

Article

Examining the attitudes of hospital pharmacists to reporting medication safety incidents using the theory of planned behaviour

STEVEN DAVID WILLIAMS¹, DENHAM L. PHIPPS², and DARREN ASHCROFT²

¹Department of Pharmacy, University Hospital of South Manchester NHS Foundation Trust, Manchester M23 9LT, UK, and ²Centre for Pharmacoepidemiology and Drug Safety, Manchester Pharmacy School, Manchester Academic Health Sciences Centre (MAHSC), University of Manchester, Manchester, UK

Address reprint requests to: Steven David Williams, Department of Pharmacy, University Hospital of South Manchester NHS Foundation Trust, Southmoor Road, Wythenshawe, Manchester M23 9LT, UK. Tel: +44-0161-2914195; Fax: +44-0161-2914195; E-mail: s.williams@manchester.ac.uk

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Abstract

Objective: To assess the effect of factors within hospital pharmacists' practice on the likelihood of their reporting a medication safety incident.

Design: Theory of planned behaviour (TPB) survey.

Setting: Twenty-one general and teaching hospitals in the North West of England.

Participants: Two hundred and seventy hospital pharmacists (response rate = 45%).

Intervention: Hospital pharmacists were invited to complete a TPB survey, based on a prescribing error scenario that had resulted in serious patient harm. Multiple regression was used to determine the relative influence of different TPB variables, and participant demographics, on the pharmacists' self-reported intention to report the medication safety incident.

Main outcome measure(s): The TPB variables predicting intention to report: attitude towards behaviour, subjective norm, perceived behavioural control and descriptive norm.

Results: Overall, the hospital pharmacists held strong intentions to report the error, with senior pharmacists being more likely to report. Perceived behavioural control (ease or difficulty of reporting), Descriptive Norms (belief that other pharmacists would report) and Attitudes towards Behaviour (expected benefits of reporting) showed good correlation with, and were statistically significant predictors of, intention to report the error [$R = 0.568$, $R^2 = 0.323$, adjusted $R^2 = 0.293$, $P < 0.001$].

Conclusions: This study suggests that efforts to improve medication safety incident reporting by hospital pharmacists should focus on their behavioural and control beliefs about the reporting process. This should include instilling greater confidence about the benefits of reporting and not harming professional relationships with doctors, greater clarity about what/not to report and a simpler reporting system.

Key words: pharmacy, adverse events, incident reporting, patient safety, drug errors

Introduction

With observed hospital prescribing and administration median error rates of 7% (of medication orders) [1] and 8% (of total opportunities for error without timing errors) [2], respectively, and retrospective case record reviews suggesting a median 15.1% of all in-hospital adverse events are drug-related [3], there is a clear need for healthcare systems to better learn from medication safety incidents to reduce the harm from repeated errors.

However, as with adverse drug reaction (ADR) reporting [4], such learning within healthcare organizations is hindered by an incomplete understanding of the level and type of medication incidents (MIs) occurring [5] and the scale of under-reporting; estimates suggest that 0.7 and 0.3% of the total number of prescribing [6] and administration errors [7] are reported, respectively.

Two recent surveys of patient safety culture in hospital pharmacy practice have suggested that encouraging pharmacists to communicate openly about patient safety issues is beneficial for MI reporting [8] and that a constructive response to MIs is a key facilitator of a more mature safety culture [9].

Several qualitative studies have specifically considered the attitudes of pharmacists to reporting MIs within hospital settings in an effort to find out reasons why they may or may not report [10–12]. Over 10 years ago, suspicion about reporting schemes, associated with a fear of the consequences for those involved, was identified in US hospitals [10]. More recently, focus group studies in Canadian community hospitals [11] and UK hospitals [12] found that the barriers to reporting MIs are complex and multifactorial.

Hartnell *et al.* [11] found the barriers to be 5-fold: the sheer burden of reporting; concern about identifying the reporter's identity; a lack of information about what, how and why to report MIs; organizational factors about reporting *per se*; and fear of reprisal or exposure to malpractice suits. In Williams *et al.*'s study [12], pharmacists admitted that they did not report incidents as much as they knew they should due to their belief that MIs were an intrinsic feature of busy hospital working environments. This has not previously emerged as an important factor affecting the reporting behaviour of doctors, nurses and midwives to reporting incidents in health care [13, 14].

