Attitudes and knowledge of hospital pharmacists to adverse drug reaction reporting

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Aims To investigate the attitudes of UK hospital pharmacists towards, and their understanding, of adverse drug reaction (ADR) reporting.

Methods A postal questionnaire survey of 600 randomly selected hospital pharmacists was conducted.

Results The response rate was 53.7% ($n = 322$). A total of 217 Yellow Cards had been submitted to the CSM/MCA by 78 (25.6%) of those responding. Half of those responding felt that ADR reporting should be compulsory and over three-quarters felt it was a professional obligation. However, almost half were unclear as to what should be reported, while the time available in clinical practice and time taken to complete forms were deemed to be major deterrents to reporting. Pharmacists were not dissuaded from reporting by the need to consult a medical colleague or by the absence of a fee. Education and training had a significant influence on pharmacists' participation in the Yellow Card Scheme.

Conclusions Pharmacists have a reasonable knowledge and are supportive of the Yellow Card spontaneous ADR reporting scheme. However, education and training will be important in maintaining and increasing ADR reports from pharmacists.

Keywords: adverse drug reaction, Committee on Safety of Medicines, hospital pharmacists, survey

Introduction

Adverse drug reactions (ADRs) are a major cause of patient morbidity and mortality [1]. For example, 6.7% of hospital patients suffer 'serious' ADRs, 0.32% suffer fatal ADRs, and ADRs were thought to be between the fourth and sixth leading cause of death in the USA in 1994 [2]. ADRs are also responsible for 5% of hospital admissions [3]. Spontaneous reporting of ADRs remains the cornerstone of pharmacovigilance and is important in maintaining patient safety. However, reporting of serious ADRs rarely exceeds 10% [4]. Since the Yellow Card spontaneous ADR reporting scheme was initiated in the UK, the number of Yellow Cards increased to reach a peak in the early 1990s. Since then, the number received annually has fallen slightly and stabilized at about 17 000 per annum. Reporting from hospitals, where most newly marketed drugs will be used first, has always been lower than reporting from primary care [5].

In order to determine whether hospital-based pharmacovigilance could be improved, a study to investigate the role of hospital pharmacists in ADR reporting was performed in North-East England. This clearly demonstrated that reporting by hospital pharmacists increased the variety and number of ADR reports [6]. Hospital pharmacists in the whole of the UK were thus officially recognized as reporters of ADRs in April 1997 and follow standard reporting criteria [7]. To encourage reporting and provide training, an information pack was sent by the CSM/MCA to all hospital pharmacy premises and the CSM/MCA Regional Monitoring Centres (RMCs) provided workshops about this new role. Despite these initiatives, and encouraging results of the pilot study [6], a review of nation-wide hospital pharmacist reporting after the first year concluded that although most reports had been of a suitable quality, the number of reports had been somewhat lower than expected [8].

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In view of this, we have undertaken a postal questionnaire survey to investigate the attitudes of UK hospital pharmacists to ADR reporting, and their understanding and knowledge of the UK Yellow Card spontaneous ADR reporting scheme.

Methods

Six hundred hospital pharmacists were randomly selected from the Royal Pharmaceutical Society of Great Britain (RPSGB) computer database of approximately 7000 hospital pharmacists. In March 1999, these pharmacists were sent a postal questionnaire. Four weeks later, a second mailing of the questionnaire was distributed to all 600 pharmacists to encourage nonrespondents to participate in the study. The questionnaire included issues addressed in previous studies examining the attitudes of medical practitioners to ADR reporting [9–11], and a previous qualitative study [12].

The questionnaire was modified (a) after comments from the MCA, and (b) after piloting on 20 randomly selected hospital pharmacists of whom 12 (60%) responded. A follow up mailing was not distributed to the pilot group. One question was identified as being ambiguous and was altered accordingly. The pilot study also identified one retired pharmacist and one not in hospital practice, and enquiries to the RPSGB revealed that the database did include such pharmacists. The sample size selected initially was 500, but was increased to 600 to allow for ineligible pharmacists.

