

**A Hospital Based Cross Sectional Study to Evaluate the Impact of a Short-Term Training in Emergency and Trauma**Shanker Bharti<sup>1</sup>, Anjani Kumar Anjan<sup>2</sup>, Rajesh Narayan<sup>3</sup><sup>1</sup>Senior Resident, Department of General Surgery, Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India<sup>2</sup>Assistant Professor, Department of General Surgery, Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India<sup>3</sup>Associate Professor and HOD, Department of General Surgery, Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India

Received: 18-04-2023 / Revised: 10-05-2023 / Accepted: 21-06-2023

Corresponding author: Dr. Anjani Kumar Anjan

Conflict of interest: Nil

**Abstract****Aim:** The aim of the present study was to evaluate the impact of a short-term training in emergency and trauma in a tertiary teaching hospital in Bihar region.**Methods:** The present study was designed to effectively train the resident doctors, nursing staff and other health-workers posted in the casualty and emergency wards providing Emergency services at department of General Surgery, Bhagwan Mahavir institute of medical science, Pawapuri, Nalanda, Bihar, India for six months**Results:** The overall evaluation of pool A shows a pre-test mean of 38.72±0.92 revealing a low level of knowledge) which improved significantly to 72.18±0.90 post training (p value=0.0000).**Conclusion:** This study showed that this training is an adequate training programme to teach the basics emergency and trauma skills and been successful in increasing knowledge, despite the variations in the vision of different subject specialities.**Keywords:** Emergency, Trauma training, Capacity building, Bihar regionThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Organising doctors, nurses, and allied health staff to provide coordinated care for patients with complex needs requires effective teamwork. This is particularly true in emergency trauma settings where trauma teams are mobilised quickly and comprise of staff from numerous specialties. This team approach allows for the simultaneous completion of time critical tasks involved in the assessment and resuscitation of critically injured patients. [1] Whilst an organised and functional team response has been shown to improve trauma care [2], dysfunctional teams contribute to adverse events and poor patient outcomes. [3,4] These failures are attributed to human factors or deficits in non-technical skills of the teams. [5]

Teamwork can be enhanced through teaching multidisciplinary team members the essential elements of non-technical team work skills. [6] Although standard resuscitation courses acknowledge non-technical skills, no structured approach or acronym exists that concisely teaches non-technical skills. [1] The composition of the trauma team is generally directed by organisational

history and local culture. Although trauma team training is associated with early and effective interventions in trauma care [1,7], it is difficult to link the influence of trauma team work to these outcomes [2,8]; in particular, the key factors that influence team performance. Under-standing team members' perspectives of what contributes to highly reliable, multidisciplinary trauma teams is important to ensuring that the team progresses along the optimal course for patient safety.

Under-standing team members' perspectives of what contributes to highly reliable, multidisciplinary trauma teams is important to ensuring that the team progresses along the optimal course for patient safety. Team member experiences and perspectives are fundamental to informing future multidisciplinary emergency trauma resuscitation team training programs. The creation and maintenance of effective trauma resuscitation teams requires the interplay of training strategies that target team training and team interaction. Various studies has proven that team performance is dependent not only on

technical but nontechnical skills (teamwork, leadership, and task management) as well. [9-11] Clinical experience alone has not been associated with improved team performance; therefore, training programs are focusing on team dynamics during medical crises as a point of improvement.

The aim of the present study was to evaluate the impact of a short-term training in emergency and trauma in a tertiary teaching hospital in Bihar region.

### Materials and Methods

The present study was designed to effectively train the resident doctors, nursing staff and other health-workers posted in the casualty and emergency wards providing Emergency services at Department of General Surgery Bhagwan Mahavir institute of medical science, Pawapuri, Nalanda, Bihar, India for six months.

#### Course settings

- EMOs, Resident doctors (senior and junior), Hospital Administration residents, Technicians and Nursing staff posted in Casualty and Emergency wards comprised Pool A.
- Ward boys, sanitation staff and security guards posted in Casualty and Emergency wards comprised Pool B.
- The hands-on mandatory training of one and half days for Pool A and half a day for Pool B candidates.
- Pre-test questionnaire to be completed before the course.
- Post-test questionnaire to be taken by all candidates. 75% marks in post-test was mandatory to be successful

The training was conducted under the guidance of corresponding author who is an ATLS Course Director and Emergency Incharge with the support from faculties from various broad specialities as Master Trainer of NASG, Obstetrics & Gynaecology, Forensic Medicine and Toxicology, BLS & ACLS Instructor, PALS & ATLS Provider, Anaesthesiology, ATLS Instructor, Paediatric Emergency Expert, Paediatrics, ATLS Provider, Orthopaedics, ATLS Instructor, General Surgery and from General Medicine.

