

Improving Knowledge, Skill and Confidence of Novice Medical Doctors in Trauma Management with Principles of ABCDE

Shrestha R,¹ Khadka SK,¹ Thapa S,¹ Shrestha B,¹ Shrestha SK,² Ranjit S,³ Pradhan BB,³ Shakya YR,⁴ Lama D,⁵ Shrestha J⁶

¹Department of Orthopedics

²Department of Emergency Medicine

³Department of Anesthesia

⁴Department of Surgery

Dhulikhel Hospital, Kathmandu University Hospital, Kathmandu University School of Medical Sciences Dhulikhel, Kavre, Nepal.

⁵Department of Surgery

Armed Police Force Hospital, Kathmandu, Nepal.

⁶International Committee of the Red Cross (ICRC), Kathmandu, Nepal.

Corresponding Author

Rohit Shrestha

Department of Orthopedics

Kathmandu University School of Medical Sciences

Dhulikhel, Kavre, Nepal.

E-mail: rohitshrestha79@gmail.com

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ABSTRACT

Background

Trauma is one of the major public health concerns claiming about five million death annually worldwide. Experience and confidence of a doctor in the management of trauma patients have big impact on the overall outcome.

Objective

This study aims to evaluate the outcome of a trauma course in improving the knowledge, skill and confidence of novice doctors in managing trauma victims.

Method

A pre/post test analytical study was carried out among novice medical doctors from Kathmandu University School of Medical Science (KUSMS) who participated in a standard two and a half day trauma course, that utilizes the principles of ABCDE, as a part of their regular training. Pre-course knowledge and skill were compared with immediate post-course scores on the same guidelines. Objective structured and subjective written feedbacks from the participants were analyzed qualitatively to identify the perceptions of candidates.

Result

Sixty-eight males and twenty-nine females completed the course. The average pre-test scores in knowledge and skill were 8.3(33.2%) and 19.6(78.5%) respectively. Similarly the post-test scores were 16.04(64.2%) and 22.45 (89.5%) respectively, showing statistically significant improvements (P 0.000). The mean percentage improvement in knowledge was 48.8% and that in skill was 160.9%. The feedback analysis showed majority of the participants were satisfied with the course and they perceived improved "self-confident" in handling trauma cases.

Conclusion

All the novice doctors should participate in a standard trauma course hence their knowledge, skill and confidence in handling a trauma can be improved.

KEY WORDS

Emergency room trauma course (ERTC), Interns, Knowledge and skill, Principles of ABCDE, Simulation, Skill stations, Trauma, Trauma course

INTRODUCTION

Trauma is one of the major public health concern, claiming about five million deaths annually worldwide.^{1,2} The initial resuscitation makes a huge difference in the outcome of the trauma victims.³⁻⁷ The young and recently passed doctors are usually in the first line to treat the victims of trauma in our setting. As every year many medical doctors graduate and come to the clinical practice, it is helpful to have some form of intensive Trauma Life Support courses to improve the management of trauma victims.

Emergency Room Trauma Course (ERTC), is one of the standard courses that is based on basic principles of airway breathing and circulation (ABC) management in the initial stage to stabilize a trauma victim.⁸ Adapted version of ERTCs are regularly being organized in our institution for novice medical doctors since 2012, so that all the doctors graduating from Kathmandu University School of Medical Sciences (KUSMS) are well trained and are capable of handling trauma cases efficiently.

However, whether this course has helped our students improve their management skill on trauma victims has not been studied. Hence, we have assessed the outcome of the course in improving the knowledge, skill and confidence of the novice doctors in managing trauma victims.

METHODS

A prospective, quantitative (pre and post test analysis) and qualitative study was carried out at KUSMS, during the successive twelfth to sixteenth batch of the courses from 2017 February to 2017 December after obtaining ethical clearance from the Institutional Review Committee and consent received from each participant for relevant data to be used in research purposes. Each batch comprised about twenty novice doctors from KUSMS. For our purpose of study, novice doctors were defined as medical interns who have successfully completed their final medical examination and at the moment working under supervised clinical practice. The doctors who had completed their internship and students who attended the course were excluded from the study.

