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Determination of pharmacy students' patient safety approach using the theory of planned behaviour: a mixed-method study

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ABSTRACT

Objectives To investigate pharmacy students' attitudes, subjective norms, perceived behavioural control, intentions and their behaviour towards patient safety using a theory of planned behaviour framework.

Design Mixed-methods research.

Setting Private university in Malaysia.

Participants Pharmacy undergraduate students participated in the study. There were 18 students participated in the qualitative study and 272 students responded to the survey questionnaire.

Methods A convergent parallel-mixed method design, involving a quantitative survey and qualitative focus group discussions was used among pharmacy students in a private university in Malaysia. Qualitative data of transcribed verbatim texts were then subjected to a thematic content analysis framework. Multiple correlations were undertaken using the quantitative data to examine how the dependent variable (self-reported knowledge) related to the independent variables (attitudes, behavioural intentions, subjective norms, perceived behavioural control).

Primary outcome Pharmacy students' attitudes, subjective norms, perceived behavioural control, behavioural intentions constructs led to their behaviour towards patient safety.

Secondary outcome The quantitative study revealed that there was a moderate positive correlation between students' self-reported knowledge and attitudes (r=0.48, p=0.03).

Results Pharmacy students' attitudes and perceived behavioural control constructs had positive correlations with pharmacy students' self-reported knowledge on patient safety. There was no correlation between students' self-reported knowledge and subjective norms (r=0.27, p=0.23). There was a weak positive correlation between students' self-reported knowledge and perceived behavioural control (r=0.39, p=0.04). There was no correlation between students' self-reported knowledge and behavioural intention (r=0.20, p=0.56).

Conclusions Theory of planned behaviour constructs such as attitudes, subjective norms, perceived behavioural control and behavioural intentions of pharmacy students, defined their behaviour towards patient safety. Pharmacy students' attitudes and perceived behavioural control constructs were correlated with their self-reported knowledge on patient safety.

Strengths and limitations of this study

► This study tested the pharmacy students' patient safety approach using theory of planned behaviour.
► This study measured the self-reported knowledge of the students.
► This study did not measure the students' factual knowledge of patient safety.
► The results of the findings may not be generalised as the participants are from one institution.

INTRODUCTION

Protecting patients from adverse events is an essential goal for every healthcare system.[1] Patient safety has been recognised as a top global health priority, as adverse events due to unsafe healthcare practices are leading causes of morbidity and mortality.[2] Unsafe care results in time and money being spent on affected patients, thus detracting from the treatment of other conditions.[3] Most unsafe healthcare practices are avoidable: preventing medical errors in the workplace and adoption of an appropriate culture by healthcare workers is important. All members of the healthcare team must understand their role in patient safety and an organisational culture must be maintained in which individuals recognise safety challenges and implement viable solutions.[4 5] The US Institute of Medicine emphasised the importance of the establishment of a safety culture in healthcare organisations to ensure that patients are not unintentionally harmed by errors in their care.[6]

Over the past few years, medication errors have become the largest constituent of medical errors, accounting for about 25% of the global occurrences, which threaten patient safety.[7] Due to their impact on the quality of healthcare, reporting medical errors and adverse drug events is receiving

significant attention in healthcare systems.[5] The burden of patient harm contributes to increases in healthcare costs and a loss of trust in the health system.[8] Multiple diseases and multimorbidity inevitably lead to polypharmacy,[9] and the increasing size of the elderly population and complexity of care adds more risk to patient safety.[10] Additionally, a need to take lifelong medications and the consumption by patients of more non-prescribed medications without any supervision from healthcare professionals contribute to patient safety issues.[11] There are wide varieties of effective treatments available in the current system, and the quality of care depends on the knowledge of healthcare professionals who are delivering existing therapies.[12]

Pharmacy is one of the core professions in the healthcare workforce and pharmacists' clinical skills and clinically relevant knowledge have led them to play a major role in patient care and medication management within the hospitals and community settings. The evolving role of pharmacists in primary and patient-centred healthcare has a significant impact on the error reduction in healthcare settings and provides a great opportunity for them to champion patient safety.[13] There is increasing evidence showing that the attitudes and behaviour of pharmacists can reduce adverse events related to medications in healthcare settings.[14–18] A previous study reported that senior pharmacists had a significantly different attitudes from junior pharmacists towards patient safety.[19]

