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Completeness of medication reviews provided by community pharmacists

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SUMMARY

What is known and objectives: **Little is known about the ability of community pharmacists who are inexperienced in medication review to identify drug-related problems (DRPs). The objective of our study was to investigate the completeness of DRPs in terms of number, type and clinical relevance identified by community pharmacists when performing home medication reviews (HMRs).**

Methods: **This is a cross-sectional study within the intervention arm of a randomized controlled trial among community-dwelling patients (≥65 years, ≥5 drugs) in ten Dutch community pharmacies. Community pharmacists, who were inexperienced in medication review, received 2-day training in medication review. These pharmacists interviewed patients at home about their medicines, identified potential DRPs and made recommendations in combination with medication and clinical records. Expert reviewers completed the number of potential DRPs and recommendations by reviewing all available information, including patient interview reports.**

Results and discussion: **In 155 patients, community pharmacists identified a mean of 3·6 (SD 2·8) potential DRPs per patient and expert reviewers added 6·5 (SD 3·2) DRPs. Community pharmacists formulated 2·6 (SD 2·3) recommendations per patient and reviewers added 7·5 (SD 3·3) recommendations. Community pharmacists identified a higher proportion of clinically relevant DRPs compared with expert reviewers, as assessed by DRPs with high priority [OR = 1·8 (95% CI 1·4–2·2)], DRPs associated with recommendations for drug change [OR = 1·9 (95% CI 1·5–2·3)] and implemented recommendations for drug change [OR = 2·1 (95% CI 1·6–2·7)].**

What is new and conclusion: **This study shows that the completeness of medication reviews by inexperienced community pharmacists with limited training could be improved, although they identified a higher proportion of potentially clinically relevant DRPs compared with expert reviewers. The results suggest that community pharmacists with limited experience in medication review may need more intensive post-graduate training.**

WHAT IS KNOWN AND OBJECTIVES

Several randomized controlled trials (RCTs) have demonstrated that clinical medication review can resolve drug-related problems (DRPs). However, these RCTs differed in the expertise of participating pharmacists who were either highly trained[1–10] or inexperienced in medication review.[11–13] Medication review is a complex intervention, which requires both knowledge and skills.[14,15] Medication review skills have to be developed to explore patient's experiences and beliefs about medicines, to identify potential drug-related problems (DRPs), formulate recommendations for a pharmaceutical care plan and to discuss this care plan with physicians.[15]

No extensive post-graduate courses in medication review were available at the start of this RCT on home medication review (HMR) in the Netherlands.[16] Therefore, community pharmacists, who were inexperienced in medication review, received a two-day training course as a part of this study where pharmacists were taught on pharmacotherapy and medication review skills. As part of the intervention, pharmaceutical care plans by the community pharmacists were evaluated by independent expert reviewers.[16]

Relatively little is known to what extent community pharmacists are able to identify DRPs in medication review.[17,18] In particular, no research has been performed into the clinical relevance of these DRPs. The objective of this study was to investigate the completeness of DRPs in terms of number, type and clinical relevance identified by community pharmacists in HMRs.

METHODS

Study design

This is a cross-sectional study among 155 community-dwelling patients (≥65 years and ≥5 drugs including at least one cardiovascular or one antidiabetic drug) enrolled in the intervention arm of an RCT on HMRs in ten community pharmacies.

Intervention

Community pharmacists who were inexperienced in medication review received 2 days of additional training. Pharmacists had access to the patient's medication records from the pharmacy, which are generally a comprehensive source of information as the majority of patients in the Netherlands are registered at only one community pharmacy, independently of prescriber.[19] Medical history and laboratory data of the patient were collected with the help of the GP practice. As part of the study protocol, patients were offered additional laboratory measurements of $HbA1_c$, cholesterol, sodium, potassium and creatinine and blood pressure measurement. Pharmacists interviewed patients at home about their medicines, identified potential DRPs and made recommendations in pharmaceutical care plans. Subsequently, expert

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reviewers (A.F., J.K.-D. and H.K.) completed the number of potential DRPs and recommendations by reviewing all available information, including patient interview reports. Expert reviewers had several years of experience with medication review as well as in-depth knowledge of national clinical guidelines. More details about the intervention have been described elsewhere.[16]

Data collection and classification

Data extracted from the completed pharmaceutical care plans included medication and medical information, patient interview reports, identified potential DRPs and associated recommendations as well as the prioritization for implementation (high, medium or low). Complete patient medication records from the community pharmacy including drug-dispensing records until at least 6 months after the patient interview were collected separately.

