

BMJ Open Safety culture perceptions of pharmacists in Malaysian hospitals and health clinics: a multicentre assessment using the Safety Attitudes Questionnaire

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ABSTRACT

Objective: To assess the safety attitudes of pharmacists, provide a profile of their domains of safety attitude and correlate their attitudes with self-reported rates of medication errors.

Design: A cross-sectional study utilising the Safety Attitudes Questionnaire (SAQ).

Setting: 3 public hospitals and 27 health clinics.

Participants: 117 pharmacists.

Main outcome measure(s): Safety culture mean scores, variation in scores across working units and between hospitals versus health clinics, predictors of safety culture, and medication errors and their correlation.

Results: Response rate was 83.6% (117 valid questionnaires returned). *Stress recognition* (73.0 ±20.4) and *working condition* (54.8±17.4) received the highest and lowest mean scores, respectively. Pharmacists exhibited positive attitudes towards: *stress recognition* (58.1%), *job satisfaction* (46.2%), *teamwork climate* (38.5%), *safety climate* (33.3%), *perception of management* (29.9%) and *working condition* (15.4%). With the exception of *stress recognition*, those who worked in health clinics scored higher than those in hospitals ($p<0.05$) and higher scores (overall score as well as score for each domain except for *stress recognition*) correlated negatively with reported number of medication errors. Conversely, those working in hospital (versus health clinic) were 8.9 times more likely ($p<0.01$) to report a medication error (OR 8.9, CI 3.08 to 25.7). As *stress recognition* increased, the number of medication errors reported increased ($p=0.023$). Years of work experience ($p=0.017$) influenced the number of medication errors reported. For every additional year of work experience, pharmacists were 0.87 times less likely to report a medication error (OR 0.87, CI 0.78 to 0.98).

Conclusions: A minority (20.5%) of the pharmacists working in hospitals and health clinics was in agreement with the overall SAQ questions and scales. Pharmacists in outpatient and ambulatory units and those in health clinics had better perceptions of safety culture. As perceptions improved, the number of medication errors reported decreased. Group-specific

Strengths and limitations of this study

- We have some confidence that our sample of pharmacists is nationally representative as our sample is not significantly different from the Malaysia Health Review System Survey whereby the ratio of pharmacists in public hospitals to health clinics is 2:1.
- Our good response rate was attributable partly to our survey being based on the 30 core questions of the Safety Attitudes Questionnaire (SAQ) (Pharmacy Version), rather than the 60-item questionnaire, as validation and benchmarking data have been published only for the core items and, additionally, respondents were more likely to complete a shorter questionnaire (one double-sided page, 10–15 min to complete).
- Our study focused only on pharmacists' perception (excluding pharmacy technicians, for instance), hence giving us limited insights into the communication network, interactions and overall picture of safety culture in a pharmacy organisation.
- Nationwide studies, which can include matched larger samples of pharmacists in the two settings, will increase the generalisability and reliability of findings.
- Error-reporting systems generally rely on self-reporting and, likewise, the SAQ scores on medication error reporting are only estimates, subject to recall bias and voluntary disclosure.

interventions that target specific domains are necessary to improve the safety culture.

BACKGROUND

Patient safety is influenced by organisational culture.¹ According to Pronovost and Sexton,² organisational culture is defined as the set of values, beliefs and assumptions

that guide members' behaviours, and is generally referred to as 'the way we do things around here', whereby the word 'here' refers not to the institution, but to a specific work unit. Personnel are channelled by an organisation with a full commitment to safety in a safe culture, in which each member and coworker sustains his or her own safety norms.²

Kohn *et al.*,³ in their publication, stated that the Institute of Medicine committee suggested the healthcare organisations' highest priority is to build an atmosphere in which safety culture is an explicit organisational goal. The culture of safety has been defined by Sorra and Nieva⁴ as the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management as stated.

The term safety culture is frequently used interchangeably with safety climate and occasionally with attitudes. Climate can be seen as the observable or measurable part of culture in broad terms. Attitudes are a subset of climate. For consistency, the term safety culture will be used throughout this article.