Preparing pharmacy graduates for safe and effective clinical work, including safe medication practices, is an important aspect of pharmacy education.[20] Pharmacy students are expected to have adequate knowledge concerning the process, procedure, and importance of reporting adverse events.[21] The undergraduate pharmacy curriculum covers many aspects of patient safety. To verify its effectiveness, or further improve the component, it is essential to explore the factors that currently influence students' attitudes, intentions and behaviour towards patient safety: this will help to improve the patient safety culture among future pharmacists. In this context, this study explored pharmacy students' attitudes, intentions, and behaviour towards patient safety by using the theory of planned behaviour (TPB) as the theoretical framework.[22 23] From the TPB, we can determine pharmacy students' behaviour towards patient safety. Their behaviour towards patient safety may be defined by their behavioural intentions, which are the reflections of their attitudes, social norms, and perceived behavioural control. Attitudes towards patient safety denote the opinions and ideas of patient safety, and subjective norms towards patient safety denote what people think or what is society's anticipation.[24] Perceived behavioural control towards patient safety denotes one's own perceptions of the ability to perform the behaviour. Hence, the aim of the current study was to investigate pharmacy students' attitudes, subjective norms, perceived behavioural control, intentions and behaviour towards patient safety using a TPB framework.
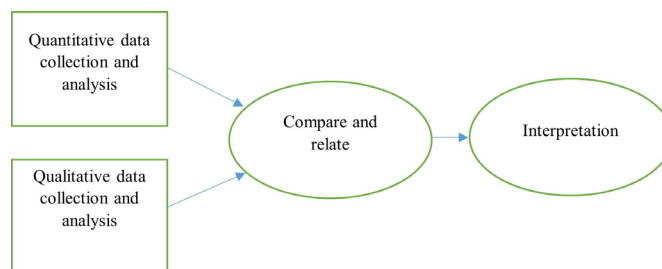

Figure 1 Convergent parallel mixed-methods design (quantitative and qualitative).

METHOD

Patients and public involvement
No patient involved in this study.

Study design
TPB constructs was used to probe four research questions: (1) What are pharmacy students' attitudes towards patient safety? (2) What are pharmacy students' perceptions regarding patient safety? (3) How do pharmacy students perceive social pressure towards patient safety? (4) How do pharmacy students address the issues in patient safety? This study adopted a convergent parallel mixed method design (figure 1) involving a quantitative survey and qualitative focus group discussions[25] to investigate the pharmacy students' attitudes, behavioural intentions, social norms and behaviour towards patient safety. Both quantitative and qualitative methods in this study were employed at the same time to obtain a complete understanding from two data sets and substantiate the results. Figure 1 shows the research design employed.

Study setting and participants
The study was conducted at a private university in Malaysia. The university offers a 4-year Pharmacy undergraduate programme, that is, Bachelor of Pharmacy (BPharm) under School of Pharmacy. The study participants were students of the undergraduate pharmacy programme.

Ethical considerations
The purpose of the study was explained to all participants. They were assured that their participation would not affect their academic progress, and written consent was obtained from each individual. All participants were told that they would be deidentified in the transcripts and that the videorecording will be viewed only by the researchers.

Participant recruitment (for qualitative study)
The participants were recruited using purposive sampling method. A total of 18 students was approached to participate in the focus group discussions and all 18 students accepted the invitation. Focus group discussions were conducted. There were six students in each focus group with at least one student representative from year 1 to the year 4. The details of students' distribution are provided in table 1. A saturation point was reached in the

Table 1 Participants' quotes for each theme

Themes	Quotes
Theme 1: Concepts of patient safety	'Basically conduct of a health professional so that the patient doesn't come into any harm, physically or mentally.' (p6,male, year 1)
	'We are trying to prevent or reduce any medical errors that will cause adverse effect to the patients.' (p12, female, year 3)
	'In my opinion, patient safety is the correct way of using medications, and apart getting (sic) benefit from the medication.'(p15, female, year 4)
Theme 2: Intrinsic potential of medicines to harm	'We know that all medications, they come with certain side effects… and how do you mean by really safe for the patient? I think it would be like the benefit to risk ratio'(P11, male, year 3)
	'Safe as in I can continue my life taking that medication without getting any negative effects from the medication.'(P9, female, year 2)
Theme 3: Medication error	'Usually, the medication errors occur while prescribing and supply of medical information.' (P3,female, year 2)
Subtheme: 3.1: Inappropriate choice/selection/prescribing	'Often doctor (sic) like to use antibiotic for cough and flu, so actually it's not needed.' (P10, male, year 3)
	'We need to cater to each patient individually, so each patient requires different way (sic) of taking care of their safety.' (P1, female, year 4)
Subtheme: 3.2 Medication errors arising from supply	'There is a higher tendency to make mistakes. In between, because maybe the doctor had forgotten your case. Maybe they mixed up the cases because they are sending from one location to another location.' (P4, male, year 3)
Subtheme: 3.3 Medicines Information by healthcare professionals	'Steroid cream when they dispense and then you just ask the patient to apply, then they just apply nonstop for like few weeks, then eventually when they come back, you saw the thinning of the epidermis' (P6, female, year 4)
	'And the right way to use the inhaler, because when we use the wrong way to use the inhaler then the patient doesn't get the efficacy of the medication.' (P2, female, year 2)
Theme 4: People involved in patient safety	'Healthcare professionals should focus on issues that are most responsible for any event.' (P8, female, year 1)
	'It is our responsibility to open up when you see things may be unsafe.' (P3, male, year 2)
Theme 5: Competence, performance and ethics of healthcare professionals	'Not only pharmacists, but all healthcare professionals will be competent enough to analyse the situations in which safety problems may arise'. (P5, female, year 3)
Subtheme 5.1: Policy factors	'It will be difficult to reduce harm as the policy may not allow to address immediate risks for patients.' (P4, male, year 4)
Theme 6: Ensuring patient safety	'Whether report or not reporting (sic) would depend on the seriousness, like if it is something that he or she can correct it, or resolve it, so it will not be a big problem.' (P12, female, year 4)
	'I think supervisor will have equal responsibility. So, if my supervisor actually makes any kind of safety risk, I will definitely report.' (P7, male, year 4)

