RESEARCH ARTICLE

A mixed-method concurrent study exploring the importance of patient safety among healthcare professionals from a low-resource setting

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Abstract

Objective: To compare the knowledge and attitudes regarding patient safety among medical students and faculty between public and private medical institutions.

Method: The mixed-method concurrent study was conducted from July 2020 to January 2021 at the private-sector Liaquat College of Medicine and Dentistry, Karachi, and the public-sector Sindh Medical College, Karachi. Data was collected using Attitudes to Patient Safety Questionnaire-III from medical students of either gender from the third to fifth year of the academic programme, and through in-depth interviews with selected students and healthcare professionals at both the institutions. Quantitative data was analysed using SPSS 26, while qualitative data was subjected to thematic analysis.

Results: Of the 225 students with mean age 22.6±1.41 years, 116(51.6%) were from the private institution, 149(66.2%) were females, 87(38.7%) were in the fourth year of the academic programme, and 85(37.8%) reported exposure to medical errors in the preceding year. Students from the private institution exhibited significantly more positive attitudes towards patient safety compared to those from the public institution ($p \leq 0.05$). Qualitative analysis yielded three key themes: "Stances on patient safety", "Stance on medical errors", and "Ways to bring about change".

Conclusion: A more favourable attitude towards patient safety was noted among students at the private-sector institution compared to their counterparts in the public sector. Participants from both the institutions expressed enthusiasm for learning, and advocated the need to integrate patient safety into the medical curriculum.

Key Words: Healthcare professionals, Medical errors, Patient safety culture, Medical students, Perceptions.

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Introduction

Medical errors represent a serious public health issue worldwide, giving rise to concerns about patient safety.[1] Defined as "the failure to properly carry out an appropriately planned action (slip) or successfully carrying out an incorrect action (mistake) where there is potential for patient harm",[2] medical errors encompass actions that were intended to be carried out, but were not performed, or incorrect actions were taken, or procedures got mistakenly manipulated. While not all errors result in patient harm, they still are preventable events occurring during healthcare interactions between healthcare professionals (HCPs) and patients.[3]

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Unfortunately, conversing about medical errors remains a taboo.[4] The response to medical errors is almost always a punitive one, with likely consequences of fallout from the medical fraternity, deterring open dialogue and learning.[5,6] Effective reporting systems, proper documentation of medical errors, and constructive discussions in healthy, proactive surroundings can significantly reduce errors, and improve patient safety. The hospital environment conducive to efficient delivery of services is critical for maximising safety.[6] Integrating these practices at the basic undergraduate level is essential to fostering a strong patient safety culture among future healthcare professionals.[7]

Globally, adverse events leading to patient harm is the 14th leading cause of disease burden, comparable to malaria and tuberculosis, with a 1 in 300 chance of a patient being harmed during hospitalisation. Approximately 421 million hospitalisations occur worldwide annually, with 42.7 million resulting in adverse events due to medical errors.[8]

In the United States, a study estimated that an alarming 251,000 deaths occur due to medication errors annually, and <10% of them are reported.[9]

In Saudi Arabia, numerous studies have been conducted probing medical error perceptions amongst HCPs. Lack of patient safety culture has been identified, with almost 40,000 medical error complaints being filed annually. Majority of staff within Saudi hospitals are from the West, and many of them perceive the patient safety climate to be unsafe.[6,10–13]

In Pakistan, approximately 500,000 deaths are attributed to medication errors annually.[14,15] Students at the University of Lahore supported the idea of integrating patient safety into the medical curricula. The study also highlighted the need for prompt disclosure of medical errors responsibly.[16]

To our knowledge, no such study has been conducted in Karachi, comparing perceptions and attitudes towards patient safety culture of undergraduate medical students and HCPs. The current study was planned to fill the gap in literature by comparing the knowledge and attitudes regarding patient safety among medical students and faculty between public and private medical institutions.

Subjects and Methods

The mixed-method concurrent study was conducted from July 2020 to January 2021 at the private-sector Liaquat College of Medicine and Dentistry (LCMD), Karachi, and the public-sector Sindh Medical College (SMC), Karachi. The quantitative domain followed a comparative cross-sectional design, while the qualitative domain utilised thematic content analysis. Both quantitative and qualitative data was collected during this period, including transcribing interviews, followed by data analysis. Medical students of either gender in the third, fourth and final years of their academic programme with at least six months of clinical exposure were included. HCPs from basic and clinical faculty were included for in-depth interviews (IDIs). The sample was raised using non-probability sampling technique.