Pharmacists' decisions to report MIs were also influenced by the perceived severity of patient harm, anxieties about harming inter-professional relationships, prior experience of the outcomes from reporting and the perceived effort required to use reporting forms [12]. The reporting of MIs by a hospital pharmacist therefore appears to be a volitional behaviour that is influenced by the pharmacist's experiences and perception of reporting. As such, it might be usefully understood through social psychological models of behaviour.

The theory of planned behaviour (TPB), shown in Fig. 1, is one such model, which explains volitional behaviour in terms of the beliefs that individuals hold about the behaviour in question [15]. According to TPB, three sets of beliefs determine engagement in the behaviour:

- (i) Attitude towards behaviour (AB)—beliefs about the likely outcomes of performing a behaviour, and whether those outcomes are desirable or undesirable;
- (ii) Subjective norm (SN)—beliefs about whether other people would wish the respondent to perform the behaviour, and the extent to which this matters to the respondent;
- (iii) Perceived behavioural control (PBC)—beliefs about the presence of factors that facilitate or inhibit the behaviour.

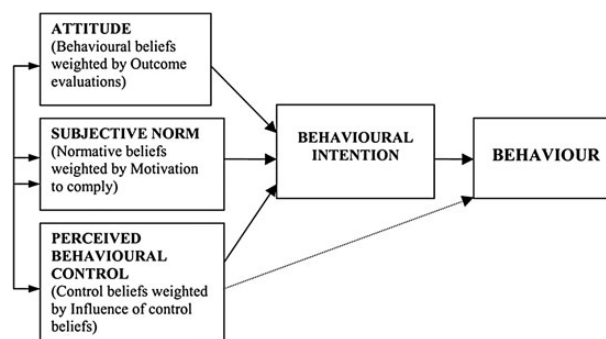


Figure 1 The theory of planned behaviour (adapted from Ajzen [15]).

According to TPB, the more favourable these beliefs are towards engaging in a behaviour, the more likely it is that the respondent will engage in the behaviour [15].

TPB surveys have been used to look at a range of health professional behaviours including anaesthetists' use of theatre practice guidelines [16] and adherence of health professionals to hand hygiene recommendations [17, 18]. The model has also been used to try to understand pharmacists' intentions to undertake a number of clinical behaviours, including community pharmacists' intentions to provide medication therapy management [19] to help patients treat vaginal candidiasis with non-prescription medicines [20]. More recently, a TPB survey found that attitudes towards behaviour and SNs, but not PBC, were significant predictors of the intention of pharmacists' to report serious adverse drug events to the Food and Drug Administration (FDA) in the USA [21]. The primary focus of this study was, however, not about medication safety incidents in hospital *per se*, but rather the reporting of serious drug side effects, product use errors, product quality problems and therapeutic failures, akin to traditional ADR reporting in Europe.

Given the relationship between behavioural intention and actual behaviour in health professionals using TPB [22], the aim of this study was to assess the effect of TPB factors within hospital pharmacists' practice on their intention to report a medication safety incident.

Method

Ethical approval for this study was granted from the NHS National Research Ethics Service (reference number 08/H1003/230). The questionnaire was pretested with six hospital pharmacists, and minor changes were then made to the wording of a number of questions.

A convenience sample of 596 pharmacists from 21 general and teaching hospitals, all in the North West of England, was invited to take part in the study in 2010. Invitations were electronically circulated to all respondents via the hospitals' clinical pharmacy services managers. Respondents were given the choice to complete paper copies and return them via freepost return delivery, or to complete an on-line version of the questionnaire via a secure website. Reminder emails were sent after 2 and 4 weeks.