second focus group discussion as no new information was obtained from third focus group discussion.

Validity and reliability of the study tool

An extensive literature review and expert discussions were undertaken to develop a semistructured interview guide for data collection. Open-ended questions were used so that the interviewees had a maximum opportunity to express their opinions, thus helping to gain deeper understanding of the issues. The initial draft tool was discussed with the content experts and modified accordingly. Pilot interviews were conducted among pharmacy students. Specific inquiries identified during pilot interviews were added to the interview guide. Data from these pilot interviews were not included in the final analysis.

Study procedure

Focus group discussions were used for data collection. Interviews were conducted in the English language, as all the participants were comfortable with it. Participants

assembled in a small group teaching room on a schedule agreed with them. The researchers conducted the focus group discussions. Discussions lasted for approximately 35–40 min and all discussions were video-recorded. The researchers attended all the discussions, with one researcher acting as a facilitator. The discussions were focused on the study objectives, while exploratory questions were also asked wherever necessary to gain a comprehensive understanding of the issues.

Data analysis

Each interview transcript was shown to the study participants to get their approval. All transcribed verbatim texts were then subjected to a thematic content analysis framework. In this process, the researchers first transcribed the videorecorded data, and carefully read the transcripts line by line, followed by separating the transcript into meaningful analytical data. Each interview transcript was then coded with keywords to identify key themes and

patterns in the data. All themes initially identified by the researchers were subjected to an independent review by an experienced qualitative researcher.

Participant recruitment (for quantitative study)

Although all the pharmacy students (n=309) were invited to participate, a minimum sample size was needed to determine statistical significance. Hence, using Raosoft software, a required sample size of 152 was calculated; power 80%, distribution of response 50%, with 95% CI and a 5% margin of error. A total of 272 students participated in the survey by completing the questionnaire; this was more than the required sample size to generalise the findings. The details of students' distribution are provided in table 1.

Validity and reliability of the study tool

A self-administered questionnaire was prepared based on relevant published studies.[26–28] An initial version of the questionnaire underwent determination of face and content validity. Content validity was determined by a panel of three subject experts and their opinion on the relevance and the significance of the questionnaire was considered. The questionnaire was adjusted based on the experts' opinion. A pilot study was undertaken on 20 students to confirm the reliability of the questionnaire. By using SPSS V.24, the internal consistency reliability was estimated with reference to the Cronbach's alpha value. In this study, Cronbach's alpha was 0.71 for self-reported knowledge, 0.74 for attitudes, 0.73 for behavioural intentions, 0.72 for subjective norms and 0.76 for perceived behavioural control constructs. The data of the pilot study were not used for the final analysis. The questionnaire had two sections (section 1 and 2) with 46 items. Section 1 had eight items with yes/no options. Section 2 had 36 items which were Likert scaled from 1 to 5 (1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly disagree). Section 1 (items 1–10) assessed self-reported knowledge of patient safety and section 2 (items 11–46) assessed on four constructs towards patient safety. Construct 1 (items 11–19) was 'attitudes of pharmacy students towards patient safety'. Construct 2 (items 20–29) was 'behavioural intentions of pharmacy students towards patient safety'. Construct 3 (items 30–38) was 'subjective norms of pharmacy students towards patient safety'. Construct 4 (items 39–46) was 'perceived behavioural control of pharmacy students towards patient safety'. The questionnaire can be found in online supplemental file 1.

Study procedure

All the 309 students were invited to participate in this study. The students were approached at the end of a lecture hour and the questionnaire along with consent form were distributed. Those who were interested signed the consent forms and completed the survey questionnaire. To maintain anonymity, students dropped the completed questionnaire in a box kept in the students' leisure area. Those who were not interested returned the questionnaire and the consent form.

