Original Article

Patient safety culture among medical students in Singapore and Hong Kong

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INTRODUCTION Undergraduate education in medical schools plays an important role in promoting patient safety. Medical students from different backgrounds may have different perceptions and attitudes toward issues concerning safety. This study aimed to investigate whether patient safety cultures differed between students from two Asian countries, and if they did, to find out how they differed. This study also aimed to identify the educational needs of these students.

METHODS A voluntary, cross-sectional and self-administered questionnaire survey was conducted on 259 students from two medical schools – one in Hong Kong and the other in Singapore. None of the students had received any formal teaching on patient safety. We used a validated survey instrument, the Attitudes to Patient Safety Questionnaire III (APSQ-III), which was designed specifically for students and covered nine key factors of patient safety culture.

RESULTS Of the 259 students, 81 (31.3%) were from Hong Kong and 178 (68.7%) were from Singapore. The overall response rate was 66.4%. Significant differences between the two groups of students were found for two key factors – 'patient safety training', with Hong Kong students being more likely to report having received more of such training (p = 0.007); and 'error reporting confidence', which Singapore students reported having less of (p < 0.001). Both groups considered medical errors as inevitable, and that long working hours and professional incompetence were important causes of medical errors. The importance of patient involvement and team functioning were ranked relatively lower by the students.

CONCLUSION Students from different countries with no prior teaching on patient safety may differ in their baseline patient safety cultures and educational needs. Our findings serve as a reference for future longitudinal studies on the effects of different teaching and healthcare development programmes.

INTRODUCTION

Patient safety is an emerging healthcare discipline that emphasises risk reduction, incident management and quality improvement in patient care.[1] In 1999, the Institute of Medicine of the National Academy of Sciences, United States, released a report titled 'To Err is Human: Building a Safer Health System'.[2] According to this report, up to 98,000 preventable deaths had reportedly occurred annually due to medical errors in hospitals, with 7,000 preventable deaths being related to medication errors alone.[2] Education plays an important role in promoting patient safety, which is already an important curricular component at some medical schools.[3-10] To facilitate the teaching of patient safety, the World Health Organization (WHO) has published a curriculum guide[11] that covers 11 topics ranging from medication safety and infection control to team play and system errors. While some of these topics can be readily integrated into existing undergraduate programmes, its implementation remains challenging for some medical schools with heavily loaded curricula. During the initial phase of development, it is often necessary to prioritise areas of learning according to the faculties' experiences and expertise.

Students from different backgrounds may also differ in their knowledge, skills and educational needs.[12] Understanding their baseline patient safety cultures, and identifying important and urgent educational needs are factors critical for the effective design and successful implementation of education programmes at individual institutions.

A valid and reliable tool is essential for the assessment of safety culture.[6,13] Most available instruments cater to healthcare personnel such as clinicians and administrators,[14] but not medical students. In the present study, we used a validated survey instrument[15] specifically designed for students to study and compare the attitudes of students from two medical schools (one in Singapore and the other in Hong Kong) toward patient safety. We aimed to examine whether patient safety cultures differed between students of different backgrounds, and if they did, to investigate how they differed. The study also aimed to identify the educational needs of these students.

METHODS

A voluntary, cross-sectional and self-administered question-naire survey was conducted on two cohorts of second-year

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Table I. Items in the Attitudes to Patient Safety Questionnaire-III that demonstrated significant differences between the two student cohorts.

Item no.	Item	Cohort's response score			p-value
		Singapore	Hong Kong	Combined mean	
2	I have a good understanding of patient safety issues as a result of my undergraduate medical training.	4.49 ± 0.97	4.89 ± 0.96	4.61 ± 0.98	0.001
3	My training is preparing me to prevent medical errors.	4.81 ± 1.08	5.16 ± 1.10	4.92 ± 1.10	0.008
4	I would feel comfortable reporting any errors I had made, no matter how serious the outcome had been for the patient.	4.28 ± 1.32	4.96 ± 1.26	4.49 ± 1.34	< 0.001
5	I would feel comfortable reporting any errors other people had made, no matter how serious the outcome had been for the patient.	4.08 ± 1.17	4.73 ± 1.04	4.29 ± 1.17	< 0.001
6	I am confident I can talk openly to my supervisor about an error I had made even if it resulted in potential or actual harm to my patient.	4.46 ± 1.20	5.15 ± 1.07	4.67 ± 1.20	< 0.001
13	Most medical errors result from careless nurses.	3.22 ± 1.12	3.61 ± 1.11	3.34 ± 1.13	0.014

Data is presented as mean ± standard deviation.

medical students – one from Hong Kong and the other from Singapore. None of the students had received any prior formal teaching on patient safety, enabling the assessment of the baseline culture of these students. The participants were informed of their right to decline participation in the present study, and thus willingness to complete the survey was taken as implied consent. Each participant was given 20 mins to complete the questionnaire anonymously. Approvals for the present study were obtained from the ethics committees of the respective schools.