Data from this survey were compared with studies performed by Belton *et al.* [9] and Bateman *et al.* [10]. Responses in the survey by Bateman *et al.* [10] were categorized into six subgroups of medical practitioners. For our purposes and to simplify comparisons, these categories were merged and re-calculated as a single numerical value and percentage of the total number of respondents. Where statistically significant differences existed between the responses from pharmacists and medical practitioners (calculated using χ^2-tests), P values are displayed in Tables 1 and 2.

Data were entered onto and analysed using the Statistical Package for Social Sciences (SPSS for MS Windows version 9). Data are presented as mean $\pm$ s.d. (where appropriate) and statistical analysis was performed by chi-squared tests, Student's t-test and stepwise logistic regression, accepting $P<0.05$ as significant; where appropriate, 95% confidence intervals for differences are included. In all stepwise regressions, nonsignificant predictors ($P>0.05$) were removed one at a time, until only significant predictors ($P\leq 0.05$) remained.

Results

Demographics

Questionnaires were returned by 322 (53.7%) pharmacists. Seventeen (2.6%) stated that they were retired or no longer practising as hospital pharmacists, and were thus excluded from the study. The age of the remaining respondents ($n=305$) ranged from 22 to 65 years (mean 36.1 ± 9.1 years) and number of years qualified ranged from 1 to 42 years (mean 13.7 ± 9.1 years). Respondents' time in hospital practice ranged from 1 to 34 years (mean 11.2 ± 7.1 years).

The Yellow Card Scheme and pharmacovigilance

The vast majority of pharmacists ($n=296$, 97.0%) knew that they could participate in the Yellow Card Scheme. Just over a half (172, 56.0%) felt that they had been adequately informed about the launch of the scheme, while 72 (23.6%) did not, and 60 (19.7%) could not remember. A Yellow Card report had been submitted to the CSM/MCA by 78 (25.6%) of those responding. Overall, the 305 respondents had sent in a total of 217 Yellow Cards (mean per pharmacist 0.7 ± 2.4 Yellow Cards, range 0–30). Pharmacists that had reported ADRs

Table 1 Factors that may encourage pharmacists to report adverse drug reactions

Factor[1]	*Agree*	*Disagree*	*Bateman* et al. [10][2,4]	*Belton* et al. [11][2,4]
The reaction is of a serious nature	278 (99.3%)	2 (0.7%)	947 (80.2%)***	247 (95%)**
The reaction is unusual	276 (98.6%)	4 (1.4%)	1122 (95.0%)[3]*	232 (89%)***
The reaction is to a new product	278 (99.3%)	2 (0.7%)	1068 (90.4%)***	237 (91%)***
Certainty that the reaction is a true ADR	229 (82.4%)	49 (17.6%)	NA[5]	129 (49%)***
The reaction is well recognised for a particular agent	35 (12.7%)	241 (87.3%)	709 (60%)***	NA[5]

[1] Number of pharmacists responding to each question varied from 276–280. [2] Number (and percentage) agreeing with statement. [3] Respondents asked if 'severity' is an important factor in deciding to send in a Yellow Card. [4] P values were calculated using χ^2 tests comparing responses from either Bateman *et al.* ($n=1181$) [13] or Belton *et al.* ($n=261$) [12] with the responses from pharmacists: *$P<0.01$, **$P<0.001$, ***$P<0.0001$. [5] NA: not applicable since question was not asked in the survey.

Table 2 Factors that may discourage pharmacists from reporting adverse drug reactions