Data analysis

The data were categorised and analysed using SPSS, V.24 (SPSS). Results were expressed as percentages for demographic variables. Survey scores were reported as mean and SD of the aggregated percentage of students who said 'yes' for section 1 and who ticked 'agree/strongly agree' for section 2. For section 1 questions, participants had to choose from the answers (yes/no); one point was awarded for each correct answer and to be considered knowledgeable, a participant had to attain a score of five points. For each item in the section 2, a 5-point Likert scale was used (strongly agree; agree; neutral; disagree; strongly disagree) in which, strongly agree=5 and strongly disagree=1. The participants had to choose one of the options from the Likert scale. A participant had to attain a minimum of 23 points to indicate positive attitudes towards patient safety (construct 1), 25 points to indicate positive behavioural intentions towards patient safety (construct 2), 23 points to indicate positive subjective norms towards patient safety (construct 3), 20 points to indicate positive perceived behavioural control towards patient safety (construct 4). The participants' overall mean scores for each construct should be 2.5 and above to be considered positive. Multiple correlations were undertaken to examine how the dependent variable (knowledge) related to the independent variables (constructs 1–4).

RESULTS
Qualitative study

A total of six themes emerged from the focus group discussions. The themes and subthemes are reported below. The letter 'P' stands for participant. Table 1 represented the participants' quotes for each theme.

Theme 1: concepts of patient safety

None of the participants could give a clear definition of patient safety as 'freedom from healthcare associated error that results in harm'. Most participants showed understanding of patient safety as prevention of harm and were able to provide concrete examples of healthcare-related harm. Only one participant stated clear links between medical error and harm.

> 'Basically, conduct of a health professional so that the patient doesn't come into any harm, physically or mentally.' (P6)

> 'We are trying to prevent or reduce any medical errors that will cause adverse effect to the patients.' (P12)

The focus groups also revealed a misconception of patient safety as patient benefit, which does not align with the globally accepted concept of patient safety as freedom from error.

'In my opinion, patient safety is the correct way of using medications, and apart getting (sic) benefit from the medication.' (P15)

Theme 2: intrinsic potential of medicines to harm

Most participants clearly showed an awareness of the intrinsic danger of drugs. In contrast, a few participants had a dichotomous view of drug treatment as 'safe' or 'not safe'. One participant used the terms 'side effects' and 'adverse reactions' imprecisely, reflecting a lack of differentiation between the terms.

'We know that all medications, they come with certain side effects.' (P11)

'Safe as in I can continue my life taking that medication without getting any negative effects from the medication.' (P9)

All participants were aware of children and the elderly being vulnerable in terms of medication safety. Participants did not mention pregnancy and breastfeeding in this context.

'Two special groups, geriatric patients and paediatric patients. They should have a special focus on this safety issue'. (P2)

Theme 3: medication error

The participants identified medication choice (selection and prescribing), supply, information and use as sources of error. These concepts align with the topics in the medication error domain in the WHO patient safety curriculum guide.[29]

'Usually, the medication errors occur while prescribing and supply of medical information'. (P3)

Subtheme 3.1: inappropriate choice/selection/prescribing

Most participants identified the potential harm of inappropriate prescribing, including antibiotics. Participants also discussed the importance of drug choice to fit the indication and the prevention of interactions.

'Often doctor (sic) like to use antibiotic for cough and flu, so actually it's not needed.' (P10)

Incomplete medical and medication histories, including failure to confirm drug allergy, were linked to inappropriate drug choice. Participants also clearly emphasised the importance of individualised medication choice.

'We need to cater to each patient individually, so each patient requires different way (sic) of taking care of their safety.' (P1)

Subtheme 3.2: medication errors arising from supply

Except for distribution, storage and administration, all the other steps of the medication management pathway leading to medication errors arising from the wrongful supply of medication were discussed. Participants

understood the importance of each step in ensuring medication safety. Participants gave examples of appropriate prescribing, extemporaneous preparation of medicines, prescription screening, monitoring for adverse effects and transfer of information.

'There is a higher tendency to make mistakes. In between, because maybe the doctor had forgotten your case. Maybe they mixed up the cases because they are sending from one location to another location.' (P4)

Subtheme 3.3: medicines information by healthcare professionals

There was awareness of the potential for medication-related harm associated with lack of quality information provided to patients by healthcare professionals. Participants gave examples of inadequate directions for use, and inadequate information about potential adverse effects.

'Steroid cream when they dispense and then you just ask the patient to apply, then they just apply nonstop for like few weeks, then eventually when they come back, you saw the thinning of the epidermis' (P6)

Participants showed understanding that medication error can arise from inappropriate use, for example, inappropriate inhaler technique and overdosing.

'And the right way to use the inhaler, because when we use the wrong way to use the inhaler then the patient doesn't get the efficacy of the medication.' (P2)

Theme 4: people involved in patient safety

All participants showed an understanding of patient safety as a multidisciplinary effort; this was consistent with teamwork recommended by patient safety guides. Participants understood the role of the pharmacist in ensuring safe prescribing, product quality and error prevention. Participants also identified the importance of engaging patients and caregivers in reporting unusual symptoms that may be markers of harm.

'Healthcare professionals should focus on issues that are most responsible for any event.' (P8)

'It is our responsibility to open up when you see things may be unsafe.' (P3)

Theme 5: competence, performance and ethics of healthcare professionals

All participants linked competence and performance of healthcare professionals (pharmacists, doctors and nurses) to patient safety. Participants' linked knowledge, accountability, conscientious work behaviour and patient care experience, to the potential for error. Participants described the impact of personal ethics in patient safety. Ethical principles raised were 'beneficence' and 'non-maleficence'.