The questionnaire (see Supplementary File S1) was constructed according to a set of guidelines for health service researchers on the design of TPB studies [23]. To populate the questionnaire, the factors influencing reporting that were identified in our previous study [12] were categorized into AB, SNs and PBC according to the definitions provided earlier. These factors, in effect, became the salient beliefs

Table 1 Salient beliefs used for the TPB questionnaire

What are the potential outcomes of reporting? (Attitude towards behaviour)	Who influences the respondent's behaviour? (Subjective norm)	What allows or stops reporting? (Perceived behavioural control)
Increasing awareness of a medication safety problem (i.e. positive feedback)	Peers	Seriousness of incident, i.e. harm or near miss
Reducing the future harm	Medical and nursing colleagues	Time pressures
Affecting professional working relationship between pharmacist and doctor	Patients	Excessive workload pressures
Creating disciplinary/litigation concerns for trust or individual health professionals	Clinical risk managers	Simplicity of reporting
		Format of reporting, e.g. anonymity, dedicated person
		Duplication of effort and co-operation of others, e.g. documentation in notes or verbal feedback to health professionals involved

to be tested in the questionnaire, as listed in Table 1 [24]. In addition to these three sets of beliefs, further questions intended to address the 'descriptive norm' were included: what the respondent would expect his or her peers to do if in the same situation [25].

TPB questionnaires are potentially lengthy and complex [26, 27]; therefore, a pragmatic decision was made to base the questions on a single medication safety incident scenario. The scenario was derived from a real-life cluster of cases at one of the hospitals participating in the study. There prescribing errors had occurred due to confusion between the immunosuppressant Azathioprine and the similar sounding antibiotic, Azithromycin. The scenario read as follows:

You have just finished your morning visit to your ward and you now need to attend a departmental meeting followed by a teaching session all afternoon. During your ward visit you discovered a medication incident which may have caused this hospital admission. A patient had been prescribed Azathioprine 250 mg instead of Azithromycin 250 mg following an outpatient visit 6 weeks ago and has now presented with severe neutropenic sepsis. You decide to report the medication incident via the hospital reporting system but you also make an entry in the clinical notes and contact the original prescriber and pharmacist involved to make sure they understand what has happened.

The outcome for the patient in the scenario was intentionally selected to ensure that the pharmacists would consider this to be a real harm incident and not a near miss, as the former are more likely to be considered worthy of reporting [14, 28]. The questionnaire design, however, allowed for subsequent questions to then ascertain if responses about reporting were any different if no harm had occurred.

Participants were then asked to imagine that they were the pharmacist in the scenario and rate each of the beliefs (attitude towards behaviour, SN, PBC and descriptive norm) about their intention to report medication safety incidents. Details of the ratings are provided below:

Attitude towards behaviour—Assessed using six paired questions, establishing first a measure of behavioural belief and then the outcome evaluation about the belief that the reporting of MIs reduces the risk of harm in the future.

Reporting MIs reduces the risk of harm to another patient due to the same problem in the future
1, Strongly disagree; 2, Disagree; 3, Slightly disagree; 4, Neutral; 5, Slightly agree; 6, Agree; 7 Strongly agree.

Reducing the risk of harm to another patient due to the same problem in the future would be

1, Extremely undesirable; 2, Undesirable; 3, Slightly undesirable; 4, Neutral; 5, Slightly desirable; 6, Desirable; 7, Extremely desirable.

SN—Assessed using four paired questions, establishing first a measure of the normative belief and then the motivation to comply with the belief that doing what colleagues thinks matters.

Example

My medical and nursing clinical colleagues in my hospital would think I should report the MI

1, Strongly disagree; 2, Disagree; 3, Slightly disagree; 4, Neutral; 5, Slightly agree; 6, Agree; 7, Strongly agree.

Doing what medical and nursing clinical colleagues would think I should do matters to me

1, Not at all; 2, Hardly; 3, A little bit; 4, Moderately; 5, Considerably; 6, Very much; 7, Absolutely.

PBC—Assessed using 11 paired questions, establishing first a measure of the control belief and then the frequency that these factors occur in their experience.

Example

Being under time pressure would make reporting medication incidents . . .

1, Much less likely; 2, Less likely; 3, Slightly less likely; 4, Neutral; 5, Slightly more likely; 6, More likely; 7, Much more likely.

How often are you under time pressure?