The Malaysian Patient Safety Goals 2003 was implemented to address patient safety issues in public and private health facilities in the nation. Among the goals identified was the need to develop a medication error reporting system that promoted a safe environment by adopting a 'reporting and learning' as well as 'just and non-blaming' culture. In an outpatient geriatric pharmacy in Malaysia, for instance, 20 cases of medication errors were reported to occur daily, and the estimated cost of the medication errors was Malaysian Ringgit (MYR)301 (£54) daily or MYR9327 (£1667) a month and approximately MYR111 924 (approximately £20 000) a year.⁵

Challenges in implementation of patient safety goals are many, as safety encompasses cultural, behaviour, technical, clinical and psychological domains. In order to transform the cultural aspect of safety, there is a need to acknowledge and understand it. Measuring safety culture is essential to determine predictor factors that influence patient safety outcomes. One way to aid healthcare leaders in understanding their organisations' safety culture is to administer a survey using safety culture assessment tools.^{6 7} These tools can be utilised to evaluate the relationships between safety culture domains and patient safety indicators.

Professional groups vary in how they perceive different dimensions of safety culture.⁸ In Malaysia, the pharmacist profession has been fast evolving and this is evidenced through years of excellence in performance and the expansion of roles in healthcare. In public-funded hospitals (secondary care setting), pharmacists are contributing in areas such as outpatient and ambulatory services, inpatient pharmacy, ward pharmacy, clinical pharmacokinetics, parenteral nutrition, oncology pharmacy, drug information services, manufacturing an

inventory control and in management. Pharmacists also provide tailored and specialised services such as dispensing and counselling in Medication Therapy Adherence Clinic, patient education and health promotional activities, and Methadone Maintenance Therapy. They also provide value-added services via the Integrated Dispensing System, 'SMS and Take', 'Drive Thru' and 'Medication Through Postage', which are efforts targeted to improve healthcare delivery efficiency in the country. In public-funded health clinics (primary care setting), pharmacists also enrol patients with chronic diseases, such as diabetes, in a Medication Therapy Adherence Clinic (MTAC) programme.

Because pharmacists are critically responsible for optimisation of drug therapy and prevention of medication errors, a study on safety culture of pharmacists in different settings will provide an insight into their perception and assist in identifying specific areas for improvement. Consequently, a safe culture that is targeted at reducing medication errors can be further engineered into daily work practices. Essentially, the aim of this study was to assess safety culture among pharmacists at public hospitals and health clinics in Malaysia's southern state of Malacca. The study focused on assessing pharmacists' perceptions towards six domains that make up the culture of safety: *teamwork climate, safety climate, job satisfaction, perception of management, working conditions and stress recognition*. Demographic characteristics that influence safety culture, and the association between safety culture and self-reported rate of medication errors over the past 12 months, were identified. Finally the predictors of safety culture and medication errors were examined.

METHODS

Study design and sampling

This was a cross-sectional study conducted at the pharmacy departments of 3 hospitals and 27 health clinics (n=140) under three district health offices in Malaysia's southern state of Malacca. All the hospitals and health clinics were publicly funded and governed by the Ministry of Health Malaysia and, therefore, patient safety practices and policies implemented were similar. Data collection was conducted for 4 months, from September to December 2014. The state of Malacca was identified as 1 of the 70 areas in the nation with a high density of public health clinics and hospitals to population ratio. Our sample is not significantly different from the Malaysia Health Review System Survey, where the ratio of pharmacists in public hospitals to health clinics is 2:1 (not shown). This gives us some confidence that our sample of pharmacists is nationally representative.

Convenience sampling was used whereby questionnaires were distributed to all pharmacists who fulfilled the study's inclusion and exclusion criteria. All pharmacists who had been working in the pharmacy departments of the selected hospitals and health clinics for at least 4 weeks were included. The rationale behind the

inclusion criteria is that, in order to obtain the essence of a culture in a particular unit, the pharmacist participating in the study should be an individual in the work setting who either influences, or is influenced by, the 'working environment' in that work setting. Pharmacists who were not working full time (part of a float pool) were excluded.

Using a written information sheet, participants were informed regarding the aim of the study, informed that their participation was voluntary and that their responses were anonymised. A cover letter was attached to the questionnaire, which included details on informed consent as well as instructions for completing and returning the sheets. After obtaining consent for participation in the study, the questionnaires were distributed for self-administration by the pharmacists. Questionnaires were administered during departmental and staff meetings at each of the 27 health clinics and 3 hospitals by the researcher (SES). Each respondent was rewarded with a pen. Individuals not captured during the meetings were each hand-delivered a questionnaire, a pen and a standard return envelope, to ensure confidentiality. This method of administration has generated high response rates.⁹ Approximately 10–15 min were required to complete the survey. Completed questionnaires were sealed in envelopes and none of the data could be traced to any respondent. A tracking sheet was used to identify serial numbers from each institution and to track the number of questionnaires given out and those returned. Tracking sheets did not contain any data that could be used to identify a particular respondent.