'Not only pharmacists, but all healthcare professionals will be competent enough to analyse the situations in which safety problems may arise'. (P5)
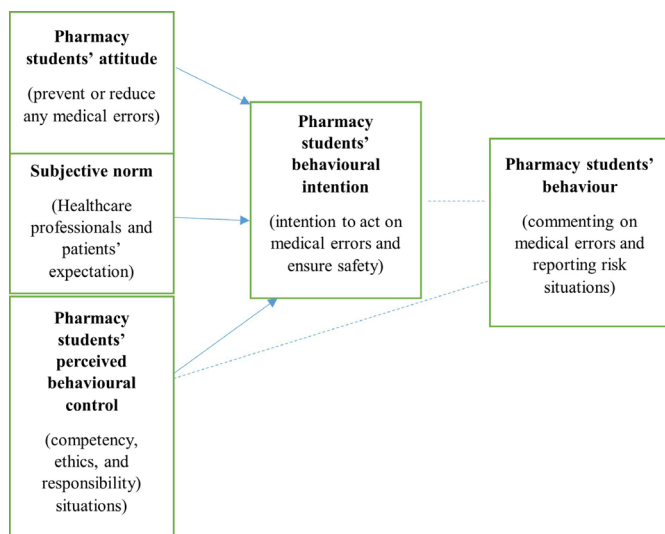
Figure 2 Conceptual framework from the qualitative results.

Subtheme 5.1: policy factors

Most participants showed great concern on proposed Malaysian medicines legislation (Ruang Undang-undang Farmasi) that may not empower patients and that may make screening of prescriptions by pharmacist more difficult.

‘It will be difficult to reduce harm as the policy may not allow to address immediate risks for patients.’ (P4)

Theme 6: ensuring patient safety

Most participants understood that humans are error prone and therefore they would not report errors that could be corrected by themselves. Most participants stated that errors should be reported based on their severity and the consequences to self and peers. One participant stated that he would report all errors, as a matter of following procedure. All participants said that the decision to report errors also depends on the status of the person who made the error. The participants viewed higher status as carrying greater responsibility with a resulting lower tolerability of their errors.

‘Whether report or not reporting (sic) would depend on the seriousness, like if it is something that he or she can correct it, or resolve it, so it will not be a big problem.’ (P12)

‘I think supervisor will have equal responsibility. So, if my supervisor actually makes any kind of safety risk, I will definitely report. ’ (P7)

The summarised results of the qualitative study are shown in figure 2. As per the TPB, attitudes towards the behaviour, subjective norms, and perceived behavioural control, influence the behavioural intentions of study participants towards patient safety. From the results, TPB predicted participants' behavioural intention (to act on medical errors and ensure safety) as they had attitudes to prevent/reduce medical errors. The results also showed that the participants believed that they can fulfil patients' expectation (subjective norms). Their competency, ethics and responsibility of being a pharmacist may lead them to focus on patient safety (perceived behavioural control).

Quantitative study

Of the 309 pharmacy students, 272 returned the completed survey questionnaire which yielded a response rate of 88%. Table 2 summarises the pharmacy students' knowledge on patient safety. Participants knew the clinical aspects of patient safety (eg, medication safety) with the highest mean score ($\bar{x}=0.93$; SD=0.32). Participants had little knowledge on the other aspects of patient safety, such as work environment, including policies and resources with the lowest mean score ($\bar{x}=0.36$; SD=0.24). Table 3 shows that participants' mean scores for each construct towards patient safety were positive. Participants agreed that active learning on patient safety is an appropriate way to minimise patient safety risks ($\bar{x}=4.43$; SD=0.63). This statement had the highest mean scores under construct 1: attitudes. Participants agreed that pharmacists should enhance patient safety

S.no	Items	Mean	SD
	Table 2 Student's self-rated knowledge on patient safety (yes/no response)		
1	I have sufficient knowledge on patient safety.	0.82	0.38
2	I know my responsibility towards patient safety.	0.78	0.29
3	I know the various patient safety issues that occur usually.	0.67	0.41
4	I know the clinical aspects of patient safety (eg, medication safety).	0.93	0.32
5	I know the other aspects of patient safety such as work environment including policies and resources.	0.36	0.24
6	I know to whom I should discuss when patient safety issue occurs.	0.61	0.42
7	I know how to handle the patient safety risks.	0.58	0.39
8	I know how to minimise the patient safety risks.	0.60	0.42
9	I know how to report a patient safety issue.	0.55	0.37
10	I know the roles of pharmacist in patient safety.	0.88	0.26

Table 3 Mean scores of each constructs towards patients' safety (Likert scale response)