The survey instrument used was the Attitudes to Patient Safety Questionnaire III (APSQ-III).[15] The questionnaire consists of 26 items covering nine key patient safety factors: (a) patient safety training received (items 1–3); (b) error reporting confidence (items 4–6); (c) working hours as an error cause (items 7–9); (d) error inevitability (items 10–12); (e) professional incompetence as an error cause (items 13–16); (f) disclosure responsibility (items 17–19); (g) team functioning (items 20 and 21); (h) patient involvement in reducing error (items 22 and 23); and (i) importance of patient safety in the curriculum (items 24–26). Responses to each item were rated on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). A higher score indicated a more affirmative or positive response to the factor concerned. Several items (items 11 and 14–17) were reverse scored, according to the instructions of the original creators of the instrument. Each participant's responses were summed up into nine subscores that corresponded to the nine key factors.

Results from the two student cohorts were compared using the Mann-Whitney U test. All statistical analyses were performed using the Statistical Package for the Social Sciences for Windows version 16.0 (SPSS Inc, Chicago, IL, USA). A p-value of < 0.05 was considered statistically significant.

RESULTS
Of the 259 students who participated in the study, 81 (31.3%) were from Hong Kong and 178 (68.7%) were from Singapore.

The overall response rate was 66.4% (62.3% Hong Kong; 68.4% Singapore). Statistically significant differences were found between the responses of the two student cohorts for six items in the APSQ-III (Table I). These included two of the three items on 'patient safety training received' (items 2 and 3), all three items on 'error reporting confidence' (items 4–6), and one of the three items on 'professional incompetence as error cause' (item 13). No significant differences were found for the remaining 21 items (Table II).

With respect to the nine key patient safety factors, statistically significant differences were found for two factors – 'patient safety training received' and 'error reporting confidence' (Table III). Students from Hong Kong were more likely to report having received more patient safety training (p = 0.007). They were also more likely to indicate comfort with reporting errors (p < 0.001). No significant differences were found for the remaining seven factors. Overall, 'working hours as an error cause' received the highest score of agreement, followed by 'error inevitability' and 'importance of patient safety in the curriculum'. 'Patient involvement in reducing error' and 'team functioning' received the lowest overall scores.

DISCUSSION
The implementation of patient safety programmes involves fundamental cultural changes and the introduction of concepts that are outside traditional medical training. The appropriate management of a medical incident is now believed to consist of open disclosure, a systematic analysis of root causes, and the implementation of systemic measures to address underlying causative factors at different levels. This contrasts with previous approaches that focused mainly on human and individual errors. Teachings on patient safety play an important role in introducing these new concepts to future doctors. A number of studies on the patient safety education programmes of medical schools in North America,[3] Europe[6] and Asia[16,17]

Table II. Items in the Attitudes to Patient Safety Questionnaire-III that demonstrated no significant differences between the two student cohorts.