1, Never; 2, Very rarely; 3, Rarely; 4, Occasionally; 5, Often; 6, Very often; 7, Always.

Behavioural intention—Assessed using two questions.

Example

How likely is it that you would report the incident described in the scenario?

1, Very unlikely; 2, Unlikely; 3, Fairly unlikely; 4, Neutral; 5, Fairly likely; 6, Likely; 7, Very likely.

How strong is your intention to report medication incident in future?

1, Very weak; 2, Weak; 3, Slightly weak; 4, Neutral; 5, Slightly strong; 6, Strong; 7, Very strong.

Descriptive norms—Assessed using two questions establishing expectations of how peers might act in the same situation.

Example

Most pharmacists would. report the medication incident described in the scenario
 1, Never; 2, Very rarely; 3, Rarely; 4, Occasionally; 5, Often; 6, Very often; 7, Always.

A copy of the final survey with all the paired questions used is available in Supplementary File 1.

Following the standard procedure for computing TPB scores [23], the overall score for attitude towards behaviour was calculated by multiplying likelihood of each outcome by its desirability and then calculating the average value of these cross products. A similar procedure was performed to obtain the score for SN (multiplying the strength of each referent’s expectation by the referent’s importance to the respondent and calculating the average of the cross products) and PBC (multiplying the influence of each control factor by the frequency of its occurrence and calculating the average for the cross products). In the case of attitude towards behaviour, both likelihood and desirability could be expressed in terms of bipolar scales (+3 to -3), yielding an overall score on a scale of -9 to +9. For SN and PBC, only expectation and influence, respectively, could be expressed in terms of bipolar scales, and so the overall score is on a scale of -21 to +21. Finally, descriptive norm was calculated by calculating the average rating across the two questions, yielding a score of 1 to 7.

The data from the questionnaire were entered into Statistical Package for the Social Sciences (SPSS) Version 15. Pearson’s correlation values and Cronbach’s alpha reliability values were obtained for the TPB measures and behavioural intention. The Cronbach’s alpha values were calculated using the cross products that make up each of the TPB constructs (i.e. likelihood * desirability; expectation * motivation to comply; influence * frequency).

A multiple regression analysis was carried out on the data, with intention to report as the outcome factor and attitude towards behaviour, SN, PBC and descriptive norm as the predictor variables. Demographic variables (gender, current pay grade and number of years’ experience as a hospital pharmacist) were included as additional predictor variables.

Results

In total, 284 surveys were completed (180 paper, 104 electronic). Fourteen were discarded as they were incomplete resulting in a final response rate of 45% (270/596). The majority of respondents were female (79.3%), working primarily in clinical pharmacy roles (83.4%), in either district general (49.2%) or teaching hospitals (43.9%). The mean age of the respondents was 35.97 (SD 9.59) with a mean number of years working as a hospital pharmacist of 11.67 (SD 8.79). One hundred and sixty-one respondents (61.5%) held senior pharmacist jobs (NHS Agenda for Change Band 8 and above).

Descriptive statistics (including mean scores and Cronbach’s alpha reliability values) for the belief measures are shown in Table 2 and illustrated in Fig. 2. Respondents reported a very strong intention to report MIs, a strong belief that colleagues would want them to report (SNs) and a strong belief that their pharmacist colleagues would report such incidents (Descriptive Norms). Overall, pharmacists also favoured reporting MIs as a good thing to do (weakly positive AB), but they were ambivalent about how easy or difficult it was to report them (PBC).

Mean scores for the behavioural beliefs (-3 extremely unlikely to +3 extremely likely) revealed that pharmacists were equivocal about the possible negative aspects of reporting (risk of litigation or disciplinary action and harming professional relationships) but strongly

Table 2 Mean scores for TPB measures

Variable	Scale	Mean	Standard deviation	Cronbach’s alpha	Number of items
Attitude towards behaviour (AB)	-9 to +9	2.15	1.88	0.37	6
Subjective norm (SN)	-21 to +21	9.39	4.2	0.75	4
Perceived behavioural control (PBC)	-21 to +21	-0.95	2.77	0.58	11
Descriptive norm (DN)	+1 to +7	6.07	0.97	0.44	2
Intention	+1 to +7	6.20	0.79	0.55	2

For all variables, a high positive score favours reporting medication incidents.