Questions	Mean	SD
Construct 1: Attitudes		
1. Pharmacists should routinely spend part of their professional time working to improve patient care.	4.35	0.61
2. Active learning on patient safety is an appropriate way to minimise patient safety risks.	4.43	0.63
3. Peer-led education, such as from pharmacist colleagues or fellow students can help my understanding of patient safety concepts.	4.24	0.66
4. If I saw an error that DID NOT cause harm, I would keep it to myself.	3.11	1.10
5. If I saw an error that DID cause harm, I would keep it to myself.	3.02	0.96
6. If there is no harm to a patient, there is no need to address an error.	2.55	0.94
7. Patient safety education requires university lecturers to teach patient safety concepts.	2.52	0.94
8. Pharmacists should routinely share information about errors and what caused them.	4.07	0.84
9. The culture of the pharmacy workplace makes it easy for pharmacy staff to deal constructively with errors.	3.84	1.05
Average	3.54	0.85
Construct 2: Behavioural intentions		
10. It is acceptable for an intern pharmacist to question the actions of a registered pharmacist.	4.00	0.92
11. It is acceptable for a registered pharmacist to screen the decisions of a prescriber (such as a doctor).	4.10	0.68
12. If harm to the patient has occurred, pharmacists should report errors to the affected patient and their family.	4.23	0.80
13. Pharmacists should discuss and report errors to an affected patient and their family even if the patient is NOT harmed.	3.82	0.97
14. Pharmacists should enhance patient safety through clear and consistent communication with patients.	3.98	0.64
15. Pharmacists should enhance patient safety through inter-professional practice with other health care providers.	4.20	0.71
16. Pharmacists should enhance effective verbal and nonverbal communication abilities to prevent adverse events.	4.00	0.67
17. Pharmacists should recognize routine situations in which safety problems may arise.	3.73	0.88
18. Pharmacists should identify and implement safety solutions.	3.72	0.85
19. Pharmacists should anticipate and manage high risk situations.	3.58	0.98
Average	3.93	0.81
Construct 3: Subjective norms		
20. The role of human factors may affect patient safety.	3.81	0.83
21. All healthcare professionals may not be ready to work towards patient safety.	3.73	0.92
22. The role of environmental factors such as work flow, ergonomics, resources, that affect patient safety.	3.77	0.93
23. Other health care professionals may not recognize an adverse event or close call or near miss.	3.64	0.95
24. It is difficult to reduce harm by addressing immediate risks for patients and others involved.	3.63	0.79
25. It is difficult to disclose an adverse event to the patient.	3.65	0.84
26. The importance of having a questioning attitude and speaking up when you see things may be unsafe.	3.62	0.80
27. Health care is complex and has many vulnerabilities (eg, workplace design, staffing, technology, human limitations)	3.80	0.87
28. It is difficult to question the decisions or actions of those with more authority.	3.88	0.81
Average	3.72	0.77

Continued

Table 3 Continued

Questions	Mean	SD
Construct 4: Perceived behavioural control		
29. Participating in timely event analysis, reflective practice and planning may prevent recurrence.	3.73	0.90
30. The importance of a supportive environment that encourages patients and providers to speak up when they have safety concerns.	4.00	0.70
31. If I see someone engaging in unsafe care practice in the clinical setting, I feel I can approach them.	3.96	0.67
32. If I make a serious error I worry that I will face disciplinary action.	3.84	0.78
33. I may reduce harm by addressing immediate risks for patients and others involved.	4.12	0.71
34. I may disclose an adverse event to the patient at any cause.	3.85	0.98
35. The role of environmental factors such as work flow, ergonomics, resources, that affect patient safety are controllable.	3.96	0.67
36. In patient care settings, discussion around adverse events should focus mainly on system-related issues, rather than focusing on the individual(s) most responsible for the event.	3.85	0.98
Average	3.91	0.79

through inter-professional practice with other healthcare providers ($\bar{x}$=4.20, SD=0.71); this statement had the highest mean score under construct 2: behavioural intention. Participants indicated that it is difficult to question the decisions or actions of those with more authority ($\bar{x}$=3.88, SD=0.81); this statement had higher mean scores under the construct 3: subjective norms. Participants indicated that they may reduce harm by addressing immediate risks to patients and others involved ($\bar{x}$=4.12, SD=0.71); this statement with highest mean scores under construct 4: perceived behavioural control. Table 4 shows the multiple correlation results conducted to examine the relationship between the dependent variable (knowledge) and the independent variables (attitudes, subjective norms, perceived behavioural control and behavioural intentions). There was a moderate positive correlation between students' knowledge and attitudes (r=0.48, p=0.03). There was no correlation between students' knowledge and subjective norms (r=0.27, p=0.23). There was a weak positive correlation between students' knowledge and perceived behavioural control (r=0.39, p=0.04).

There was no correlation between students' knowledge and behavioural intentions (r=0.20, p=0.56).

Figure 3 summarises the qualitative and quantitative results. Pharmacy students' attitudes, subjective norms, perceived behavioural control, behavioural intentions constructs led to pharmacy students' behaviour towards patient safety. Pharmacy students' attitudes and perceived behavioural control constructs had positive correlations with pharmacy students' knowledge on patient safety.