Each potential DRP and recommendation were classified as being identified by community pharmacist or added during completion by pharmacist reviewer. When the description of a DRP or recommendation was incomplete and refined by a pharmacist reviewer, this DRP was assigned to the community pharmacist. All potential DRPs and associated recommendations were classified using the D.O.C.U.M.E.N.T. classification system using the most recent version.[16,20,21] Clinical relevance was assessed by the percentage of DRPs assigned a high priority, the percentage of recommendations for drug change and the percentage of implemented recommendations for drug change. Implemented recommendations for drug change were assessed by analysing drug-dispensing records for medication changes.

All coding and classification was independently undertaken by one investigator (H.K.) and a student investigator (Y.A.). When there were differences in coding, the investigators reached consensus in a case conference with a third investigator (A.F. or M.B.).

Statistical analysis

Pearson chi-squared tests were used to compare categorical variables. Independent *t*-tests were used to compare the mean number of DRPs per patient. Differences between the percentages of clinically relevant DRPs and recommendations identified by community pharmacists and those added by expert reviewers were compared by odds ratios (ORs) and corresponding 95% confidence intervals.

A *P*-value <0·05 was considered statistically significant. All data were analysed using Microsoft Access 2007 (Microsoft Corporation, Redmond, WA, USA) and SPSS version 17.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Identified DRPs and recommendations

During the study period, 16 different community pharmacists in 10 community pharmacies were involved. Community pharmacists identified 553 potential DRPs (mean 3·6, SD 2·8 per patient) and expert reviewers 1012 potential DRPs (mean 6·5, SD 3·2 per patient; Table 1). Community pharmacists formulated 398 recommendations (mean 2·6, SD 2·3 per patient) and expert reviewers 1167 recommendations (mean 7·5, SD 3·3 per patient, $P < 0·01$; Table 2). Considerable variations were observed in the proportion of DRPs identified by community pharmacists (range 13–57%) and recommendations formulated by community pharmacists (range 10–46%).

All DRP types, except 'Compliance', were in absolute numbers more frequently added by expert reviewers. DRP types 'Toxicity' ($P < 0·01$) and 'Undertreated' ($P = 0·04$) were relatively more frequently identified by community pharmacists (Table 1).

All recommendations were in absolute numbers more frequently added by expert reviewers, except 'Drug formulation change'. 'Addition of drug' was relatively more frequently recommended by community pharmacists ($P = 0·02$) (Table 2).

DRPs identified in patient interviews

Of 415 potential DRPs originating from patient interviews, community pharmacists identified 171 DRPs (mean 1·1 per patient, SD 1·1) and expert reviewers added 244 DRPs (mean 1·6 per patient, SD 1·7) ($P < 0.01$). 'No indication apparent' ($n = 64$, 26%), 'Condition undertreated' ($n = 33$, 14%), 'Toxicity, allergic reaction or adverse effect present' ($n = 30$, 12%) and 'Incorrect or unclear dosing instructions' ($n = 29$, 12%) were the main DRP subtypes added by expert reviewers from patient interviews.

Clinical relevance

Community pharmacist identified a higher proportion of DRPs with a high priority compared with expert reviewers [OR 1·8 (1·4–2·2), $P < 0·01$]. Furthermore, a higher proportion of DRPs followed by recommendations for a drug change was identified by community pharmacists compared with expert reviewers [OR 1·9 (1·5–2·3), $P < 0·01$]. Finally, a higher proportion of DRPs followed by implemented recommendations for drug change was identified by community pharmacists [OR 2·1 (1·6–2·7), $P < 0·01$] (Table 3).

DISCUSSION

This study shows that expert reviewers identified considerably more potential DRPs and associated recommendations than community pharmacists. However, the DRPs identified by community pharmacists were more often clinically relevant compared with DRPs added by expert reviewers.