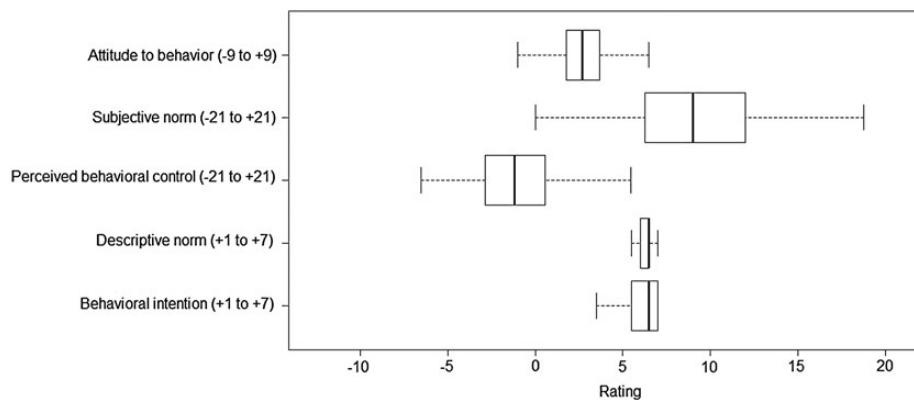


Figure 2 Mean scores and distributions of TPB scores.

Table 3 Pearson's correlations between the TPB measures

	Attitude towards behaviour	Subjective norm	Perceived behavioural control	Descriptive norm
Subjective norm	0.25**			
Perceived behavioural control	0.17**	0.06		
Descriptive norm	0.17**	0.17**	0.15*	
Intention	0.32**	0.17*	0.36**	0.38**

* $P < 0.05$.** $P < 0.01$.

The bold values indicate that intention to report is the outcome factor and attitude towards behaviour, subjective norm, perceived behavioural control and descriptive norm are the predictor variables.

endorsed the idea that reporting reduces the chance of similar harm happening to another patient in the future (mean score 2.13, SD 0.98).

Mean scores for the outcome evaluations associated with the behavioural beliefs (−3 extremely undesirable outcome to +3 extremely desirable outcome) showed that the positive consequences of reporting (increasing awareness of a problem and reducing the risk of a similar incident) were more important than the negative ones. The fear of harming the doctor–pharmacist professional relationship was seen as the most undesirable (mean score −1.89, SD 0.95).

Mean scores for the control beliefs (−3 extremely unlikely to +3 extremely likely) showed that an incident being a near miss where the patient comes to no harm (mean score −1.26, SD 1.49) or personally being under time (mean score −1.62, SD 0.58) or workload (mean score −1.69, SD 1.36), pressures were all rated as making reporting less likely. The use of a simple reporting form (mean score 1.99, SD 0.92) and the presence of a medication safety pharmacist, to assist with the completion of the reports, (mean score −1.6, SD 1.18) were rated as making reporting more likely.

The Pearson's correlations between each of the TPB predictors and the dependent variable, intention to report, are shown in Table 3. There was a moderate relationship between the Attitude towards behaviour (AB), Descriptive Norm (DN) and PBC with the intention to report medication safety incidents.

The regression model containing demographic variables and the TPB measures was a statistically significant predictor of behavioural intention [$R = 0.568$, $R^2 = 0.323$; adjusted $R^2 = 0.293$; $P < 0.001$]. The coefficients, shown in Table 4, indicate that PBC, descriptive norms and attitudes towards behaviour all had statistically significant influence over intention to report (32% of the variance in intention to report was accounted for by the regression model). Of the three, PBC had the strongest influence [$\beta = 0.28$], followed by descriptive norm [$\beta = 0.22$].

Respondents' grade of job and gender had a statistically significant influence over the intention to report MIs, with more senior pharmacists and female pharmacists being more likely to report. However, applying the Barron–Kenney procedure [29] to gender and descriptive norm led to the latter accounting for the effect of gender on intention. In other words, female respondents have a stronger intention to report MIs, because their beliefs about other pharmacists reporting differ from those of male respondents.