The demographic details of respondents of the qualitative and quantitative study can be found in table 5.

DISCUSSION

Medical education has a pivotal role in patient safety through the development of knowledge, attitudes, values, skills and practice.[30] Patient safety is critical for the healthcare industry, especially receiving significant attention towards drug safety. This requires a collective and coordinated response from various stakeholders in the healthcare system.[31] To produce pharmacists who

Table 4 Multiple correlation results

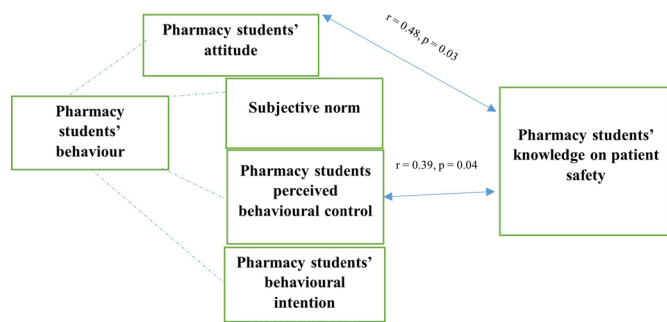|	Attitudes	Subjective norms	Perceived behavioural control	Behavioural intentions	Knowledge
Attitudes	1	–	–	–	–
Subjective norms	0.40	1	–	–	–
Perceived behavioural control	0.42	0.39	1	–	–
Behavioural intentions	0.38	0.45	0.38	1	–
Knowledge	0.48*	0.27	0.39*	0.20	1

*P<0.05.

Figure 3 Conceptual framework from the results of quantitative and qualitative studies.

are competent in maintaining patient safety, patient safety-related content must be included in the curriculum throughout their pharmacy education[32]; with an evolving healthcare environment, pharmacy students need basic and advanced knowledge and skills to keep patients safe. As most training and development related to patient safety takes place through university education, well-trained pharmacy graduates will play a major role

Table 5 Demographic details of respondents of the qualitative and quantitative study	
Qualitative demographic profile	**Frequency (%) (N=18)**
Gender	
Male	5 (27.7)
Female	13 (72.3)
Year of study	
Year 1	4 (22.3)
Year 2	4 (22.3)
Year 3	5 (27.7)
Year 4	5 (27.7)
Ethnicity	
Malay	4 (22.2)
Chinese	10 (55.6)
Indian	4 (22.2)
Quantitative demographic profile	**Frequency (%) (n=309)**
Gender	
Male	102 (33)
Female	207 (77)
Year of study	
Year 1	55 (17.9)
Year 2	83 (26.8)
Year 3	81 (26.2)
Year 4	90 (29.1)
Ethnicity	
Malay	31 (10.1)
Chinese	226 (73.1)
Indian	52 (16.8)

in addressing patient safety- related concerns. Hence, the purpose of this study was to investigate pharmacy students' attitudes, perception, behavioural intentions and behaviour towards patient safety using a TPB framework that may contribute to an update or revision in the pharmacy undergraduate curriculum.

The themes that emerged from this study demonstrate that the participants view pharmacy as one of the professions in the healthcare system that contributes to patient safety. The theme 'concept of patient safety' highlights the participants' understanding of harm and medical error. The results from the quantitative study suggested that the participants are aware of the clinical aspects of patient safety. This reflects the current practice in which patient safety is viewed as a part of clinical care. However, their lack of understanding of a clear definition of patient safety and their knowledge of aspects of the work environment-related patient safety is current concerns. A comprehensive understanding of environmental factors is a prerequisite for managing the safety culture.[33] An introduction to patient safety components early in the curriculum potentially allows students to understand the concept of patient safety and apply these principles in their future practice. The participants agreed that active learning on patient safety is an appropriate way to minimise patient safety risks.

The participants were aware of the potential harm of using drugs, and the risks involved in elderly and paediatric patients. The use of medications has increased significantly among the elderly in recent times due to their chronic conditions requiring lifelong medication.[34] The paediatric population is at risk of preventable medication errors and has a higher mortality rate because of such errors.[35] Therefore, initiatives such as developing risk-specific protocols for high-alert medications, identifying and evaluating patient-specific dose preparations and fostering robust error-reporting processes are required.

The participants' understanding of medication error was associated with the current role of pharmacists in healthcare settings. Pharmacists and other healthcare professionals are responsible for ensuring the rational use of medication by patients.[36] Healthcare professionals and organisations face a challenge on how best to match, prioritise and implement safety interventions that provide effective, evidence-based, relevant, achievable, measurable and best-value protection from harm across the care spectrum. The participants' responses relating to inappropriate use of medication, supply-related medication errors and lack of good quality medication information are indicators of their positive attitudes towards patient safety; their attitudes were correlated with their knowledge on patient safety. The results from the quantitative study indicated the participants' willingness to enhance patient safety through interprofessional practice with other healthcare providers. This statement, with the highest mean scores, demonstrated their behavioural intentions towards patient safety.