Measures

One of the most rigorously validated and commonly used *tool* for measuring safety culture in healthcare is the Safety Attitudes Questionnaire (SAQ). The tool has been adapted for use in intensive care units (ICUs), general inpatient settings such as medical and surgical wards, emergency medical services, operation theatres, ambulatory clinics or primary care, community pharmacies and nursing homes.⁹

The SAQ has good construct validity and internal consistency, as well as good psychometric properties, and is associated with clinical and patient outcomes. The SAQ is a 60-item questionnaire with closed-ended responses asking the respondents to indicate their level of agreement with each item on a 5-point scale ranging from '1' (strongly disagree) to '5' (strongly agree). There are several versions developed for different healthcare settings. All versions consist of 30 identical core questions, eliciting respondents' attitudes through six domains: *Teamwork Climate*, *Safety Climate*, *Perceptions On Management*, *Job Satisfaction*, *Working Conditions* and *Stress Recognition*, using a 5-point Likert scale. For example, six individual items, when taken together, comprised a respondent's perception of *Teamwork Climate*. An additional group of 30 items investigates other aspects of

safety according to the particular unit type being surveyed. In this study, the survey was based on the 30 core questions of the SAQ (Pharmacy Version), rather than the 60-item questionnaire.¹⁰ The reasons being that validation and benchmarking data have only been published for the core items¹¹ and, additionally, respondents were more likely to complete a shorter questionnaire (one double-sided page, 10–15 min to complete). Information on the number of medication error report forms (including near misses) that respondents filled out and submitted in the past 12 months in their current working institution was also obtained. On the instruction section of the front page, the following definition of medication error was given: 'An error is any type of medication error, mistake, incident, or quality-related event, regardless of whether or not (near miss) it reaches the patient or results in patient harm. Errors may be related to, or include: prescribing, transcribing, dispensing, administering, monitoring (use of medication), supplying, giving information, preparing, unsafe conditions or procedures in the pharmacy'. Respondents' demographic information (eg, age, gender, institution and department and number of years of work experience) was also obtained.

Data analysis

Descriptive statistics were used to calculate and present the general mean score, standard deviation, median and interquartile range of safety culture dimensions and other numerical variables. The percentages of respondents who gave a positive response (≥ 75 ; agree slightly and agree strongly) for each safety culture domain were also calculated. All SAQ scores were converted to a 100-point scale: 1=0, 2=25, 3=50, 4=75, 5=100 (5-point Likert scale). All negatively worded items were reverse scored. Responses to each item within the same domain were summed and then divided by the number of items in the domain, to obtain a mean domain score. The higher the score, the more positive the attitude of the pharmacist surveyed. The percentages of respondents who gave a positive response (≥ 75 ; agree slightly and agree strongly) for each safety culture domain was also calculated.

All of the analyses were two sided and statistical significance level was set at $\alpha=0.05$ with 95% CI (p value <0.05 was considered as statistically significant). Based on the Shapiro-Wilk test of normality of data, independent t test/ Mann-Whitney was used to compare the mean/median scores of two categorical variables (safety culture domains between hospitals and health clinics). Spearman's correlation coefficient was used to evaluate the relationship between two numerical variables in terms of strength and direction (association between overall and scores of each domain with number of medication errors reported in hospitals and health clinics).

Simple logistic regression and multiple logistic regression were performed to identify demographic predictors of both—overall positive safety culture scores and number of medication errors reported.

All statistical analyses were performed using SPSS V.21.

RESULTS

A total of 140 pharmacists fulfilled the inclusion criteria. A total of 140 questionnaires were distributed to the three hospitals (94 questionnaires) and 27 health clinics (46 questionnaires) during several visits. One hundred and seventeen pharmacists completed and returned the questionnaires, resulting in an overall response rate of 83.6%.