Discussion

Overall, the hospital pharmacists held strong intentions to report medication safety incidents and PBC (ease or difficulty of reporting), descriptive norms (belief that other pharmacists would report) and attitudes towards behaviour (expected benefits of reporting) showed

Table 4 Regression coefficients for reporting medication incidents

Predictor	β	t	P -value
Gender	0.19	3.06	0.003
Grade of job	0.19	2.74	0.007
Primary role	−0.02	−0.35 ns	0.724
Hospital type	−0.03	−0.58 ns	0.567
Years of hospital experience	0.05	0.79 ns	0.429
Attitude towards behaviour	0.18	2.95	0.004
Subjective norm	0.06	0.95 ns	0.342
Perceived behavioural control	0.28	4.65	<0.001
Descriptive norm	0.22	3.63	<0.001

ns, non significant.

good correlation with, and were statistically significant predictors of, the intention to report.

The results suggest that efforts to improve the reporting by hospital pharmacists should focus on these behavioural and control beliefs about the MI reporting process.

A comparison of the behavioural beliefs with the outcome evaluations used in the TPB survey suggests that pharmacists think that preventing medication harms in the future and the increased awareness of medication safety issues are both desirable outcomes and agree that incident reporting may help deliver the former but not the latter. As far back as 1979 Duran reported that feedback from incidents can encourage healthcare staff to help reduce patient harm [30], and the importance of feedback about safety problems and their solutions is still considered critical to improve reporting and learning [31–34]. Patterson and colleagues [8] concluded that the presence of a good feedback infrastructure following incidents may actually not be sufficient to stimulate further MI reporting. However, despite the large sample size of the Agency for Healthcare Research and Quality (AHRQ) patient safety culture survey, the results comparing pharmacists with higher versus lower communication feedback composite scores and their likelihood of reporting incidents were not statistically significant.

Pharmacists also think that damaging the doctor–pharmacist professional relationship is an undesirable outcome but were equivocal about the negative effects of reporting harming such professional relationships. This is contrary to earlier qualitative research where hospital pharmacists cited concerns about inter-professional relationships [12] and fears about professional identity [11] as direct barriers to medication safety reporting.

We found that control beliefs, time/workload pressures and the fact that patients commonly come to no harm (i.e. a near miss) were rated as making reporting incidents less likely, while a simple reporting form and the presence of a medication safety pharmacist, to assist

with the completion of the reports, were rated as making reporting more likely. Qualitative studies agree that the decision by hospital pharmacists about whether or not to report a MI is a complex one and often depends on the severity of any patient harm [11, 12]. It also involves institution-specific issues [11] and pharmacists' detail conscious nature probably makes the act of reporting even more challenging [12]. Coupled with the sheer scale of prescribing and administration errors and the time/workload pressures for pharmacists in hospitals, greater clarity about which incidents need or need not be reported could be implemented to improve reporting [11, 12]. Calls for simpler incident reporting systems have also been previously acknowledged [11, 12, 35, 36], and the presence of dedicated medication safety staff have been both suggested [9, 37] and shown, in a single hospital, to increase MI reporting rates [38].

Our TPB survey additionally found that senior UK hospital pharmacists (expected ≥ 5 years in the profession) were more likely to report medication safety incidents. This seniority pattern in reporting has not been established before as a hospital pharmacy survey on patient safety culture found no difference in the likelihood of reporting any MI between pharmacists who had worked less rather than > 5 years in the profession [8].

The inclusion of pharmacists from 21 large and small, district and teaching hospitals, and with a range of experience, in predominantly clinical roles strengthens the external validity of these findings and their applicability to other UK hospitals, and possibly non-UK hospitals with similar service configurations.

Attitudes towards behaviour are the best predictors of intention in the TPB model [39, 40], and the model assumes that the salient beliefs of an individual are the ones that determine a person's attitude. The use of behavioural belief questions determined from previous qualitative work on reporting MIs would have enhanced the validity of the TPB questionnaire.