The participants identified sources of medication error. Medication errors are one of the crucial factors risking patient safety. Although medication errors are avoidable, patient harm due to adverse events is one of the top ten causes of death and disability in the world.[37] The 'Swiss Cheese Model', illustrated by James Reason, explained various loopholes in the healthcare system.[38] Later, Vincent's model explained the organisational processes relating to the planning, scheduling, maintenance, strategy and policy of a healthcare organisation or institution.[39] The participants' knowledge of the association between patient safety and inappropriate choice of medications, extemporaneous preparation, and information provided by healthcare providers, reflects their understanding of the role of a healthcare system in preventing such errors. Pharmacy students involved in this study have the intentions to prevent or reduce any medical errors. As the role of pharmacists in both therapeutic decisions and advocacy of stewardship programmes is currently evolving, the findings from this study indicates their readiness to be involved in patient safety.

To enforce the concept of patient safety in an organisation, a coordinated effort is required among the health system, health workers and regulators. The participants' understanding of patient safety as a multidisciplinary effort is consistent with the WHO Multi-Professional Patient Safety Curriculum Guide to build and sustain a culture of patient safety.[29] A dynamic shift in the patient safety paradigm occurred when the stakeholders acknowledged the complexity within the healthcare system.[40] The respondents perceived that the behaviours of healthcare professionals and patients' expectations may influence their performance in relation to patient safety. The participants' understanding of the role of healthcare professionals in managing patient safety issues will help them to use their knowledge and skills in their future healthcare practice.[41] However, their hesitation in questioning the decisions or actions of those with higher authority is a concern.

The participants understood the importance of the competence and performance of healthcare professionals in ensuring patient safety. They also mentioned that their competency, ethics and responsibility towards patient safety may increase their focus in promoting patient safety. The study participants perceived that pharmacists should enhance patient safety through interprofessional practice with other healthcare providers. The skills and behaviours of healthcare professionals (leadership, teamwork, communication, co-operation, situation awareness and decision making) that enhance the safe delivery of care have been recognised as critical to patient safety and these skills are highly achievable through training.[42–44] Participants were willing to reduce harm by addressing immediate risks to patients and others involved.

The participants perceived that the intentions to act on medical errors may help to promote patient safety. Although they mentioned that humans are error prone, and that medical errors should be reported, their decision to report error depends on the status of the person who made the error. There is a need to investigate the performance of healthcare professionals in error analysis and in utilising error-reporting mechanisms; this is essential to prevent errors and improve patient safety.[45]

According to TPB, this study suggested that the behaviour of the pharmacy students was related by their attitudes, perceived behavioural control, subjective norms and behaviour intentions. These constructs were mapped with the TPB based on the study results (refer table 3). Pharmacy students had positive attitudes to prevent or reduce any medical errors. They perceived that competency, ethics, and responsibility are needed for patient safety. They believe that healthcare professionals' acceptance of pharmacists and patients' expectations of a pharmacist may influence pharmacists' role in patient safety. These factors defined pharmacy students' intentions to act on medical errors and ensure patient safety.

Strengths and limitations

The strength of this study is the research method (quantitative and qualitative) as the findings generated and tested the TPB. This study attempted to address a broader range of research question in terms of pharmacy students' patient safety behaviour. This study provided stronger evidence in the conclusions by converging the findings. This study produced complete knowledge necessary to inform theory and practice. The limitation is, this study did not measure the factual knowledge, it measured the self-reported knowledge of the students. Also, the results were based on students from a single institute. Therefore, the findings may not be representing the views of the entire Malaysian pharmacy student population.

CONCLUSIONS

TPB constructs such as attitudes, subjective norms, perceived behavioural control and behavioural intentions of pharmacy students, defined their behaviour towards patient safety. Pharmacy students' attitudes and perceived behavioural control constructs were correlated with their knowledge on patient safety. This theory stated that with knowledge of medications and patient safety risks, pharmacists can contribute significantly to the improvement of prescribing practices and the consequent reduction in medication errors. Their application of patient safety knowledge, including recognition of system errors, error reporting and root cause analysis to improve patient safety is very useful in healthcare settings. This study suggests that pharmacy students perceive this area as highly important and transforming to their professional development. Further research is required to consider the return-on-investment of pharmacist-led patient safety programmes. As patient safety involves multiprofessionals in healthcare, it echoes the need to address patient safety on a system-wide basis. There is a need to connect all healthcare providers and pharmacy students' learning in an integrated way how to operate within a

culture of safety, openness and reporting, which should be the cornerstones of future healthcare systems world-wide. This may give a different perspective to pharmacy students and may affect their attitudes and norms towards patient safety. It is through such an integrated approach including all future healthcare providers, change can be expected at the pace and scale of the global healthcare environment in which patient-related harm may become a rare event.

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