The quantitative sample size was calculated using an equation to calculate for one sample mean[17] in line with literature[16] after factoring in a 20% non-response rate. For the qualitative domain, IDIs were conducted at each institution using theoretical sampling technique.

The quantitative domain utilised the Attitudes to Patient Safety Questionnaire-III (APSQ-III), which is a 26-item tool with a Cronbach's alpha value of 0.732, which assesses students' patient safety knowledge on a seven-point Likert scale. The questionnaire demonstrated good reliability (Cronbach's alpha=0.745) during the pilot. In-person data collection was done at SMC, while the questionnaire was sent online to LCMD students using Google Forms because there were coronavirus disease-2019 (COVID-19) lockdowns in place at the time.

The qualitative domain employed a semi-structured interview guide developed after literature review.[18] Qualitative data was gathered through IDIs conducted in-person or online via Zoom, with recordings stored securely. Informed consent was obtained from all the participants.

Quantitative data was analysed using SPSS 26. Data was expressed as mean +/- standard deviation Or frequencies and percentages, as appropriate. Mann-Whitney U test was used for Likert scale (ordinal) data where normality could not be assumed. Independent sample t-tests were used for approximately normally distributed continuous variables. $P \leq 0.05$ was considered significant. Qualitative data was transcribed verbatim, cross-checked with the participants, coded and analysed to generate themes and subthemes.

Results

Of the 225 students with mean age 22.6±1.41 years, 116(51.6%) were from the private institution (p=0.006), 149(66.2%) were females (p=0.006), 87(38.7%) were in the fourth year of the academic programme, and 85(37.8%) reported exposure to medical errors in the preceding year.

Students from the private institution demonstrated significantly more positive attitudes towards patient safety compared to their counterparts in the public sector with respect to receiving patient safety training (p=0.001), team functioning (p=0.002), error reporting confidence (p=0.001), working hours as an error cause (p=0.008), error inevitability (p=0.032), and patient involvement in reducing errors (p=0.038) (Table 1)

For the qualitative part, there were 12 interviewees; 6(50%) from each institution. From the private institution, the sample comprised the principal (P1), a medical educationist (lecturer, P2), a head of department (HOD) (professor, P3), a nursing team leader (P4), a fourth-year medical student (P5), and a fifth-year medical student (P6). From the public institutions, the participants included a medical educationist (professor, G1), two HODs (one professor [G2] and one associate professor [G3]), a nursing lecturer (G4), a third-year medical student (G5), and a fourth-year medical student (G6).

A total of three broad themes and recurring sub-themes were identified (Table 2, Figure).

The participants defined patient safety as measures taken to prevent harm to patients, including infection control.

Table-1: Comparison of key factors in relation to demographic variables (n=225).