Course content-interactive discussion topics

#### Pool A

- ATLS protocols
- Medical Emergencies: Basic Management
- Paediatric Emergencies: Basic Management
- Medico-legal guidance
- Haemorrhagic shock in Obstetrics
- Ethics and Counselling

#### Pool B

- Supportive Role of Ancillary Staff
- Armamentarium check-up
- Patient Shifting
- Security protocols

#### Skill stations

##### 1) Airway

- Adult and Paediatric
- Cricothyroidotomy- needle & surgical

##### 2) Breathing

- Needle decompression/ ICD insertion
- Helmet removal
- Cervical collar application

##### 3) Circulation-1

- Haemorrhage control
- Venous access

##### 4) Circulation -2

- Pelvic stabilization
- Splintage
- Log roll

##### 5) Circulation -3

- 4 T demonstration
- Balloon Tamponade
- NASG

##### 6) Disability

- GCS scoring
- Ryle's tube insertion
- Catheter insertion

##### 7) Medicolegal Documentation

- Taking a sample in poisoning
- Documenting injuries
- Foreign body retrieval protocols

#### CPR skills

Pretest (as MCQs) was taken by all the candidates of pool A at the time of registration and evaluated during the course to ascertain their basic knowledge. Post-test questionnaire was taken by all the candidates of pool A at the end of the course. Feedback regarding the course was received with the help of predesigned google forms which were circulated among the candidates after 3 months of their respective courses.

Pool B was delivered with well-organized lectures on the roles and responsibilities, patient shifting protocols, security protocols and armamentarium checkup viz. monitors and attachments, suction, trauma trolley functioning. Counselling and motivating sessions were carried about the sense of team, role of leader and effective communication.

#### Participant selection

Total of 120 participants attended the training course collectively in two courses. 70 candidates in pool A and 50 candidates in pool B.

Candidates in pool A came from various broad specialities including general surgery, general medicine, emergency medicine, orthopaedics, paediatrics, obstetrics and gynaecology, nursing staff and emergency technicians. Pool B comprised of ward boys, sanitation staff and security guards posted in casualty and emergency wards.

#### Data analysis

**Table 1: Distribution of candidates in pool A and pool B**

| Department                 | Academic resident (DNB trainee senior residents) | Non-academic resident (postMBBS) |
|----------------------------|--|----------------------------------|
| General medicine           | 4  | 5                                |
| General surgery            | 4  | 5                                |
| Orthopaedics               | 4  | 3                                |
| Paediatrics                | 4  | 3                                |
| Obstetrics and gynaecology | 4  | 5                                |
| Emergency medicine         | 0  | 10                               |
| Emergency medical officer  | 6  |                                  |
| Nursing staff              | 10   |                                  |
| Emergency technicians      | 4  |                                  |
| Pool B                     | 50   |                                  |

All the departments were evaluated individually too. Department of surgery, orthopaedics, emergency medicine, internal medicine and EMOs scored higher though differences were there.

**Table 2: Participant test scores and analysis**

| Department                 | No. of participants | Paired t-test |            | P value |
|----------------------------|---------------------|---------------|------------|---------|
|                            |                     | Pre-test      | Post-test  |         |
|                            |                     | Mean±S.E.     | Mean±S.E.  |         |
| General medicine           | 9                   | 38.52±1.16    | 72.48±1.5  | 0.0000  |
| General surgery            | 9                   | 48.72±0.54    | 82.50±2.34 | 0.0000  |
| Orthopaedics               | 7                   | 43.37±1.66    | 75.00±1.72 | 0.0000  |
| Paediatrics                | 7                   | 34.56±1.25    | 68.32±2.42 | 0.0000  |
| Obstetrics and gynaecology | 9                   | 32.00±1.81    | 64.00±1.84 | 0.0000  |
| Emergency medicine         | 11                  | 36.54±1.52    | 74.86±1.58 | 0.0000  |
| EMO                        | 5                   | 36.00±2.44    | 72.48±3.08 | 0.0001  |
| Nursing staff              | 10                  | 32.00±1.30    | 68.52±1.95 | 0.0000  |
| Emergency technicians      | 3                   | 30.00±2.00    | 70.00±2.00 | NA      |
| Total                      | 70                  | 38.72±0.92    | 72.18±0.90 | 0.0000  |

The overall evaluation of pool A shows a pre-test mean of 38.72±0.92 revealing a low level of knowledge) which improved significantly to 72.18±0.90 post training (p value=0.0000).