Demographic characteristics of the respondents

Demographic characteristics of the respondents are listed in table 1. Most of the pharmacists were from hospitals (62.4%) and had worked in an outpatient and ambulatory setting (54.7%). Women represented 88.9%

Table 1 Demographic characteristics of respondents

Demographic characteristics	Respondents (n=117)	Frequency (%)
Gender		
Male	13	11.1
Female	104	88.9
Age group (years)		
<25	36	30.8
26–30	62	53.0
31–35	13	11.1
36–40	4	3.4
≥41	2	1.7
Mean (SD)=28.0 (±4.4)		
Working institution		
Hospital	73	62.4
Health clinic	44	37.6
Working unit		
Outpatient and ambulatory	64	54.7
Inpatient and clinical	31	26.5
Others (store, drug information service)	22	18.8
Total work experience (years)		
<1	7	6.0
1–5	79	67.5
6–10	24	20.5
11–15	4	3.4
>16	3	2.6
Mean (SD)=4.4 (±4.0)		
Work experience in current institution (years)		
<1	22	18.8
1–5	82	70.1
6–10	11	9.4
11–15	2	1.7
>16	0	0.0
Mean (SD)=2.4 (±2.4)		
Number of reported medication errors (including near misses) in 12 months		
0	26	22.2
1–9	27	23.1
>10	64	54.7

of the total respondents; 53% of the respondents' age ranged between 26 and 30 years, with a mean age of 28 years. The majority of the respondents had between 1 and 5 years (67.5%) of overall working experience with a mean work experience of 4.4 years. As for the number of years of working at their current institution, a mean of 2.4 years was recorded, with 70.1% of the pharmacists having worked at the current institution for 1–5 years. More than half of the pharmacists (54.7%) reported more than 10 medication errors (including near misses) in 12 months' time, whereas only 22.2% did not report any medication error.

Table 2 demonstrates pharmacists' perceptions towards each safety culture domain and the respective scoring. The overall safety culture domains' mean score ranged from 31.7 to 98.3 with a mean of 65.6±11.0. The *stress recognition* domain received the highest mean score among pharmacists (73.0±20.4). In contrast, *working condition* was perceived as the least important domain, with the lowest mean score (54.8±17.4). In decreasing order, the percentage of pharmacists who held positive attitudes towards each domain was 58.1% (*stress recognition*), 46.2% (*job satisfaction*), 38.5% (*teamwork climate*), 33.3% (*safety climate*), 29.9% (*perception of management*) and 15.4% (*working condition*).

Demographic characteristics that influence safety culture and number of medication errors reported

Table 3 shows the demographic predictors of overall safety culture positive scores. After adjusting for age, gender, working units, total years of work experience and current work experience, pharmacists working in health clinics were 3.7 times more likely ($p=0.006$) to have overall safety culture positive scores than those working in the hospitals (OR 3.68 CI 1.44 to 9.38).

Table 4 demonstrates that the strongest demographic predictor of number of medication error reporting was being attached to a hospital. Hospital pharmacists were over 8.9 times more likely to report a medication error than were health clinic pharmacists (OR 8.90, 95% CI 3.08 to 25.71). Meanwhile, for every additional year of work experience, respondents were 0.87 times less likely to report a medication error (OR 0.870, 95% CI 0.78 to 0.98).

Table 5 shows the comparison of safety culture scores between hospital and health clinic pharmacists. With the exception of *stress recognition*, where the scores were similar, there were statistically significant ($p<0.05$) differences for overall and individual safety culture domain scores, where those who worked in health clinics scored higher than those in hospitals.

Association between safety culture and medication errors reported

There was a significant ($p<0.05$) negative fair correlation ($r=-0.276$) for overall safety culture mean score and number of medication errors reported for pharmacists working in the hospitals (table 6).

Table 2 Pharmacists' perception of safety culture

Safety culture domains	Minimum	Maximum	Mean (SD)	Positive response (≥ 75) (%)*
Teamwork climate	16.7	95.8	67.6 (14.5)	38.5
Safety climate	10.7	100.0	66.8 (14.9)	33.3
Job satisfaction	10.0	100.0	67.3 (19.4)	46.2
Stress recognition	6.3	100.0	73.0 (20.4)	58.1
Perception of management	18.8	100.0	62.2 (14.0)	29.9
Working condition	0.0	100.0	54.8 (17.4)	15.4
Overall safety culture	31.7	98.3	65.6 (11.0)	20.5

*Per cent positive scores are computed as the per cent of pharmacists who answered 'agree slightly' or 'agree strongly' on each of the items within a scale (ie, 4 or 5 on the original 5-point Likert scale).

As demonstrated in table 7, there were significant ($p < 0.05$) negative fair correlations between number of medication errors reported and all domains of safety culture mean scores except for the domain *stress recognition*, where a significant ($p = 0.023$) positive poor correlation ($r = 0.21$) was found. Higher scores of *teamwork climate*, *safety climate*, *job satisfaction*, *perception of management*, *working condition* and overall safety culture were associated with fewer numbers of medication errors reported. In contrast, as *stress recognition* increased, numbers of medication errors reported also increased.