Item no.	Item	Cohort's response score			p-value
		Singapore	Hong Kong	Combined mean	
1	My training is preparing me to understand the causes of medical errors.	4.80 ± 1.02	5.00 ± 1.14	4.86 ± 1.06	0.136
7	Shorter shifts for doctors will reduce medical errors.	5.85 ± 1.11	5.95 ± 1.12	5.88 ± 1.11	0.437
8	By not taking regular breaks during shifts, doctors are at an increased risk of making errors.	5.80 ± 1.04	5.84 ± 1.11	5.81 ± 1.06	0.620
9	The number of hours doctors work increases the likelihood of making medical errors.	5.96 ± 1.01	5.98 ± 1.17	5.97 ± 1.06	0.566
10	Even the most experienced and competent doctors make errors.	5.93 ± 1.01	5.83 ± 1.04	5.90 ± 1.02	0.228
11	A true professional does not make mistakes or errors.	2.46 ± 1.43	2.61 ± 1.35	2.51 ± 1.40	0.311
12	Human error is inevitable.	5.50 ± 1.17	5.38 ± 1.44	5.46 ± 1.26	0.945
14	If people paid more attention at work, medical errors would be avoided.	5.13 ± 1.08	5.14 ± 0.88	5.14 ± 1.02	0.818
15	Most medical errors result from careless doctors.	4.14 ± 1.10	3.86 ± 1.09	4.05 ± 1.10	0.181
16	Medical errors are a sign of incompetence.	3.57 ± 1.17	3.71 ± 1.10	3.61 ± 1.15	0.242
17	It is not necessary to report errors which do not result in adverse outcomes for the patient.	2.92 ± 1.11	3.23 ± 1.27	3.02 ± 1.17	0.169
18	Doctors have a responsibility to disclose errors to patients only if the errors result in patient harm.	3.56 ± 1.25	3.84 ± 1.42	3.64 ± 1.31	0.231
19	All medical errors should be reported.	4.83 ± 1.17	4.98 ± 1.17	4.88 ± 1.17	0.255
20	Better multidisciplinary teamwork will reduce medical errors.	5.47 ± 0.88	5.43 ± 1.03	5.45 ± 0.93	0.622
21	Teaching students teamwork skills will reduce medical errors.	5.23 ± 1.11	5.04 ± 1.02	5.17 ± 1.08	0.159
22	Patients have an important role in preventing medical errors.	4.94 ± 1.04	4.81 ± 1.15	4.90 ± 1.07	0.396
23	Encouraging patients to be more involved in their care can help to reduce the risk of medical errors occurring.	5.17 ± 0.95	5.39 ± 0.95	5.24 ± 0.96	0.155
24	Teaching students about patient safety should be an important priority in medical students training.	5.55 ± 0.93	5.40 ± 0.98	5.50 ± 0.95	0.205
25	Patient safety issues cannot be taught, they can only be learned through clinical experience, which is gained when one is qualified.	4.09 ± 1.31	4.09 ± 1.29	4.09 ± 1.30	0.993
26	Learning about patient safety issues before I qualify will enable me to become a more effective doctor.	5.47 ± 0.96	5.59 ± 1.02	5.51 ± 0.98	0.238

Data is presented as mean ± standard deviation.

have described the respective programmes' design and impact. Medical schools differ in their capacities for implementing new curricular components, and may need to tailor their programmes to their students' needs. The formation of a patient safety culture among students is also influenced by social, historical and cultural factors. Therefore, understanding students' baseline attitudes and perceptions is critical for the design of effective programmes.

The instrument used in this study, the APSQ-III, has good and stable factor structure and criterion validity; it can also distinguish between different student subgroups.[15] The present study demonstrates the use of APSQ-III in identifying differences between students from two medical schools from different Asian countries; both medical schools have well-established five-year undergraduate programmes. It was

interesting to find that although none of our participants had received any formal teaching on the subject, students from Hong Kong were more likely to report good training. This contrasts with a previous study from Hong Kong by Leung and Patil, in which over 50% of students rated their knowledge as poor.[4] In that study, only 6% of the students considered themselves 'well-informed on patient safety'.[4] However, Leung and Patil employed a different instrument that was non-validated, and patient safety knowledge was assessed using specific examples of factual items. In the present study, knowledge of patient safety was assessed using general statements of self-evaluation. It must be emphasised that the APSQ-III addresses students' self-assessment of training received rather than the actual teachings given. Thus, the differences observed between the two student cohorts in our study may

Table III. Student responses to the nine key patient safety factors in the Attitudes to Patient Safety Questionnaire III.

Key factor	Cohort's response score			p-value
	Singapore	Hong Kong	Combined mean	
Patient safety training received	14.1 ± 2.69	15.05 ± 2.59	14.39 ± 2.69	0.007
Error reporting confidence	12.81 ± 3.25	14.84 ± 3.04	13.45 ± 3.32	< 0.001
Working hours as an error cause	17.63 ± 2.81	17.77 ± 3.12	17.67 ± 2.90	0.48
Error inevitability	16.97 ± 2.85	16.63 ± 2.87	16.87 ± 2.86	0.37
Professional incompetence as an error cause	14.38 ± 2.47	14.92 ± 2.13	14.54 ± 2.38	0.31
Disclosure responsibility	13.46 ± 1.82	13.59 ± 1.76	13.5 ± 1.80	0.68
Team functioning	10.70 ± 1.75	10.46 ± 1.81	10.63 ± 1.77	0.61
Patient involvement in reducing error	10.11 ± 1.82	10.20 ± 1.91	10.14 ± 1.84	0.87
Importance of patient safety in the curriculum	14.93 ± 2.32	14.88 ± 2.24	14.91 ± 2.29	0.97

Data is presented as mean ± standard deviation.

reflect the students' different perceptions of what patient safety actually entails, rather than differences in the actual teachings given. For instance, in the present study, we found that Hong Kong students reported receiving good teaching despite not having received any as part of their curriculum. This could be due to the students' harboured misunderstandings or failure to distinguish teaching from what they had established from public media.