#### Discussion

The residents and health-workers working in Emergency area need better training to handle emergency patients with utmost sincerity and accurate clinical skills. There has been increasing interest in developing interdisciplinary teams in the emergency that actively involve health care professionals as they possess a diverse range of highly trained skills that can help to speed up and enhance the patients' throughput. [12] To achieve

Data variables collected included basic participant demographics, pre-test and post-test scores and course evaluation survey responses. STATA version 13 software was used for the statistical analysis. Analysis of variance (ANOVA) and paired t-test was used to assess the pre-test/post-test difference among the groups and evaluate the changes in the candidates' mean test scores before and after training respectively.

#### Results

the same, it is imperative to train them on simulation models (manikins) and prepare them to perform their duties with higher confidence and better skills. Trauma cases comprise the major input of patients in any casualty department. To handle these patients, team work between different speciality residents and nursing staff is mandatory. Also, our ward attendants, sanitation workers and security personnel play an important role in managing these patients effectively.

While teamwork practices are commonly addressed in the literature, factors that influence teamwork during real life trauma resuscitations are not clearly defined. [1,13] One of the major team-work

challenges was the changing team dynamics resulting from new members constantly joining the trauma team. This 'flash' team composition made teamwork especially challenging for the participants in an emergency. Our findings suggest that creation and maintenance of effective trauma teams involves interplay of strategies that target team training and team interaction. As flash teams are a reality in our current health care system, we suggest a new approach to training whereby the multidisciplinary team trains together using simulation, rather than the disciplines and groups of specialists that make up the team being trained separately. Trauma resuscitation requires designated leadership over a multidisciplinary group of highly differentiated personnel, to function effectively. Participants viewed effective leadership as facilitating the integration of expertise from across the varied specialists that make up the team. The resuscitation leader was seen to be the catalyst for teamwork and leadership was identified as having significant impact on trauma care. [14-17] But trauma resuscitation can pose a challenge for some leaders as it involves the interplay of team interaction in unpredictable time critical situations. The trauma management context requires urgent coordination of cognitive, task and systems-based resources, but participants identified that leaders need to focus on more than task performance and encourage contributions from each team member's unique discipline or speciality.

A quickly constructed specialty team with unstable membership, will not transform naturally into an expert trauma team. The creation and maintenance of effective trauma teams requires training strategies such as multidisciplinary simulation that target team training and team interaction. Specifically, training should focus on developing non-technical skills for resuscitation trauma teams that have to form quickly and function effectively, often having never met before. [18] The short-term training done was found to have dramatic improvement in knowledge as reflected by the post test score and simultaneously the participants felt much confident about it. Emergency and trauma management needs a multidisciplinary approach. Usually, the skills and procedures are taught by silo method that more experienced members pass the skills to youngsters only in their field, which restricts their exposure to comprehensive approach.<sup>19</sup> The comprehensive approach from various departments at a common platform made a better understanding and built the guts to combat the challenges posed by different clinical situations. Though the lectures increase the knowledge but the inclusion of the hands-on training increases the psychomotor reflexes and skills, thus better outcomes. It has been equally suggested by the national stop the bleed (STB) campaign implemented in 2015 to provide haemorrhage control education to non-

medical providers. Participants who engaged in hands-on practice for tourniquet and wound packing were more proficient than those who only saw the lecture. [20] Similarly Ghazali et al did a randomized controlled trial design was conducted in ten emergency department of public hospitals, to identify the effect of triage training on the skills and accuracy of triage decisions for adult trauma patients and found a significant effect on the skill of triage and accuracy of triage decisions. [21]

With the increasing incidences of aggressive and violent environment in the emergencies, it's been suggested by various studies that the security interventions must be done and documented in the clinical notes of the patients.<sup>10,11</sup> But along with the documentation a tactical and compassionate handling is an utmost need of the time. The training was successful to aware the ancillary staff and security persons about their roles and responsibility and they felt more confident and were well recognized as a team member post-training.

### Conclusion

This study showed that this training is an adequate training programme to teach the basics emergency, trauma skills and been successful in increasing the practical oriented knowledge despite the variations in the vision of different subject specialities. A comprehensive approach as this platform provided, will definitely help in the coordination and thus improved patient outcome. Yet, the capacity building is a continuous process and requires more number of such structured courses' training like ATLS, ACLS and PALS. For better implementation, routine mock drills and direct observation of procedural skills (DOPS) is a better modality.