DISCUSSION

The response rate of 83.6% achieved in this study is considered as a good response rate for studies on safety culture. The percentage is higher compared to the international benchmark of 66–72%,¹¹ and other studies that used the same instrument, such as the study conducted in community pharmacies in Sweden, 60.22%;¹⁰ that in an ICU in the USA, 70.2%;¹² another in an ambulatory setting in the USA, 69%;¹³ and yet one more among healthcare workers at several hospitals in Taiwan, 69.4%.¹⁴ This might be due to the method of questionnaire administration used, whereby each respondent was given a pen and a sealed envelope in which to return

the survey, in order to preserve confidentiality and anonymity; this suggests that the technique was effective in increasing response rates. In addition, a high response rate is an apparent sign of staff participation and attentiveness to quality issues, both signalling responsible behaviour.

When comparing the mean score against the international benchmark, our study scored higher for four of the six safety domains: in decreasing score order, *stress recognition* (73.0 vs 67.8), *job satisfaction* (67.3 vs 63.6), *safety climate* (66.8 vs 65.9) and *perception on management* (62.2 vs 46.4).^{11–15} *Teamwork climate* was scored below the international benchmark, demonstrating that respondents in our study had less positivity towards: input acceptance, speaking up, conflict resolution, feeling supported by others, ease of asking questions and collaboration with their own colleagues or other professionals. *Working condition* was scored below the international benchmark demonstrating: negativity towards level of staffing, training of new personnel, availability of necessary information for therapeutic decision and supervision of trainees.

Studies conducted in the UK, Egypt and Brazil,^{12–16–17} found that *job satisfaction* scored the highest compared to other safety culture domains. In our study, the *stress recognition* domain received the highest mean score

Table 3 Demographic predictors of overall safety culture positive scores

Variables	Adjusted OR (95% CI)†	Wald statistics (df)	p Value
Age	–	–	–
Total work experience (years)	–	–	–
Work experience in current institution	–	–	–
Gender	–	–	–
Institution			
Health clinic	3.678 (1.443 to 9.375)	7.444 (1)	006*
Hospital	1.00		
Working unit			
Outpatient and ambulatory	–	–	–
Inpatient and clinical	–	–	–
Others	–	–	–

*Statistically significant at $p < 0.05$.

†Multiple logistic regression.
df, degree of freedom.

Table 4 Demographic predictors of number of medication errors reported

Variables	Adjusted OR (95% CI)†	Wald statistics (df)	p Value
Age	–	–	–
Total work experience (years)	0.870 (0.777 to 0.975)	5.714 (1)	0.017*
Work experience in current institution	–	–	–
Gender	–	–	–
Institution			
Hospital	8.902 (3.082 to 25.709)	16.322 (1)	<0.001*
Health clinic	1.00		
Working unit			
Outpatient and ambulatory	–	–	–
Inpatient and clinical	–	–	–
Others			

*Statistically significant at $p < 0.05$.

†Multiple logistic regression.

df, degree of freedom.

among both hospital as well as health clinic pharmacists. However, it is important to note that the *stress recognition* subscale does not contribute to the SAQ as intended and interpretation of results on this scale by its label 'stress recognition' may be misleading.^{11 18} In our opinion, stress recognition can yield positive outcomes if respondents acknowledge the effects of stress on their performance and attribute it to desiring improved performance (eg, respondents with high *stress recognition* scores highlighted the need for increasing staffing levels); negative when they perceive it as an indicative of measuring their stress level and attributing it to suboptimal performance (eg, attributing it to increased frequencies of medication errors). In our study, for instance, greater numbers of medication errors were reported as *stress recognition* increased. Our opinion is also shared by Taylor and Pandian,¹⁹ who further suggested that this subscale be investigated for its true meaning.

Working condition received the lowest mean score from respondents. The plausible explanation for this was that the respondents were dissatisfied with staffing and human resources. Staffing, which was one of the questions addressed in the *working condition* subsection,

received a very low score. A lack of staff, patient volume increment and higher expectations from other health-care professionals, may have contributed to increased workload; this could certainly jeopardise patient safety. Better scoring on staffing increased the possibility of having a more positive perception of safety among respondents and the likelihood of reporting a higher patient safety grade.²⁰ Conversely, several studies reported that the domain *perception of management*, received the lowest mean score.^{10 11 18} The percentages of respondents with positive response (score >75) for all safety culture domains in this study (range 15.4–58.1% positive) were comparable with studies across emergency medical service agencies, ICUs and hospitals.^{12 14 21}

