This rate is only graphically reported in the publication

[h] The classification system is based on the Westerlund system [18] and includes a category termed "other problem"

[i] This is an approximated result based on an average of 1.4 prescription per patient visit

[j] Incorrect use or handling

fully computerized system should be the next goal. Future research areas suggested by the present study are based on the development of an accredited monitoring centre, which could be active in patient safety research and education.

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Conflicts of Interest None

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