Although the construction of the TPB survey followed international design guidance, there are a number of limitations that need to be considered. Five hundred and ninety-six hospital pharmacists were invited to take part, with two reminder emails sent, but the response rate was marginally lower than the 50% response rate expected with TPB surveys [23], and the potential for non-responder bias cannot be ruled out.

The survey only tested the intention of pharmacists to report an outpatient prescribing safety incident and no administration or dispensing incidents. This may limit the generalizability of the findings; however, it was a deliberate choice due to the difficulty that has often been encountered in completing a TPB questionnaire that includes multiple scenarios [23]. Prescribing errors are the most common type of MIs reported by hospital pharmacists [41], and the majority of the TPB questions considered views about MIs in general. It is also accepted, however, that the professional relationship between a pharmacist and an outpatient prescriber is likely to be less well-developed than between a clinical pharmacist and a doctor, who work together daily in a multidisciplinary ward team. This could have influenced respondents' answers to questions about the act of reporting and possibly harming the professional relationship between pharmacists and doctors. The survey also only tested the intention to report a MI that caused serious patient harm, but this is unlikely to have changed the conclusions about improving reporting given that hospital pharmacists admit that the high prevalence of medication incidents has led to an acceptance of not using hospital reporting systems anyway [12].

The reliability values for the TPB constructs were lower than expected; this may have influenced the results as measures with low reliabilities can lead to an underestimate of the variance predicted by a

regression model that contains them [24]. It is possible that the low reliability was due to the presence of 'sub-factors' within each set of beliefs, such as have been identified in previous TPB studies [42]. It is not clear from the present data what the nature of such factors would be, but this is an issue that requires further investigation.

The study, like others based on TPB, used self-reported measures of behavioural intention that can possibly overestimate the association between intention and behaviour associations because of consistency, social desirability or memory biases [43]. It is also possible that other influences on reporting behaviour have not been represented in the beliefs that were selected for the study. The latter is suggested by the relatively low amount of variance accounted for in behavioural intention by the predictor variables. (While the amount of variance accounted for is low, though, it is typical of what is found in other TPB studies [40] and carries the advantage of being easily translated into a set of interventions, as described later). Therefore, the findings of the study should be confirmed by studying actual reporting behaviour in addition to behavioural intention, whether by self-report or by observation.

National efforts to better learn from medication adverse events, and thus potentially prevent medication harms in hospitals, are common [44, 45] and could develop further through focussed quality improvement initiatives to measure the prevalence of harms [46, 47], but need to start with improving the reporting of medication safety incidents by hospital pharmacists [48].

Given the importance of behavioural and control beliefs to hospital pharmacists identified in this study, an appropriate hypothesis for improving the reporting of medication safety incidents appears to be 3-fold:

- (i) Confidence: Personal confidence to report health professional colleagues involved in incidents and overall confidence that they will see positive outcomes from reporting the incidents.
- (ii) Clarity: Given the endemic nature of MIs greater clarity about which MIs should and should not be reported with the use of targeted reporting along similar lines to the Medicines and Healthcare Products Regulatory Agency (MHRA) yellow card reporting scheme;
- (iii) Simplicity: Simpler reporting forms, possibly specific for medication, and which might include completion of form by others.

One line of development for this work is to translate the findings into improvement interventions. Specifically that the beliefs identified in this TPB study become the focus of educational or design interventions to improve reporting. There are, as yet, no studies that have demonstrated the effectiveness of TPB-based interventions in patient safety; however, experience in other settings such as transport safety [49] and health behaviour [50] suggest that TPB would be useful in this regard.

Conclusion

Efforts to improve the reporting of MIs by hospital pharmacists should focus on their behavioural and control beliefs. This should include instilling greater confidence about the benefits of reporting and not harming inter-professional relationships, greater clarity about what/not to report and a simpler reporting system.

Supplementary material

Supplementary material is available at *INTQHC* online.

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Authors' contribution

S.D.W. made substantial contributions to conception and design, acquisition of data or analysis and interpretation of data; drafted the article and revised it critically for important intellectual content and provided final approval of the version to be published. D.L.P. and D.A. also contributed to the design and analysis and interpretation of data; revision of the article critically for important intellectual content and provided final approval of the version to be published.

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