We also found differences with regard to the two student cohorts' error reporting confidence. For many years, the importance of patient safety has been acknowledged in both Singapore and Hong Kong.[18-20] In Hong Kong, public disclosure of medical errors is highly encouraged, and its Hospital Authority publishes quarterly reports on medical incidents.[21] In the Hong Kong study by Leung and Patil, 53% of students indicated that they would not hide their own errors, and 61% disagreed that 'near miss' incidents needed no disclosure.[4] In contrast, public disclosure of healthcare performance information,[22] particularly that of medical errors,[23] is arguably less clearly established in Singapore. As students are keen observers of their seniors' behaviour, how clinical instructors and senior medical personnel handle errors may have significant impact.[24,25] We surmise that different practices with regard to error disclosure in the two countries may have accounted for the differences apparent in the students' perceptions of it. However, there is no reported evidence of different reporting practices in the two countries available to support our supposition. Differences in local patient safety cultures, as well as differences in the social and cultural backgrounds of students, may also be significant contributing factors. However, the present study design did not enable the exploration of these factors.

Insights can also be gained from the similarities observed between the two cohorts. The existing undergraduate programmes of the two medical schools involved in the present study emphasise ethical professionalism and patient-centred practices. It was encouraging, and perhaps not surprising, to find that both cohorts of students considered patient safety an important subject, echoing findings from other medical schools.[10] Long working hours and professional incompetence were marked by many in the present study as important causes of error. This may be suggestive of the students placing an emphasis on the human factor, in line with the findings of a previous study involving Hong Kong students, in which a majority of students was found to consider 'working harder' as an effective strategy to prevent future errors.[4] These findings may indicate the need to emphasise the potential roles of other factors (e.g. system errors and procedure complexity) in the occurrence of medical errors. The relatively low scores given to team functioning and patient involvement are clear indications that the inclusion of these topics in future programmes are needed.

This study has several limitations. First, the response rate was relatively low, and our results should therefore be interpreted with caution. Second, despite its good criterion validity, the APSQ-III is a new instrument that has yet to be subjected to retesting for reliability and predictive validity. The survey instrument assessed only the students' self-evaluation, and hence, the results of the present study should not be taken as indicators of the students' actual skills and knowledge. Furthermore, the size of the two cohorts were not balanced. The size of the Hong Kong student cohort was nearly half of the Singapore student cohort. This difference may have affected the validity of our analysis. Also, in retrospect, it might have been more appropriate to survey first-year medical students instead of second-year medical students for baseline safety culture. Another limitation of the present study is that only a single year of students were surveyed, with no follow-up conducted. It would have been interesting and useful to assess the same group of students longitudinally to evaluate the differential impact of the two schools' education programmes, as well as the differential impact of local efforts toward promoting a safety culture among medical students.

Nonetheless, the present study represents an important step in patient safety education at both institutions. Since the present study was conducted, the two institutions have increased emphasis on the issues of system error, team functioning and patient involvement in their respective

patient safety education programmes. The students' recognition of the importance of the subject also served as positive feedback to the faculties. Patient safety education is now conducted in the third to fifth years of medical schools in Hong Kong. While in Singapore, patient safety education is implemented even earlier, beginning in year one of medical school. Previous studies from other countries have emphasised the importance of understanding baseline culture.[14,26] Therefore, the findings of the present study may serve as a reference for other institutions planning to introduce, or are in the process of introducing, patient safety education in their curricula.

In conclusion, we used the APSQ-III to identify differences in the patient safety cultures and educational needs of medical students from two Asian countries with well-developed healthcare systems and undergraduate programmes. Patient safety education should be tailored to students' perceptions and needs, which are potentially influenced by local practices. Longitudinal studies using a validated instrument should be conducted to evaluate patient safety education programmes and study its impact on local healthcare development.

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