Reason[1]	*Agree*	*Disagree*	*Bateman* et al. [10][2,4]	*Belton* et al. [11][3,4]
Concern that a doctor gets a copy of my yellow card	25 (9.0%)	254 (91.0%)	NA[5]	NA[5]
Lack of confidence in discussing the ADR with the prescriber	45 (16.2%)	233 (83.8%)	NA[5]	NA[5]
Apprehension about sending in an inappropriate report	94 (33.7%)	185 (66.3%)	NA[5]	20 (8%)***
Lack of time to fill in a report	126 (45.2%)	153 (54.8%)	327 (27.7%)*	54 (21%)***
Concern that a report will generate extra work	49 (17.6%)	230 (82.4%)	346 (29.3%)***	NA[5]
The absence of a fee for reporting ADRs	14 (5.0%)	265 (95.0%)	177 (15.0%)***	NA[5]
Lack of time to actively look for ADRs while in clinical practice	158 (56.8%)	120 (43.2%)	NA[5]	NA[5]
Level of clinical knowledge makes it difficult to decide whether or not an ADR has occurred	90 (32.3%)	189 (67.7%)	NA[5]	NA[5]
Don't feel the need to report well recognised reactions	114 (40.9%)	165 (59.1%)	NA[5]	NA[5]
Pharmacists yellow cards not available when needed	27 (9.7%)	252 (90.3%)	NA[5]	55 (21%)**

[1] Number of pharmacists responding ($n=278$ or 279). [2] Number and percentage agreeing with statement. [3] Responses were 'Yes'/'No'/'Not Sure'. [4] P values were calculated using χ^2 tests comparing responses from either Bateman *et al.* ($n=1181$) [13] or Belton *et al.* ($n=260$) [12] with the responses from pharmacists: *$P<0.01$, **$P<0.001$, ***$P<0.0001$. [5] NA: not applicable or not asked in the survey.

($n=78$) had submitted a mean of 2.8 ± 4.2 Yellow Cards (range 1–30).

Most pharmacists knew that all reactions should be reported for newly marketed agents ($n=297$, 97.7%), and that serious reactions should be reported for established products ($n=278$, 91.4%). When compared with the responses for serious reactions, significantly fewer knew that all reactions should be reported for vaccines ($n=171$, 56.3% ($\chi^2=94.8$, $P<0.001$)) and herbal medicines ($n=110$, 36.2% ($\chi^2=198$, $P<0.0001$)). These responses were similar to those reported for medical practitioners by Belton *et al.* [9] and Bateman *et al.* [10]. Most pharmacists ($n=284$, 94%) also knew that the CSM/MCA did not only want to receive reports of 'only proven ADRs'.

Pharmacists were asked to identify the purpose of the Yellow Card Scheme from six statements. Of those responding, 122 (41.0%) incorrectly thought that the scheme could be used to identify safe drugs and 249 (82.5%) mistakenly thought the incidence of ADRs could be calculated from the Yellow Card Scheme. In addition, 227 (75.2%) pharmacists knew that factors predisposing patients to ADRs could be identified, 299 (98.0%) knew that previously unrecognized reactions could be identified, 188 (62.5%) knew that information about the characteristics of reactions could be obtained and 198 (65.1%) knew that the adverse effects of drugs within the same therapeutic class could be compared.

Attitudes to reporting

Pharmacists were asked about their attitudes to ADR reporting. Of those responding, 260 (86.1%) felt that ADR reporting was a professional obligation for pharmacists, only 6 (2.0%) felt that one report made no difference to the Yellow Card Scheme, while none felt that all serious ADRs were identified by the time a drug had been marketed. However, only 168 (56.0%) felt that it was clear to them what should be reported to the CSM. Only 29 (9.5%) pharmacists felt that Yellow Cards were too complicated, in comparison with over half of the doctors surveyed by Bateman *et al.* [10]. Half (152, 49.8%) of those surveyed felt that ADR reporting should be compulsory, with 131 (43.0%) stating that it should be voluntary, and 22 (7.1%) being either unsure or not responding. There was no significant difference between reporters and nonreporters opinions as to whether reporting should be compulsory or voluntary ($\chi^2=1.5$, $P=0.5$).

Reporting of ADRs

Factors influencing pharmacists to report included serious or unusual reactions, any reactions related to new products, and if they were certain that the drug had caused the reaction (Table 1). Over a third of those surveyed had either not reported an ADR knowing that a doctor was going to report it (107[37.2%]), or had completed a Yellow Card for a doctor to sign (65[22.6%]).