When comparing health clinics with hospitals, our study indicated that pharmacists in clinics had a more positive attitude towards *teamwork climate*, *safety climate*, *job satisfaction*, *perception of management* and *working condition* (5 of the 6 safety culture domains). In a study using the hospital survey on patient safety culture (HSOPSC) as the instrument, some authors found that smaller institutions had a better overall perception of safety than large institutions.²⁰ One explanation could be that small institutions have a more homogenous culture where staff are

Table 5 Comparison of safety culture scores between hospital and health clinic pharmacists

Safety culture domain	Hospital (n=73) Median (IQR)†	Health clinic (n=44) Median (IQR)†	p Value
Teamwork climate	66.7 (22.9)	75.0 (11.5)	<0.001*
Safety climate	64.3 (17.9)	73.2 (10.5)	<0.001*
Job satisfaction	70.0 (25.0)	75.0 (20.0)	0.005*
Stress recognition	75.0 (31.3)	75.0 (29.7)	0.100
Perception of management	62.5 (21.9)	68.8 (17.2)	0.010*
Working condition	50.0 (18.8)	62.5 (25.0)	<0.001*
	Mean (SD)‡	Mean (SD)‡	p Value
Overall safety culture	62.5 (11.2)	70.9 (8.5)	<0.001*

*Statistically significant at $p < 0.05$.

†Mann-Whitney test.

‡Independent t test.

Table 6 Correlation between overall safety culture and number of medication errors reported for hospital and health clinic

		Overall safety culture [†]	p Value
Hospital	Number of ME reported	-0.276	0.018*
Health clinic	Number of ME reported	-0.111	0.474

*Statistically significant at $p < 0.05$.

[†]Spearman's r correlation coefficient.
ME, medication error.

more likely to share the same values.⁴ Health clinics are considered small institutions and have fewer staff members than do hospitals. The former probably have a feedback mechanism whereby staff members are able to share their ideas with the management team. Therefore, their staff have a more positive attitude towards the work that they do and the institutions they work for.²⁰

Our study further revealed that, for the domains *teamwork climate*, *safety climate* and *job satisfaction*, and overall safety culture, pharmacists working in outpatient and ambulatory care reported significantly higher scores than those working elsewhere (result analyses not shown). This could be explained by the proportion of pharmacists in outpatient and ambulatory unit, which is normally higher than that in other units such as inpatient and clinical. Therefore, these pharmacists have more opportunities for interacting with their peers within the same unit, while being minimally involved in collaborative activities with other healthcare professionals.⁸ As a result, they have better attitudes towards teamwork, safety and job satisfaction. Meanwhile, the multidisciplinary nature of the job in inpatient and in clinical settings would mean that the pharmacists would need to interact and build a good rapport with other healthcare professionals. Job conflicts may occur on a daily basis, which may influence pharmacists' satisfaction and positive perception on teamwork and safety climate.²² Sexton *et al*²³ and Relihan *et al*¹⁵ also recognised the scores of *teamwork climate* to be higher within a group of peers.

Table 7 Correlation between safety culture domains and number of medication errors reported

Safety culture domains	Number of medication error reported [†]	p Value
Teamwork climate	-0.440	<0.001*
Safety climate	-0.427	<0.001*
Job satisfaction	-0.371	<0.001*
Stress recognition	0.210	0.023*
Perception of management	-0.314	0.001*
Working condition	-0.264	0.004*
Overall safety culture	-0.423	<0.001*

*Statistically significant at $p < 0.05$.

[†]Spearman's r correlation coefficient.

A majority of the respondents reported more than 10 medication errors (including near misses) over the past 12 months. A study in a 159-bed community hospital in the USA revealed that pharmacists and nurses collectively reported 14 medication errors per month.²⁴ There is a good indication that pharmacists in our study understood the importance of medication error reporting. The awareness was also attributable to the successful implementation of the Malaysian Patient Safety Goals, primarily in hospitals. This could possibly explain the reason for a hospital pharmacist being almost nine times more likely to report a medication error than a health clinic pharmacist. Nevertheless, our study also found that there were respondents who did not report any medication error, suggesting that there is a lack of a non-punitive culture—a culture that needs to be built in order to increase medication error reporting by staff. Staff reportedly felt more confident to report when they witnessed positive feedback and system change following an error.²⁵ Previous studies had also found that many errors in healthcare were under-reported^{26 27} due to possible barriers such as having busy working schedules, severity of patient harm and anxieties about harming interprofessional relationships.^{25 27}