Expert reviewers almost doubled the amount of DRPs identified by community pharmacists. The highest difference was seen for the DRP type 'Monitoring'. Reviewers especially added DRPs related to appropriate monitoring of hypertension, dyslipidaemia, diabetes[22,23] and other diseases. Community pharmacists rarely identified these. Monitoring-related problems accounted for more than two DRPs per patient, but were mostly assigned a low priority and not followed by a recommendation for drug change. Monitoring-related problems and some other DRPs identified by expert reviewers might be perceived by community pharmacists and GPs as too theoretical or 'textbook advice'.[24] This may partly explain why community pharmacists identified a lower number but relatively more clinically relevant DRPs. Furthermore, community pharmacists may have ignored other potential DRPs, expecting that associated recommendations might not be implemented based on their earlier experiences with GPs and patients.

There was a considerable variation in the completeness of the reviews. We were not able to identify explicit indicators that may account for this variation in identified DRPs among pharmacists. All participating community pharmacists had no previous hospital experience, no additional clinical pharmacy skills nor followed

Table 1. Comparison of number and type of drug-related problems (DRPs) identified by community pharmacists and added by expert reviewers for 155 patients

DRP type and subtype	Community pharmacists		Expert reviewers		*P*-value
	N	%[a]	*N*	%[a]	
Overall	553	36	1012	64	–
Mean per patient ± SD	3·6	±2·8	6·5	±3·2	–
D*(rug selection)*	156	36	279	64	0·79
Duplication	7	58	5	42	0·09
Drug interaction	5	33	10	67	0·87
Contraindications apparent	28	38	46	62	0·65
No indication apparent	106	33	217	67	0·29
Other drug selection problem	10	91	1	9	<0·01
O*(ver or underdose)*	64	38	105	62	0·47
Prescribed dosage too high	14	42	19	58	0·39
Prescribed dosage too low	31	43	41	57	0·16
Incorrect or unclear dosing instructions	19	30	45	70	0·33
C*(ompliance)*	52	54	44	46	<0·01
Taking too little	25	58	18	42	<0·01
Taking too much	5	63	3	38	0·11
Difficulty using dosage form	22	49	23	51	0·05
U*(ndertreated)*	159	40	243	60	0·04
Condition undertreated	117	40	172	60	0·04
Condition untreated	28	36	49	64	0·85
Preventive therapy required	14	39	22	61	0·65
M*(onitoring)*	75	21	284	79	<0·01
Laboratory monitoring	58	22	203	78	<0·01
Non-laboratory monitoring	17	17	81	83	<0·01
E*(ducation) or Information*	1	11	8	89	0·13
Disease management or advice	1	11	8	89	0·13
T*(oxicity)*	46	48	49	52	<0·01
Toxicity, allergic reaction or adverse effect present	46	48	49	52	<0·01

DRPs, drug-related problems; SD, standard deviation.
[a]% is the percentage within type or subtype of recommendation.

earlier courses in medication review. Nevertheless, differences in knowledge of pharmacotherapy and medication review skills[14,15] among community pharmacists were observed by expert reviewers. Furthermore, some pharmacists may have relied on the expert reviewers to complete the medication reviews. This may partly be explained by the fact that the registration of all research data was experienced as time-consuming by the participating pharmacists.

Surprisingly, a considerable part of issues that were discussed with the patients were not formally identified as potential DRP by community pharmacists. The most frequently added subtype of DRP by expert reviewers from patient interviews was 'Indication not apparent'. This refers to patients using drugs without knowing the indication, which was also lacking in the GP record, or refers to patients using drugs not intended for prolonged use. 'Condition undertreated' was also frequently added by reviewers (e.g. patients indicated that their pain treatment was suboptimal, whereas community pharmacists had not suggested a change of drug or dosing regimen). Furthermore, adverse effects were frequently described in patient interview reports, but surprisingly not always identified as potential DRPs. Possibly, community pharmacists did not recognize complaints as caused by adverse effects or did recognize these, but considered these as inevitable. Finally, 'Incorrect or unclear dosing instructions' was also frequently 'missed' as potential DRPs by community pharmacists. Community pharmacists may consider these medication management problems (e.g. time of intake) as typical pharmacist issues and of minor interest for discussion with GP. Often, these issues were directly solved during the patient interview by advice (e.g. change time of intake).