Table 2 lists factors that may act as deterrents to reporting by pharmacists. When compared with doctors responses elicited through surveys performed by Belton *et al.* [9] and Bateman *et al.* [10], significant differences were found for lack of time, concern about submitting inappropriate reports, lack of report forms, the absence of a fee and concern that reporting would generate extra work.

Pharmacists were provided with a list of hypothetical ADRs and asked to state which ones they would report to the CSM/MCA (Table 3). Of the five examples that

Table 3 Pharmacists' decision to report hypothetical ADRs in line with Committee on Safety of Medicines/Medicines Control Agency reporting criteria

Reaction[1]	*Yes*	*No*	*Don't know*
Jaundice with frusemide (Yes)[2]	198 (72.5%)	34 (12.5%)	41 (15.0%)
Nausea with montelukast[3] (Yes)	192 (70.1%)	51 (18.6%)	31 (11.3%)
Headache with venlafaxine[3] (Yes)	129 (47.6%)	104 (38.4%)	38 (14.0%)
Thrombocytopaenia with heparin (Yes)	115 (41.5%)	138 (49.8%)	24 (8.7%)
Gastrointestinal bleed with diclofenac (Yes)	92 (33.1%)	169 (60.8%)	17 (6.1%)
Cold extremities with β-adrenoceptor blockers (No)	1 (0.4%)	265 (96.0%)	10 (3.6%)

[1] Number of responses from pharmacists varied from 273 to 278. [2] Responses in brackets refer to standard CSM reporting criteria in the UK. [3] Montelukast and venlafaxine were under intensive monitoring at the time of the survey (as indicated by ▼) although this was not indicated on the questionnaire.

were appropriate for a Yellow Card report, pharmacists would have reported a mean of 3.7 ± 1.7 (range 0–6) ADRs. Significantly fewer would have reported headache with venlafaxine than nausea with montelukast ($P < 0.001$, 95% CI for the difference 14.4–30.5%), and significantly fewer would have reported thrombocytopaenia with heparin (95% CI 23.2–38.9%) and a gastrointestinal bleed with diclofenac (95% CI 31.8–47.1%) than jaundice with frusemide ($P < 0.001$). Stepwise logistic regression demonstrated that pharmacists were significantly more likely to report serious reactions to new drugs or reactions not well known to be associated with that drug ($P < 0.0001$).

Education and training

Training had been received by 109 (37.9%) pharmacists, mostly through internal departmental meetings (67.9%). Those who had received training were more likely to have reported an ADR ($P < 0.0001$, 95% CI for the difference, 15.4–36.7%), scored higher on the criteria for reporting ($P = 0.001$, 95% CI 0.16–0.57), were more likely to report ADRs according to the CSM criteria ($P < 0.0001$, 0.67–1.37), and, knew more about the purposes of the Yellow Card Scheme ($P = 0.04$, 95% CI 0.01–0.55). Stepwise logistic regression analysis showed that education and training was the only positive predictor in influencing pharmacists to report ADRs ($P = 0.001$).

Increasing reporting

When asked about how ADR reporting could be improved (open question), pharmacists gave a wide variety of responses. The most frequently cited comments included education, training and study days or evenings (62), more time to spend on the wards with patients (31), more feedback, reminders and increased awareness (21), encouragement from managers and departments (13), increased collaboration with prescribers and participation on ward rounds (12), increased accessibility of Yellow Cards and cards specifically designed for the use of pharmacists (13) and more publicity in journals about the scheme (8). Other proposals (frequency less than 7) included on-line access or telephone based reporting, development of local initiatives, increased confidence in dealing with medical staff, making reporting a professional responsibility, a fee for reporting, ADR specialist pharmacists and increasing awareness among other professionals that pharmacists could report ADRs.