Fewer numbers of medication errors were reported with higher scores of *teamwork climate*, *safety climate*, *job satisfaction*, *perception of management*, *working condition* and overall safety culture. In particular, a mean score decrease of 10 in *teamwork climate* increased the number of medication errors reported by 5.7 (result analyses not shown). In contrast, greater numbers of medication errors were reported as *stress recognition* increased. Our findings were comparable to those of a Swedish study on community pharmacies, which demonstrated a positive relationship between dispensing errors and *stress recognition*—with *better teamwork climate*, *safety climate* and *job satisfaction*, the number of errors decreased.²⁸ Other correlation studies from the USA also concluded that safety culture influenced the occurrence of medication errors²⁹ and adverse events,³⁰ where, in a positive environment, staff were less likely to commit an error and an adverse event was less likely to occur.

Our study highlights the variation in safety culture between different institutional settings and across working units, even those located in the same state. Prior studies also identified differences in SAQ scores across departments, organisations and agencies, although positioned within a defined geographic area.^{11 21} It is important to analyse the scores and make improvements based on the specific domain, and group-specific interventions should be a part of any strategy to improve safety culture.

LIMITATIONS

There are several limitations to this study. The study was conducted using convenience sampling, a method prone to sampling bias. Although characteristics of our

sample were not significantly different from those of the Malaysia Health Review System Survey, our sample may still not be representative of the entire population. Furthermore, our study focused only on pharmacists' perception. It is also important to assess safety culture of other personnel (eg, pharmacy technicians) in the pharmacy department in order to gain insights into the communication network, interactions and overall picture of safety culture in a pharmacy organisation. Such insights are pertinent to distinguish between pharmacists' responses on the SAQ that resonate with organisational culture as opposed to the norms, beliefs, values and attitudes of the professional culture. Further nationwide studies that include larger matched samples of pharmacists in health clinics and hospitals will increase the generalisability and reliability of the findings to accurately assess the difference between pharmacists working in the two settings. The effect of clustering within an organisation (intra-class correlation) should also be taken into account. A smaller hierarchical effect would give greater confidence that the organisation is well assimilated, has a group (teamwork) culture and is therefore better aligned for quality improvement.

While we demonstrated that medication errors were influenced by safety culture, future work should explore the effect of safety culture interventions on such patient outcomes. Measurement of safety culture should also constitute quantitative as well as qualitative methods, using more in-depth observational and longitudinal research.

CONCLUSIONS

In general, only a minority of the pharmacists working in hospitals and health clinics were in agreement with each question and scale. As perceptions improved, the number of medication errors reported decreased. Pharmacists in outpatient and ambulatory units and those attached to health clinics had better perceptions of safety culture. Pharmacists vary in how they perceive different domains of safety culture based on the institution and units they work for, indicating that safety culture is inherent within a unit of an organisation and that variation at the unit level cannot be ignored. Findings of this study will be useful for identification of specific domain areas that require improvement, and plans for remedial action should inherently be group specific.

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Contributors SES led the design of the study for postgraduate research. SES conducted data collection, analysed the data and drafted the manuscript. LPL provided intellectual input and revised the manuscript. MLF supervised data collection and analysis, and revised the final manuscript. All the authors approved the final version.