### References

1. Murphy M, Curtis K, McCloughen A. What is the impact of multidisciplinary team simulation training on team performance and efficiency of patient care? An integrative review. *Australasian emergency nursing journal*. 2016 Feb 1;19(1):44-53.
2. Murphy M, Curtis K, Lam MK, Palmer CS, Hsu J, McCloughen A. Simulation-based multidisciplinary team training decreases time to critical operations for trauma patients. *Injury*. 2018 May 1;49(5):953-8.
3. Yates AR, Blankenship AC, Schwartz RM, Fernandez RP. Multidisciplinary review of cardiopulmonary arrest in a heart center. *Pediatr Crit Care Med*. 2013;14(5): S103.
4. Pucher PH, Aggarwal R, Twajj A, Batrick N, Jenkins M, Darzi A. Identifying and addressing preventable process errors in trauma care. *World J Surg* 2013;37(4):752-8.
5. Carne B, Kennedy M, Gray T. Review article: Crisis resource management in emergency

- medicine. *Emerg Med Australasia*. 2012;24(1):7–13.
6. Boet S, Etherington C, Larrigan S, Yin L, Khan H, Sullivan K, Jung JJ, Grantcharov TP. Measuring the teamwork performance of teams in crisis situations: a systematic review of assessment tools and their measurement properties. *BMJ quality & safety*. 2019 Apr 1;28(4):327-37.
  7. Härgestam M, Lindkvist M, Jacobsson M, Brulin C, Hultin M. Trauma teams and time to early management during in situ trauma team training. *BMJ open*. 2016 Jan 1;6(1):e009911.
  8. Welp A, Meier LL, Manser T. The interplay between teamwork, clinicians' emotional exhaustion, and clinician-rated patient safety: a longitudinal study. *Critical Care*. 2016 Dec; 20:1-0.
  9. Cooper S, O'Carroll J, Jenkin A, Badger B. Collaborative practices in unscheduled emergency care: role and impact of the emergency care practitioner—quantitative findings. *Emerg Med J*. 2007;24(9):630-3.
  10. Ummerhofer W, Amsler F, Sutter PM, Martina B, Martin J, Scheidegger D. Team performance in the emergency room: assessment of inter-disciplinary attitudes. *Resuscitation*. 2001;49(1):39-46.
  11. Pennington KM, Dong Y, Coville HH, Wang B, Gajic O, Kelm DJ. Evaluation of TEAM dynamics before and after remote simulation training utilizing CERTAIN platform. *Med Educ Online*. 2018;23(1):1485431.
  12. Saxon RL, Gray MA, Oprescu FI. Extended roles for allied health professionals: an updated systematic review of the evidence. *Journal of multidisciplinary healthcare*. 2014 Oct 13:479-88.
  13. Courtenay M, Nancarrow S, Dawson D. Interprofessional teamwork in the trauma setting: a scoping review. *Human resources for health*. 2013 Dec; 11:1-0.
  14. Ford K, Menchine M, Burner E, Arora S, Inaba K, Demetriades D, et al. Leadership and teamwork in trauma and resuscitation. *Western J Emerg Med* 2016;17(5):549–56.
  15. Yeung JHY, Ong GJ, Davies RP, Gao F, Perkins GD. Factors affecting team leadership skills and their relationship with quality of cardiopulmonary resuscitation. *Crit Care Med* 2012;40(9):2617–21.
  16. Sakran JV, Finneman B, Maxwell C, Sonnad SS, Sarani B, Pascual J, et al. Trauma leadership: does perception drive reality? *J Surg Educ*. 2011;69(2):236–40.
  17. Hargestam M, Hultin M, Brulin C, Jacobsson M. Trauma team leader's non-verbal communication: video registration during trauma team training. *Scand J Trauma Resusc Emerg Med*. 2016;24(1).
  18. Murphy M, McCloughen A, Curtis K. The impact of simulated multidisciplinary Trauma Team Training on team performance: A qualitative study. *Australas Emerg Care*. 2019; 22(1):1-7.
  19. Kunac A, King NA, Ostrovsky I, Rytzarev D, Merchant AM, Murano T. The Impact of Interdisciplinary Education on Skills and Attitudes of Surgery and Emergency Medicine Residents. *Surg J N Y N*. 2019;5(1):18-24.
  20. Zwislewski A, Nanassy AD, Meyer LK, Scantling D, Jankowski MA, Blinstrub G, et al. Practice makes perfect: The impact of Stop the Bleed training on hemorrhage control knowledge, wound packing, and tourniquet application in the workplace. *Injury*. 2019;50(4):864-8.
  21. Ghazali SA, Abdullah KL, Moy FM, Ahmad R, Hussin EOD. The impact of adult trauma triage training on decision-making skills and accuracy of triage decision at emergency departments in Malaysia: A randomized control trial. *Int Emerg Nurs*. 2020; 51:100889.