Clinical pharmacy interventions by community pharmacists during the dispensing process

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Aims To evaluate the professional contact between the community pharmacist and general practitioner during the dispensing process on issues other than the legality or simple clarification of the prescription.

Methods Fourteen community pharmacists from five adjacent localities completed details of each clinical pharmacy intervention during 1 week of each month for a period of 1 year. Each week of the month was randomly selected. When a community pharmacist had to contact the prescriber, during the dispensing of a prescription, the following data were recorded: brief patient details, the prescribed drug therapy, the reason for intervention, the outcome and the time taken. The main outcome measures were the type and nature of each intervention, the BNF category of the drug involved and the time taken. A multidisciplinary clinical panel assessed the potential of each intervention to alter the outcome of the patient's clinical management and to prevent a drug related hospital admission. These assessments were ranked between 0 and 10 (100% confident).

Results During a period covering 1 week per month over 1 year, 1503 clinical pharmacy interventions were made out of 201 000 items dispensed. When normalized for the dispensing volume of each community pharmacy the lower the number of items dispensed then the greater was the percentage of interventions ($P=0.013$). The clinical panel decided that between 19 (0.01% of the total items dispensed) and 242 (0.12%) interventions may have prevented a drug-related hospital admission, 71 (0.04%) to 483 (0.24%) could have prevented harm whilst 103 (0.05%) to 364 (0.18%) had the potential to improve the efficacy of the intended therapeutic plan. The panel also decided that 748 (0.37%) interventions improved the clinical outcome and could have saved a visit to or by the general practitioner.

Conclusion Clinical pharmacy provided by a community pharmacist during the dispensing process has the potential to provide a valuable contribution to health care.

Keywords: clinical pharmacy, community pharmacists, dispensing, interventions

Introduction

Community pharmacists are gradually extending their roles as recommended in the Nuffield Report [1], by a joint working party report [2] and more recently by a directive from The Royal Pharmaceutical Society of Great Britain [3]. In addition, three recent government White Papers [4–6] have encouraged the development of community pharmacy within primary care. Currently, remuneration is focused towards volume dispensing rather

than the extent or quality of pharmaceutical care to the patient. However, the dispensing process does include a check on the safety and efficacy of each prescribed therapy and on many occasions this cannot be clarified without consultations with the prescriber.

Community pharmacists contact the prescriber on issues of legal prescribing, clarification of items prescribed and also on matters relating to the practice of clinical pharmacy, otherwise referred to as pharmaceutical care [7]. A pilot study, in one UK community pharmacy has revealed that out of 9000 items dispensed the prescriber had to be contacted on 80 (0.89% of items dispensed) occasions to make clinical pharmacy interventions and an independent clinical panel assessed that 15 (0.35% of

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dispensed items) could have led to a hospital admission if left unchanged [8].

Other limited small-scale UK studies have also indicated a potential benefit of making these interventions with the prescriber [9–12]. An American study involving 89 community pharmacies showed that of 33 011 new prescriptions there were 623 (1.9%) interventions made with the prescriber and a clinical panel concluded that 176 of the interventions (0.53%) may have prevented possible harm to the patient [13]. Other similar studies in Australia [14, 15], Canada [16], New Zealand [17] and South Africa [18] have also highlighted the potential value of this service. All previous studies have documented interventions over a short period of time. We have therefore carried out a 1-year multicentre study of clinical pharmacy interventions. In addition, an independent clinical panel has been used to assess the details of each clinical pharmacy intervention and provide an insight into the potential health gains for each patient.

Methods

Community pharmacies from different locations were recruited to the study. Those who agreed to take part were trained on the practicalities of the study. Each recorded all clinical pharmacy interventions made with the prescriber. These interventions relate to those where the prescribed items could have been dispensed without contact with the prescriber. These did not therefore include reactive interventions which occur when the prescribed item cannot be dispensed without contacting the prescriber. Non-clinical pharmacy interventions, e.g. legal problems, were not recorded. For 1 week during each month over the 12 month period all proactive interventions were recorded. The week chosen for these interventions was randomised. For each intervention the data recorded by the pharmacist were patient details (sex, age, exemption from payment), prescription details, the reason for the intervention, the nature and grade of the intervention and the pharmacist's time. The nature and grade of the intervention was classified as (a) missing drug (from last prescription according to patient medication records); (b) drug not required (not prescribed on last prescription and not an intended new item); (c) discuss information about a drug; (d) change a drug; (e) alter the formulation; (f) enquiry about the dose; (g) enquiry about the dosage interval; (h) recommend the monitoring of plasma parameters to check the efficacy and safety of a drug regimen; (i) discuss with the prescriber a complete drug review of the patient's therapy and (j) others.

Each intervention was presented to a multidisciplinary clinical panel. The panel rated each intervention on a

scale of 0 (definitely not) to 10 (100% confident), to the nearest whole number, for the following criteria:

- Detrimental to the management of the patient
- Improved the efficacy of the patient's therapeutic management
- Prevented harm to the patient
- Prevented a hospital admission

Each community pharmacy provided a range (of one thousand) for their monthly dispensing volumes. The mid value of this range was taken as an estimate of the number of items they had dispensed during the 12-week study period. Two tailed Spearman rank correlations were tested between the number of items dispensed by each pharmacy, the interventions made and the time taken.

