Impact of Primary Trauma Care Training In Karachi: A Quasi Experimental Study

Shireen Abdul Aziz Ramzanali,[1*] Dileep Kumar,[1] Shamsa Alnoor Kassam,[1] Kahkashan Tahir[2]

ABSTRACT

Objective To assess the impact of Life & Limb PTC training on trauma-related knowledge and clinical skills among healthcare workers in Karachi.

Study design This was a quasi-experimental study.

Place & Duration of study The study was conducted under the umbrella of Sir Syed College of Medical Sciences for Girls Karachi in different hospitals from November 2024 to November 2025.

Methods Different categories of healthcare providers including doctors, nurses, technologists and students related to these disciplines were enrolled in Primary Trauma Care (PTC) course. The knowledge of the participants of PTC course was assessed using a structured best choice questionnaire (BCQ) administered before and after the training. Clinical skills were evaluated through a standardized post-training skills assessment sheet. Descriptive statistics were used to compute demographic data. The Wilcoxon signed-rank test was applied to compare paired pre- and post-test knowledge scores, while post-training performance in skills stations was analyzed against predefined competency criteria and one-sample Wilcoxon signed-rank test was applied to the post-test results of the clinical skills part. A $p<0.05$ was taken as significant.

Results A total of 94 participants were included. There were 74 (78.7%) females and 20 (21.3%) males in the study. Most of the participants (n=52 - 55.4%) were doctors and undergraduate medical students. Median BCQ knowledge scores improved significantly following the training ($p<0.001$), demonstrating a gain in theoretical understanding. Post-training clinical skills assessment showed that most participants achieved competency in airway management, cervical spine protection, hemorrhage control, and structured trauma assessment. Overall, the training led to measurable improvement in both knowledge and skill performance.

Conclusion PTC training substantially enhanced participants' trauma-care knowledge and foundational clinical skills. The findings support integrating PTC-based capacity-building initiatives across healthcare facilities in Karachi to strengthen early trauma management and improve patient outcomes.

Key words Primary Trauma Care, Trauma training, Pre- and post-test, Clinical skills, Capacity building.

[1] Sir Syed College of Medical Sciences for Girls.
[2] Liaquat National Hospital Karachi

Correspondence:
Dr. Shireen Abdul Aziz Ramzanali [1*]
Department of Surgery, Sir Syed College of Medical Sciences for Girls Karachi
E mail: dr_shireenramzanali@yahoo.co.uk
ORCID ID: 0000-0003-4550-1709.

INTRODUCTION:

Trauma is a leading cause of morbidity and mortality in low- and middle-income countries (LMICs), and Pakistan is no exception.[1] Karachi, with its dense population and high incidence of road traffic injuries, faces a disproportionately large burden of unintentional injury and trauma-related deaths.[2] The trauma-care system of Karachi is disorganized with limited coordination between rescue services and

tertiary care hospitals. The facilities available for trauma victims in majority of these hospitals is far from satisfactory. In this context, empowering frontline healthcare providers through structured trauma training, is an urgent need. This has the potential to reduce preventable deaths and improve early management of injured patients.[3]

One promising approach for capacity building in resource-constrained settings is the Primary Trauma Care course, which was specifically developed for frontline health workers operating in low-resource environments. PTC offers a pragmatic, cost-effective alternative that emphasizes rapid assessment, basic resuscitation, and initial stabilization using minimal equipment. Prior systematic reviews in LMICs have demonstrated that PTC courses can significantly improve participants' knowledge, confidence, and procedural skills, though evidence on patient-centered outcomes remains limited.

In Pakistan, especially Karachi, the implementation of PTC has shown early promise. Number of workshops were held at different tertiary care hospitals in 2024.[4-6] The focus was on training participants in airway management, triage, pelvic stabilization, and basic life support skills. Additionally, hybrid courses like the Collaborative Advance Trauma Course (CATC) is being implemented in collaboration with an NGO to strengthen the interdisciplinary trauma management skills to improve fragmented trauma-care system.[7] Despite these encouraging educational outcomes, there remains a paucity of quasi-experimental evaluations in Karachi that systematically assess pre- and post-training changes, overtime. This study was done to provide an evidence based data on the subject.

METHODS:

Study design, place & duration: This quasi-experimental study was conducted at different hospitals and medical colleges of Karachi under the umbrella of Sir Syed College of Medical Sciences for Girls Karachi by Life and Limb primary trauma care team. This study was conduct from November 2024 to November 2025.

Ethical considerations: The Ethical Review board approval was obtained (SSCMS IRB letter No. 051). The written consent from all the course participants was taken.

Inclusion and exclusion criteria: Individuals who voluntarily agreed to participate and provided written consent, and attended full two days PTC training course including pre-test and post-test were enrolled. Those who participated in similar course within past three years were excluded. The PTC two days' course is available to all the healthcare workers including various cadres of doctors, undergraduate medical students, nursing faculty and students and technologists working at hospitals.

Sample size estimation: The sample size included all the participants (n=94), who consented taking PTC courses in Karachi (via invitation or application regarding PTC Course) during the study period.

Study protocol: The study design included a two sample group (pre-test and post-test) study for BCQS and one sample group (post-test) study for clinical skills. The participants completed pre-test and post-test multiple choice questions with one best answer (BCQ). Pre-test knowledge part had 20 sets of BCQS with five options. There was no negative marking. The participant were directed to complete same set of questions on day-2, as post-test knowledge part. The clinical skills that were taught on day-one were tested as post-test on day-2. A form was designed to collect demographic data and enter scores of the study participants.