Discussion

The aim of this questionnaire survey was to evaluate the attitudes and knowledge of hospital pharmacists to spontaneous ADR reporting in the UK. The response rate was 51%, but is probably artificially low because (a) a significant proportion of those surveyed would not have been eligible for the survey, and (b) not all the pharmacists sent the questionnaire will have received it because the address on the register may not have been up-dated. Moreover, the number of hospital pharmacists in the UK has been reported at 4500 full time equivalents, and not the 7000 stated on the RPSGB database [13]. Thus, our sample of respondents probably represents at least 5% of the hospital pharmacists registered in the UK, a higher proportion than studies involving medical practitioners used for comparison in this paper [9–11]. Nevertheless, we cannot exclude the possibility that the responses of nonrespondents may have been different to the responses received.

A review of the first year of reporting by hospital pharmacists in the UK found that pharmacists reported a higher proportion of serious reactions and a lower proportion of reactions to newly marketed drugs in comparison to hospital doctors [8]. In our survey, almost all respondents stated these two factors would encourage them to report. Pharmacists were less aware than their medical colleagues [9, 10] of the purpose and usefulness

of the information collected by the scheme. The reasons for this are unclear, but lack of awareness may well contribute to the different pattern of reporting from doctors. The responses from this study and our previous qualitative work [12] suggest that pharmacists are reluctant to report minor reactions to newly marketed agents, perhaps because they do not perceive that the contribution this data can make to postmarketing surveillance is important.

A large majority of pharmacists considered that reporting was a professional obligation. However, only a quarter of those responding had reported an ADR, which is substantially lower than medical practitioners in the UK [9], Holland [14] and most of the rest of Europe [11], and may be even less if the proportion of nonresponders in this study is considered. Clearly, there is scope for improvement.

As has been borne out from surveys of medical practitioners, pharmacists were more likely to report if there was a degree of certainty that the drug had caused an ADR, despite the fact that almost all respondents knew that the CSM/MCA did not want to receive reports of only proven reactions. This is a consistent finding from all surveys, and may reflect the anxieties of reporters 'not to appear foolish', a sentiment that needs to be dispelled through communications from regulatory agencies and education. Indeed, a lack of clinical confidence in the diagnosis of an ADR was an issue for a third of the pharmacists surveyed.

The proportion of pharmacists quoting a lack of time in clinical practice and a lack of time to complete reports was significantly higher than that found in previous work [9–11], and perhaps reflects different working practices between the professions and current recruitment difficulties within the pharmacy profession [15]. Time was also the second most frequently cited factor needed to improve pharmacists' involvement in ADR reporting. However, there are probably many clinical activities for which pharmacists consider themselves to have insufficient time. Interestingly, a fee was not considered to be an incentive to report. This issue has been addressed previously by a CSM/MCA working party which concluded that the concept of having a sizeable fee might encourage reporting of trivial reactions while a small fee would not be a spur to reporting [16]. Pharmacists also stated that participation in ward rounds might aid their identification of ADRs and result in increased reporting of reactions. Indeed, participation in ward rounds by pharmacists may not only improve reporting, but may actually decrease the number of avoidable adverse drug events (including ADRs) [17]. This can certainly be considered to be an example of good practice, and should be instituted in all hospitals. The findings of this survey also demonstrate that education and increased awareness is required to improve pharmacists' knowledge, and increase participation in, the Yellow Card Scheme. The infrastructure for the delivery of postgraduate education and training is well established within the pharmacy profession in the UK. Education concerning the importance of ADR reporting needs to continue and be re-inforced by all the bodies involved.

In conclusion, ADR reporting is an activity that may take some time to become fully accepted as a role for the hospital pharmacist and integrated into their daily routines. Pharmacists have a reasonable knowledge of the Yellow Card Scheme and consider it as part of their professional obligation. Major obstacles to reporting include a lack of time, and reluctance to report reactions about which a degree of uncertainty exists. Education and training appear to be a significant influence on ADR reporting and should be continued and re-inforced in order to improve ADR reporting by pharmacists. In the long term, ADR reporting by pharmacists needs a culture change, whereby it is seen as being an integral part of their clinical activities. It is worth noting that when reporting was first introduced for doctors and dentists, reporting took a number of years to reach the levels recorded in the late 1980s and early 1990s [18].

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