Results

Eighteen community pharmacies dispensing between 2000 and 8000 items per month agreed to take part in the study. Four of these failed to submit complete data for all the study period and thus only the results from the remaining 14 community pharmacies are presented. The four pharmacies who failed to submit complete data all dispensed more than 6000 items per month. Table 1 shows that the total nominal number of items dispensed during the 12 weeks of the study period was 201 000 and 1503 proactive clinical pharmacy interventions were made with the prescriber. This is an incidence of 75 interventions per 10 000 prescribed items. All pharmacies were single handed except numbers 3, 8, 11 and 12 which employed the equivalent of 1.5 full-time pharmacists each. Statistical analysis (2 tailed Spearman's rank correlation) revealed a significant ($P=0.013$) correlation between the number of items dispensed by each community pharmacy and the number of interventions when they were expressed as a percentage of the items dispensed. Table 1 also shows that the mean (s.d.) time taken for each intervention was 8.11 (3.70) min. There was no significant correlation between the number of items dispensed and the time taken but, as shown in Table 1, the trend is that more time was spent per intervention by those who dispensed less items per month.

The clinical panel assessed that 755 interventions only provided information to the prescriber in that they did not gain a score for any of the categories. No intervention was judged to cause the patient any harm or clinical deterioration. Seven hundred and forty-eight of the interventions were rated between 1 and 10 for either improved efficacy, prevented harm or both. Table 2 shows that 242 (0.12% of the items dispensed) of these 748 interventions were rated between 1 and 10 for preventing the likelihood of a hospital admission. The 19 clinical pharmacy interventions which were rated 100%

Table 1 Clinical pharmacy interventions and dispensing statistics.

Community pharmacy	Location	Items dispensed (1000s)		Total	Interventions % of dispensed items	Mean (s.d.) time (min)
		per month	during study weeks			
1	H/C	7–8	22.5	175	0.78	4.95 (2.90)
2	H/C	5–6	16.5	66	0.40	9.70 (7.01)
3	H/C	6–7	19.5	103	0.53	6.79 (4.54)
4	H.C	6–7	19.5	102	0.53	7.79 (7.69)
5	H/C	7–8	22.5	67	0.30	3.97 (3.19)
6	S	3–4	10.5	255	2.43	12.64 (10.12)
7	S	4–5	13.5	76	0.56	16.29 (19.39)
8	S	4–5	13.5	53	0.39	8.82 (8.61)
9	S	3–4	10.5	169	1.61	7.46 (21.95)
10	S	2–3	7.5	142	2.89	13.18 (24.92)
11	R	5–6	16.5	81	0.49	5.76 (2.64)
12	R	4–5	13.5	77	0.57	7.24 (7.51)
13	R	2–3	7.5	53	0.71	4.82 (3.32)
14	R	2–3	7.5	84	1.12	4.58 (1.72)
Mean (s.d.)			14.36 (5.32)	107.4 (58.1)	0.89 (0.66)	8.11 (3.70)

H/C—Health Centre; S—Suburban; R—Rural.

Table 2 Clinical panel assessment of the clinical pharmacy interventions.

Panel rating	Frequency		
	Improved efficacy	Prevented harm	Prevented hospital admission
0	1139	1020	1261
1	12	63	104
2	24	98	66
3	29	67	20
4	32	50	9
5	21	31	7
6	90	69	5
7	10	8	3
8	40	21	9
9	3	5	0
10	103	71	19

by the clinical panel for preventing a hospital admission represents 0.0095% of the total number of items dispensed (≈ 1 per 100 000 items prescribed). Table 2 also shows that 364 (0.18% of total items) and 483 (0.24%) of the clinical pharmacy interventions were rated between 1 and 10 for having the potential to improve the efficacy of the prescribed therapies and prevent possible harm, respectively. Of these 103 (0.051%) and 71 (0.035%), respectively, were given maximum scores by the panel. 99 received a score of at least 1 for both categories.

GPs accepted 82% of the clinical pharmacy interventions. Of the 269 (18%) interventions that were not accepted 43 and 32 received a score of 1 or more, by the clinical panel, for the prevented harm and improved efficacy categories, respectively. Of these 5 (dosage

decrease recommendations) of the prevented harm category and 9 (dosage increase recommendations) of the improved efficacy classification received a score of 10 out of 10 from the clinical panel. Nineteen of the unaccepted interventions received a score of 1 or more for preventing a hospital admission but only one of these received a score of 10.

Figure 1 shows that the most common clinical pharmacy intervention was to query the dose (23.8%). Only 2.3% of the clinical pharmacy interventions were to monitor biochemical or therapeutic drug concentrations and only two of the community pharmacists made such recommendations. BNF categories 2 (cardiovascular system) and 4 (central nervous system) accounted for most of the interventions as shown in Figure 2.

Figure 1 The community pharmacists' reasons for the clinical pharmacy interventions (a) missing drug; (b) drug not required; (c) discuss information about a drug; (d) change a drug; (e) alter the formulation; (f) dose; (g) dosage interval; (h) recommend monitoring; (i) drug review; (j) others.