Statistical analysis: Statistical analysis was conducted using SPSS version 20. Percentages and mean scores were calculated for both pre-test and post-test data. To determine significant differences between the pre-test and post-test scores of the knowledge part, the Wilcoxon signed-rank test for two related samples was applied, with a p-value of less than 0.05 establishing statistical significance. The one-sample Wilcoxon signed-rank test was applied to the post-test results of the clinical skills part.

RESULTS:

A total of 94 participants completed the questionnaire. There were 74 (78.7%) females and 20 (21.3%) males in this cohort. There were 52 (55.4%) surgeons, physicians and medical students, 32 (34%) nursing faculty and students and 10 (10.6%) technologists including students.

Total score of BCQs test was 20 marks. The mean total score before the course was 10.5 marks and after the course 15.75 marks. This showed a showed a statistically significant difference between the pre-course and post-course scores with $p<0.001$. Furthermore, 85 (90%) participants demonstrated an improvement in scores after the post-test (table I). Wilcoxon signed ranked (one sample) revealed that the post-clinical-skills test median score was 14 marks. The training improved

Table I: Pre-test and post-test BCQ scores					
	n	Mean	SD +/-	Z-value	p-value
Pre-test	94	10.5	1.6	-8.65	<0.001
Post –test	94	15.7	2.5		

Table II: Post-test Clinical Skills Scores			
n	Mean	Z-value	p-value
94	14	-6.08	<0.001

performance from additional supervised practice sessions. Details are given in table II.

DISCUSSION:

This pre–post test quasi-experimental study conducted in Karachi aimed to assess the impact of PTC training on the knowledge and clinical skills of healthcare providers (HCPs). The study design was particularly appropriate in low-resource settings where randomization may not be feasible, yet measurable improvement was essential to justify our training interventions. The hypothesized outcomes aligned with global evidence, suggesting that structured trauma courses improve both cognitive and psychomotor competencies, especially in emergency and trauma settings.

The findings of this study demonstrated a statistically significant improvement in the mean knowledge scores between pre- and post-training assessments. Similar studies from LMICs report 20–40% increases in knowledge immediately after PTC training.[8-10] the improvement may reflect increased familiarity with trauma protocols, airway management principles, shock assessment, and timely resuscitation practices. Furthermore, PTC's structured approach, focusing on systematic ABCDE assessment, prioritization of life-threatening conditions, and team communication, supports cognitive strengthening among participants.[11]

Clinical skill enhancement, measured through different stations such as airway management, cervical spine stabilization, hemorrhage control, and log-rolling techniques, is also expected to show notable improvement. Pre-training deficits in skills are common among HCPs in busy emergency departments, especially where workload overwhelms opportunities for hands-on education. The post-training results manifested an increased competency scores, better adherent to trauma protocols, and faster performance in simulated scenarios. These findings are consistent with regional literature demonstrating that structured PTC training leads to enhanced clinical performance and greater confidence among providers.[12] A study conducted by Jawed et al showed that there was a significant increase of participants' knowledge in post test results.[13] Furthermore, other studies had reported improvement in the mean score in post-test.[14,15]

In our study, all participants rated workshop to be highly informative and useful. Furthermore, the post-test part of the clinical skills was highly rated by the participants as reported earlier as well.[16] It is interesting to note that there was a remarkable increase in the knowledge of most of the participants, however, a small number of the course attendees secured less than 70% in clinical skills. This may be due to lack of one to one participant feedback by the facilitators during the course along with inadequacy of time for hands on practice of the skills during rotation on different work stations on day one. In order to overcome this problem one can increase the duration of the workshop along with increase in the number of demonstrations of clinical scenario with participants ensuring one to one involvement.

We advocate incorporation of structured PTC courses as a measure to foster continuous professional development. In addition, concept of working in team, having effective communication improve the outcome. By participating in such courses the healthcare providers learn rapid triage, and critical decision making skills.[17,18] In changing environment where frequency of trauma has increased and mass casualty incidents are more frequent specially in an urban setting, acquiring skills to effectively manage trauma victims can help in saving precious lives in an efficient manner.

Limitations of the study: This study is limited by its sample size. Furthermore, major proportion of the course participants were junior doctors and medical students. The junior faculty and senior consultants who are involved in teaching and training were few. Their participation can help in endorsing similar message to the junior doctors who are part of the teams working in the emergency room. The need of more clinical scenarios was also identified.

CONCLUSION:

The results highlight the significant improvement in both theoretical knowledge and clinical competency by participating in PTC course. It proved effective in enhancing trauma care skills among participants, demonstrating the value of PTC course in resource-limited settings.

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Authors' contributions:
Shireen Abdul Aziz Ramzanali (E mail: dr_shireenramzanali@yahoo.co.uk): Concept , data analysis, manuscript writing and revising.

Dileep Kumar (E mail: surgeonartooai@gmail.com): data collection

Shamsa Alnoor Kassam (E mail: shamsa2016@gmail.com): manuscript writing and revising

Kahkashan Tahir (E mail: kahkashan.tahir@lnh.edu.pk): data collection

All authors are responsible for the content of the manuscript.

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