The percentage of identified DRPs by community pharmacists in our study (36%) was comparable to findings of Krska and Avery[17] (34%) with a clinical pharmacist and an experienced GP as expert reviewers. In the study of Krska, training of the community pharmacists was limited to 2 days, specifically designed for the study, and no formal assessment of their competency to conduct medication reviews was made.[17] Laaksonen *et al.*[18] investigated the performance of community pharmacists who completed a more intensive post-graduate course (i.e. five 60-h distance learning modules in clinical therapeutics). These trained community pharmacists managed to identify 75% of the DRPs found by a clinical pharmacist. These comparisons with our study suggest that 2-day training in medication review may be too limited. A practical solution could be to enrol pharmacists inexperienced in medication review in an intensive post-graduate course in which feedback on reviews from expert reviewers (and portfolio building) plays an essential role.

This study had several strengths. First, a very detailed and accurate description of DRPs was available, because community pharmacists sent all pharmaceutical care plans to the expert reviewers. This enabled us to distinguish very clearly between

Table 2. Comparisons of number and type of recommendations identified by community pharmacists and added by expert reviewers for 155 patients

	Community Pharmacists		Expert Reviewers		
Type of recommendation	*N*	%[a]	*N*	%[a]	*P*-value
Overall	398	25	1167	75	–
Mean per patient ± SD	2·5	±2·3	7·5	±3·3	–
Recommendation for drug change	272	30	633	70	<0·01
Cessation of drug	59	29	146	71	0·24
Dose increase	31	32	67	68	0·15
Dose decrease	16	25	47	75	0·99
Addition of drug	85	31	190	69	0·02
Replacement of drug	49	30	115	70	0·17
Dose frequency/schedule change	20	27	54	73	0·75
Drug formulation change	12	50	12	50	<0·01
Recommended dose administration aid	0	0	3	100	0·31
Other recommendations	126	19	534	81	<0·01
Education/counselling session	10	20	39	80	0·41
Monitoring: Non-laboratory	14	14	85	86	<0·01
Monitoring: Laboratory	59	20	232	80	0·03
Adjustment of patient records	38	19	158	81	0·04
Other	4	17	19	83	0·37

SD, standard deviation.
[a]% is the percentage within type or subtype of recommendation

Table 3. Comparison of clinical relevance of drug-related problems (DRPs) identified by community pharmacists and added by expert reviewers

	Community Pharmacists		Expert Reviewers			
Clinical relevance of DRPs	*N*	%	*N*	%	OR (95% CI)	*P*-value
Overall (reference)	553	100	1012	100	Ref	–
With high priority	285	52	379	37	1·8 (1·4–2·2)	<0·01
With recommendations for drug change	375	68	530	52	1·9 (1·5–2·3)	<0·01
With *implemented* recommendations for drug change	132	24	133	13	2·1 (1·6–2·7)	<0·01

OR, odds ratio; 95% CI, 95% confidence interval.

DRPs identified by community pharmacists and expert reviewers and also provided insight into the clinical relevance of DRPs. Second, the availability of detailed patient interview reports enabled us to assign DRPs originating from patient interviews.

There are some limitations associated with this study. First, expert reviewers in this study could only refine or add to the DRPs already identified by community pharmacists. Blinding of the reviewers for DRPs identified by community pharmacists would have enabled a more in-depth comparison between community pharmacists and expert reviewers. However, assuming that expert reviewers would have identified the majority of DRPs detected by community pharmacists, this would not have a major impact on the findings of the study. Second, expert reviewers were dependent on the provided documentation by community pharmacists for identifying DRPs and did not conduct patient interviews. On the one hand, expert reviewers at distance might have identified some potential DRPs in this study that they possibly might have neglected if they knew the patient. On the other hand, expert reviewers might have identified more or other DRPs from patient interviews. Third, the number of DRPs identified by community pharmacists may have been underestimated, as a limited number of issues were directly solved during the patient interview, but not registered in the pharmaceutical care plan by the pharmacists.

WHAT IS NEW AND CONCLUSION

This study shows that the completeness of medication reviews by inexperienced community pharmacists with limited training could be improved, although they identified a higher proportion of potentially clinically relevant DRPs compared with expert review-

ers. This suggests that a 2-day training programme in medication review may be too limited.

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CONFLICT OF INTERESTS

All authors declare that they have no conflict of interests that are directly relevant to the content of this study.

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