Key Factors	Age groups		p-value	Gender		p-value	Academic year			p-value	Institute		p-value	Prior experience with medical error		p-value
	≤22 years (n=76)	>22 years (n=149)		Male (n=76)	Female (n=149)		3rd year (n=65)	4th year (n=87)	Final year (n=73)		Private (n=116)	Govt. (n=109)		Yes (n=85)	No (n=140)	
PS training received	4.33 -2	5 -2.33	U0.037	4.83 -2.34	4.67 -2	U0.978	4.33 -2	5 -2.34	4.33 -2.17	K0.748	5.33 -2	4 -2.33	U0.001*	4.67 -2.5	4.33 -1.95	U0.726
Error reporting confidence	5 -1.67	5.33 -2	U0.703	5 -2.33	5 -1.67	U0.897	5 -1.83	5 -2.33	5.33 -1.67	K0.354	5.67 -2	4.67 -2	U0.001*	5 -2	5 -1.67	U0.255
Working hours as an error cause	6 -1	6.33 -2	U0.281	6.67 -2.25	6 -2	U0.602	6 -2.33	6.33 -1.67	6.33 -1.67	K0.103	6.5 -1.67	6 -2.33	U0.008*	6 -2	6.33 -2	U0.546
Error inevitability	4.83 -1.33	5 -1.33	U0.913	5 -1	4.67 -1.33	U0.088	4.67 -1	5 -1	5 -1	K0.320	5 -1	4.67 -1.33	U0.032*	4.67 -1	5 -1.33	U0.993
Professional incompetence as an error cause	4.60± 1.11	4.51± 1.09	t0.507	3.35± 1.05	3.49± 1.12	t0.352	3.45± 1.01	3.27±1.18	3.65± 1.04	F0.088	3.17± 1.09	3.74± 1.02	t0.281	3.25 -1.75	3.75 -1.5	t0.302
Disclosure responsibility	4.67 -1.33	4.33 -1.33	U0.207	4.33 -1.66	4.33 -1.66	U0.645	4.67 -1.5	4.33 -1.66	4.33 -1.5	K0.840	4.33 -1.33	4.67 -1.66	U0.070	4.33 -1.66	4.33 -1.33	U0.373
Team functioning	6.25 -1.5	6 -2	U0.167	6.5 -2	6 -2	U0.382	6 -2	6.5 -1.5	6 -2	K0.304	6.5 -1.5	6 -2	U0.002*	6 -2	6 -1.5	U0.193
Patient involvement in reducing error	5 -2	5 -2	U0.644	4.5 -2.37	5 -2	U0.159	5 -2	5 -2	4.5 -1.5	K0.138	5 -2	5 -1.5	U0.038*	5 -2	5 -2	U0.356
Importance of PS in the curriculum	5.67 -1.33	5.33 -1.33	U0.052	5 -1	5 -1.33	U0.726	5 -1	5 -1.33	5.33 -1.66	K0.502	5 -1.33	5 -1	U0.284	5 -1.67	5.17 -1	U0.381

PS: Patient safety.

Median (interquartile range [IQR]), frequency (%), Mean ± standard deviation (SD) for continuous variables. : Mann-Whitney U test, χ: Chi-square test, t: Independent samples t-test, F: Analysis of variance (ANOVA) test, K: Kruskal-Wallis test, *p≤ 0.05.

Table-2: The themes and sub-categories that emerged from the indepth interviews (IDIs).

Themes	Sub-themes	Illustrative Quotes
Stance on Patient Safety	• Definition of patient safety (infection control, protocols) • Preventive measures	"Policies and procedures… how to prevent error whether it's medication or infection control." (G2)
Stance on Medical Errors	• Types of errors (clinical, record-keeping) • Causes (human factors, system issues, workload) • Barriers to reporting (fear, punitive culture)	"When you're overburdened… competency starts decreasing, judgement calls might get affected." (P1) "I myself committed medical errors; I haven't reported any of those." (P5)
Ways to Bring About Change	• Need for formal patient safety education • Error reporting systems (anonymity, independent committees) • Cultural shift (role models, whistle-blowing)	"In our medical education, we need to have formal teaching of ethics and legislation." (G1) "Teacher first of all becomes a role model of ethical practice." (P1)

G2 emphasised it as, "Policies and procedures (and) how to prevent error ... whether it's medication ... or infection control, or anything else".

Medical errors were perceived as unintentional, preventable, and often inevitable due to human factors. P3 categorised errors into those that can occur during history-taking, patient examination, treatment and medication, while P4 additionally included errors during filing and record-keeping. Causes included near-misses, lack of training, overburdened HCPs, and systemic shortcomings. P1 noted, "When you are overburdened, ... level of competency starts decreasing, although HCP is competent for the job. Judgement calls might get affected." G6 highlighted, "Maybe because our system is not too good. Maybe it is because of improper management in all public and private institutions. We need to make our system better."

The participants attributed minimal reporting of errors to job insecurity, fear of being blamed and defamed publicly, and a hostile work environment. P1 remarked, "The drawback of this is that there is no development of a proper system to address this problem. A facility is not developed, services are not developed, they do not evolve." P5 admitted, "I myself committed medical errors, I have not reported any of those, to be very honest. But, yes, I do have that guilt in me."

Penalties, such as loss of job and salary deductions, further discouraged error reporting, and being blamed and shamed publicly further exacerbated that fear. P4 mentioned that the penalty for committing errors was getting fired from one's post or in the form of a salary deduction, based on the severity of the error.

All the participants advocated in favour of formal patient safety education, starting as early as the first year, or when students had clinical exposure starting from the third year. G1 stated, "In our medical education, we need to have formal teaching of ethics, formal teaching of medical legislation, and rules currently being practiced in our country." Some suggestions also included case-based learning, role-plays, seminars, demonstrations, experiential learning, and skills-lab training on responsive dummies.