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REFERENCES

1. Bates DW. Preventing medication errors: a summary. *Am J Health Syst Pharm* 2007;64(14 Suppl 9):S3–9.
2. Pronovost P, Sexton B. Assessing safety culture: guidelines and recommendations. *Qual Saf Health Care* 2005;14:231–3.
3. Kohn LT, Corrigan JM, Donaldson MS. *To err is human: building a safer health system*. National Academies Press, 2000.
4. Sorra J, Nieva VF. *Hospital survey on patient safety culture*. Agency for Healthcare Research and Quality, 2004.
5. Kar CSC, Hamid HSA. Department of Psychology, International Islamic University Malaysia. [http://irep.iium.edu.my/32075/1/adaptation_of_SAQ_version_1.3_\(1\).pdf](http://irep.iium.edu.my/32075/1/adaptation_of_SAQ_version_1.3_(1).pdf)
6. Colla JB, Bracken AC, Kinney LM, et al. Measuring patient safety climate: a review of surveys. *Qual Saf Health Care* 2005;14:364–6.
7. Nieva V, Sorra J. Safety culture assessment: a tool for improving patient safety in healthcare organizations. *Qual Saf Health Care* 2003;12(Suppl 2):ii17–23.
8. Listyowardojo TA, Nap RE, Johnson A. Variations in hospital worker perceptions of safety culture. *Int J Qual Health Care* 2012;24:9–15.
9. Sexton J, Thomas E, Grillo S. *The Safety Attitudes Questionnaire (SAQ) guidelines for administration*. The University of Texas Center of Excellence for Patient Safety Research and Practice, 2003.
10. Nordén-Hägg A, Sexton J, Källemark-Sporrong S, et al. Assessing safety culture in pharmacies: the psychometric validation of the Safety Attitudes Questionnaire (SAQ) in a national sample of community pharmacies in Sweden. *BMC Clin Pharmacol* 2010;10:1–12.
11. Sexton JB, Helmreich RL, Neilands TB, et al. The Safety Attitudes Questionnaire: psychometric properties, benchmarking data, and emerging research. *BMC Health Serv Res* 2006;6:44.
12. Huang DT, Clermont G, Sexton JB, et al. Perceptions of safety culture vary across the intensive care units of a single institution. *Crit Care Med* 2007;35:165–76.
13. Modak I, Sexton JB, Lux TR, et al. Measuring safety culture in the ambulatory setting: the Safety Attitudes Questionnaire—ambulatory version. *J Gen Intern Med* 2007;22:1–5.
14. Lee WC, Wung HY, Liao HH, et al. Hospital safety culture in Taiwan: a nationwide survey using Chinese version Safety Attitude Questionnaire. *BMC Health Serv Res* 2010;10:234.
15. Relihan E, Glynn S, Daly D, et al. Measuring and benchmarking safety culture: application of the safety attitudes questionnaire to an acute medical admissions unit. *Ir J Med Sci* 2009;178:433–9.
16. Rigobello MCG, De Carvalho REFL, De Bortoli Cassiani SH, et al. The climate of patient safety: perception of nursing professionals. *Acta Paul Enferm* 2012;25:728–35.
17. Abdou HA, Sabe KM. A baseline assessment of patient safety culture among nurses at Student University Hospital-Egypt. *World J Med Sci* 2011;6:17–26.

18. Speroff T, Nwosu S, Greevy R, *et al.* Organisational culture: variation across hospitals and connection to patient safety climate. *Qual Saf Health Care* 2010;19:592–6.
19. Taylor JA, Pandian R. A dissonant scale: stress recognition in the SAQ. *BMC Res Notes* 2013;6:302.
20. El-Jardali F, Dimassi H, Jamal D, *et al.* Predictors and outcomes of patient safety culture in hospitals. *BMC Health Serv Res* 2011;11:45.
21. Patterson PD, Huang DT, Fairbanks RJ, *et al.* The emergency medical services safety attitudes questionnaire. *Am J Med Qual* 2010;25:109–15.
22. Al Khalidi D, Wazaify M. Assessment of pharmacists' job satisfaction and job related stress in Amman. *Int J Clin Pharm* 2013;35:821–8.
23. Sexton JB, Thomas EJ, Helmreich RL. Error, stress, and teamwork in medicine and aviation: cross sectional surveys. *BMJ* 2000;320:745–9.
24. Force MV, Deering L, Hubbe J, *et al.* Effective strategies to increase reporting of medication errors in hospitals. *J Nurs Adm* 2006;36:34–41.
25. Williams SD, Phipps DL, Ashcroft DM. Understanding the attitudes of hospital pharmacists to reporting medication incidents: a qualitative study. *Res Social Adm Pharm* 2013;9:80–9.
26. Etchegaray JM, Throckmorton T. Barriers to reporting medication errors: a measurement equivalence perspective. *Qual Saf Health Care* 2010;19:e14.
27. Wakefield DS, Wakefield BJ, Uden-Holman T, *et al.* Understanding why medication administration errors may not be reported. *Am J Med Qual* 1999;14:81–8.
28. Nordén-Hägg A, Källemark-Sporrong S, Lindblad AK. Exploring the relationship between safety culture and reported dispensing errors in a large sample of Swedish community pharmacies. *BMC Pharmacol Toxicol* 2012;13:4.
29. Hofmann DA, Mark B. An investigation of the relationship between safety climate and medication errors as well as other nurse and patient outcomes. *Pers Psychol* 2006;59:847–69.
30. Kline TJ, Willness C, Ghali WA. Determinants of adverse events in hospitals—the potential role of patient safety culture. *J Healthc Qual* 2008;30:11–17.