Figure 2 The clinical pharmacy interventions according to the BNF category of the drug: 1—g.i; 2—CNS; 3—resp; 4—CNS; 5—infections; 6—endocrine; 7—obs; gynae and U.T.I; 8—malignant dis. and immunosuppression; 9—nutrition and blood; 10—musculoskeletal and joint dis; 11—eye; 12—ear, nose and oropharynx; 13—skin.

Discussion

The 1503 clinical pharmacy interventions relate to an overall incidence of 0.75% with a mean of 0.89% per item dispensed by each pharmacy. These interventions

occurred during the dispensing of 201 000 new and repeat prescribed items. This compares with a 1.9% intervention rate for new prescriptions reported from a North American multicomunity pharmacy study by Rupp *et al.* 0.25% by Shulman *et al.* in one U.K.

community pharmacy [11] and 0.89% in the pilot study (involving 9000 items) at one of the community pharmacies which took part in this study [8]. Although evaluation by the clinical panel to predict the outcome of each intervention is subjective, the process is similar to that used in previous reports [8, 13, 19] except that a 10 point rating system was used rather than a yes/no decision. The 0.24% incidence of clinical pharmacy interventions which the independent clinical panel were 10–100% confident may have prevented a harmful effect is close to the 0.35% incidence in the pilot study [8] and 0.13% of possible adverse drug reactions prevented by Shulman *et al.* [9]. This incidence for the prevention of possible harmful effects is lower than the 0.53% reported in the multicentre North American study by Rupp *et al.* [13] but this latter study only included new prescriptions whereas the majority of prescriptions in the other studies were repeats. Overall, the number of interventions to improve efficacy, prevent harm or hospital admission are very low with an incidence according to the panel of 37 per 10 000 items prescribed (i.e. a total of 748 in this study). The results highlight the potentially valuable role of a clinical pharmacy service provided by community pharmacists during the dispensing process. The incidence of 0.12% of the items dispensed reducing possible hospital admission, in our study, is much lower than the reports that have indicated that adverse effects are responsible for 3–5% of hospital admissions [20–24].

The clinical pharmacy interventions were made under the current arrangements of the patient not being registered with a pharmacy. However, many of these interventions were possible because of the use of patient medication records (PMRs) during the dispensing of repeat items. This is an important process because many repeat medications are initiated by the patient (not the GP) via a repeat prescribing system. Zermansky reported that in his analysis of prescribing by 50 surgeries there were inadequate controls of repeat prescribing which lead to unauthorized repeats [25]. 72% of repeat drugs in his study showed no evidence of having been reviewed by a doctor for 15 months. Harris [26] reported that repeat prescriptions accounted for 75% of all items, 81% of prescribing costs and that 48.4% of all patients received them. Thus, up to three quarters of all prescriptions dispensed have been generated by the repeat prescribing system and so the greater involvement of the pharmacist is important.

The overall average time taken per intervention was 8.11 min. At present the standard locum charge of employing a pharmacist for 8.11 min is less than the remuneration received for dispensing an item. On some occasions the decision may be to delete at least one item from the patient's prescription. In this instance the remuneration would be nil because an item was not

dispensed. The current system of NHS remuneration therefore penalizes the community pharmacies for recommending these deletions. Another aspect to consider is the costs which are incurred by the primary healthcare budget if a hospital admission had occurred. If an intervention prevents a hospital admission then primary care money is saved and the pressure to find a hospital bed is prevented.

On many occasions the clinical pharmacy interventions could have prevented a visit to or by the patient's GP. The 748 of the 1503 clinical pharmacy interventions made in this study improved pharmaceutical care to these patients according to the findings of Hepler & Strand [7]. This represents 0.37% of all items dispensed during the study period which is much less than an earlier report which stated that 1 in 40 general practice consultations are due to drug related effects [27]. These 748 interventions convert to a national average of 232 per annum for each GP.

In Table 1 there is a suggestion of an inverse link between the prescription volume and the number of interventions made when these are normalized for the prescription volume. The lower incidence of interventions per item dispensed by the high volume dispensaries could be due to dispensing overload but could also be due to local factors such as the experience of the pharmacist, the type of computerized repeat prescribing systems and the pharmacist involvement with patients, general practitioners or other health care staff. Nevertheless, the results do indicate that if the trend to fewer pharmacies with high volume dispensing does continue to occur then the number of employed pharmacists should be increased pro-rata. Dispensing overload could therefore jeopardise the pharmacist's ability to identify clinical pharmacy interventions thereby impeding the process of delivering pharmacy into a new age [3] and also the health outcomes of the patient.

The inverse relationship suggests why clinical pharmacy within primary care has not mirrored the substantial developments that have occurred within secondary care. The study highlights the potential role of the community pharmacist provided that remuneration is focused towards pharmaceutical care rather than a supply service based on volume dispensing. If the remuneration structure was changed then with both further training (via postgraduate taught courses which concentration on clinical pharmacy) and access to relevant patient information the role of the community pharmacist may be truly extended.

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