Anonymity in error reporting and independent review committees in hospitals were emphasised as essential to developing trust in the system. P5 suggested the presence of an independent committee for reviewing medical error cases in hospitals, devoid of bias and favours.

Cultural and behavioural changes were deemed critical to the task of bringing about a change in patient safety culture, requiring role models and whistle-blowers. G1 remarked, "We need to recognise them, appreciate them, and need to incentivise whistleblowing, too. By incentiving, I do not mean giving money, but it means that he/she should be appreciated and clapped for, that, yes, you have done the right thing." P1 stressed the need for ethical role models, stating, "Teacher first of all becomes a role model of ethical practice."

Discussion

The current study, to our knowledge, is the first in Pakistan to have explored attitudes and perceptions of students and HCPs regarding patient safety.

Students at the private institution demonstrated more positive attitudes than those at the public institution, similar to the findings reported by Arkam et al.[18] The students from both the institutions were satisfied with the trainings they were receiving on the topic of patient safety, which was an interesting finding because neither group received formal patient safety education. This mirrors findings from a study conducted in Hong Kong and Singapore.[7]

Most of the participants struggled to define "medical errors" and "patient safety" correctly, reflecting a lack of

structured training. Most participants relied on informal learning through clinical rotations, as no faculty in either institution had patient safety specialists. This gap underscores the need for formal curricula to address misconceptions and to deepen understanding.[5,19]

The domain of "team functioning" showed positive attitudes among students at both the institutions, with slightly higher positive attitudes in the private sector. This aligns with research conducted in Saudi Arabia, which highlighted the importance of teamwork and open communication in fostering a healthy patient safety culture.[19]

However, the domain "working hours as an error cause" showed positive attitudes in both the institutions, revealing concerns about working long hours and potential burnout. These results were in line with the study conducted by Hamid et al.[20] in which participants stated that long working hours, increased workload, and understaffing did not allow time for staff at hospitals to focus their energies on patient safety. As one HCP shared in the current study, "Judgement calls might get affected," pointing out that heavy workloads can lead to an increased risk of errors.

Error reporting confidence showed a stark contrast with respect to attitude between the two sets of student, with private-sector students scoring significantly higher. Similar significant differences were found between students of Hong Kong and Singapore.[7] Issues like punitive responses to error reporting and a "blame-and-shame" culture deter error reporting. P1 further elaborated that even though they had suggestion and complaint boxes placed all over the hospital, they had no idea what became of the complaints that were dropped in them.

The prevailing misconception that medical errors stem from individual failures rather than systemic issues needs to be addressed urgently. A dire need for implementation of a "formal and hidden curriculum" in the context of Pakistan is needed with targetted training for undergraduates and postgraduates, ultimately leading to the mitigation of errors.[6] The current participants called for role models and cultural shifts to address this. As G1 mentioned, there is a need for "role models and whistle-blowers" who take the plunge and report errors to kick-start the cultural change.

Majority of the participants agreed that patient safety education should begin early in medical school, maybe even when medical education begins. This was in line with global literature.[7]. Shah et al.[4] proposed that patient safety education should start from the third year of medical school in Pakistan.

The current study has a few limitations, including its non-probability sampling method for the qualitative part, and reliance on self-reported data. The results, as such, are not generalisable to all medical institutions across Karachi. Additionally, the use of Google Forms at one institution might have introduced bias, as students could look up patient safety concepts while responding. Lastly, as with all qualitative studies, the perceptions of participants regarding patient safety were not measured objectively.

Despite the limitations, however, the study highlights an urgent need for structured education, cultural reforms and supportive policies to improve patient safety in Pakistan, with special focus on disclosure responsibility, error reporting and misconceptions, which are elements stressed by Tussardi et al.[21] in their systematic review.

Conclusion

With advancing complexity in healthcare and a multi-disciplinary approach to treating patients, the aspect of patient safety has become critical. Students from private medical institution showed more positive attitudes towards patient safety compared to those in the public sector, and considerable knowledge gaps were apparent in the qualitative data.

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HH: Concept, design, data acquisition, statistical analysis, interpretation and drafting.
LAB: Data analysis, interpretation, supervision and final review.
ZA: Data analysis, interpretation, supervision, editing and final review.
AM: Data collection, statistical analysis and interpretation.