The course was conducted in its usual and standard format comprising of lectures, skill stations, group discussion, simulation of clinical scenarios and tabletop drills. (Annex 1 – Agenda of the course) There were pre-test and post-test for each participant comprising assessment of knowledge by 25 Multiple Choice Questions (MCQ) which were standardized and validated by International Committee of the Red Cross (ICRC) Geneva. Skill was assessed with Objective Structured Clinical Examination (OSCE) over a simulated patient moulage and pre designed checklists amounting to 25 marks total. The OSCE checklist was initially piloted on 20 candidates; and the shortcoming and confusions were cleared in the faculty meeting and

final agreed version was used for research purpose. The scenarios and checklist were previously discussed among all the faculties and consensus was obtained. The pre-test and post-test utilized the same 25 MCQs but arranged in different sets of randomly arranged questions. Evaluation of the skill with OSCE was done by an external faculty who did not know the candidates personally over one of the five standard clinical scenarios along with the checklists to assess the skill. The weightage of evaluation was equally distributed on knowledge, (25 marks for MCQs) and on skills (25 marks on the OSCE). At the end of the course, the participants were given opportunity to provide their written feedback on predesigned format. There were seven objective structured questions to be responded on 5 point Likert's scale and five open ended questions regarding improvement on their level of confidence and various other aspects of the course.

The relevant data was stored in Microsoft Excel until five batches of courses were conducted encompassing complete batches of KUSMS medical interns during the study period. The data was finally analyzed with SPSS 20.0. Pre-test results were compared with respective post test results with paired t-test and p value less than 0.05 was considered significant. Participants' responses on open ended questions were analyzed according to the principles of qualitative research.

RESULTS

One hundred and six candidates participated in five sequential courses. Nine participants, including two senior doctors and seven students, were excluded from the study. Total of ninety-seven candidates (68 males and 29 females) were included for final analysis.

Statistically significant improvements among the participants could be observed in both knowledge and skill after the trauma course. On the average, the improvement observed in mean post-test score in knowledge was almost one and a half times that of the pre-test scores and in skills it was almost two and a half times more. (Table1)

Table 1. Scores in Knowledge and Skill assessment during Pre-test and Post-test

Marks (out of 25) (Percentage)	Average Pre Test	Average Post Test	P Value (Paired T Test)
Knowledge Assessment (MCQ)	16.04 (64.2%)	22.45(89.8%)	0.000
Skill Assessment (OSCE)	8.3 (33.2%)	19.64 (78.6%)	0.000

Objective structured feedback showed that the participants had mostly positive impression about the course. (Table 2) The finding was supplemented on subjective feedback, where majority of the participants clearly mentioned that

Table 2. Objective structured feedback from participants on Likert's Scale.

Parameters (N = 69 respondent)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
My Confidence Level Improved	41	27	1	0	0
Lectures Were Effective	21	46	1	0	1
Time Allocated for Practicles Were Adequate	7	48	2	12	
Knowledge And Skill Training Were Adequate	51	15	2	0	1
Pre And Post Tests (Both Theory & Practical Tests) Should Be Done	40	27	2	0	0
Logistics And Management Of The Course Was Good	17	50	2	0	0
It Was Waste Of Time Attending The Course	1	7	6	28	27

they felt the course was useful and it helped them gain confidence in handling trauma cases systematically.

Some of the comments made by participants were:

"... I found it very good, in fact, it reinforced on ABCDE principles which I knew beforehand but hadn't applied. Now I am confident I can approach any trauma patient systematically and methodologically..." Participant number 11.

"... bits and pieces of information was already there (with us) but this course made all those things very systematic and practical..." Participant number 20

"... it taught me that there is a vast difference between knowing what to do and actually doing it in clinical life..." Participant number 22

Another aspect of the course appreciated by the participants was the group work and table-top drill on disaster preparedness included as an extension into the trauma course.

"... Interactive lesions and use of simulations were good and easier to learn." Participant 23.

"...the simulation cases were the main highlight of this course. This builds our confidence. It taught us the importance of preparedness, quick action and more importantly the team-work. ..." Participant 29

"... letting us think and plan in case of Mass Causality Incidence provided better insight and can be useful in future (when need arise) ..." Participant 32

Two participants felt that the course did not add much in their existing knowledge or skill; they felt the lectures were lengthy and tedious. Majority of the participants liked the practices, skill stations and clinical simulations more.

"... lectures should be reduced and duration of the course should be increased and more practical sessions should be included..." Participant number 63

Some participants felt inclusion of some hands on skill like assessing surgical airway and chest tube insertion would have made the course even better while others were more concerned about the administrative and logistic issues like provision of more coffee breaks and better lunch and hands-out materials.

On the whole, (95, 97.9%) participants said they met their expectations and commented that the course gave them an opportunity to approach a trauma victim in simple and systematic way.

DISCUSSION

This standard trauma course with simulation exercises designed for novice doctors help freshen-up their knowledge, prepare them to work in a team and enhance their skill and confidence required to resuscitate a trauma victim in real life scenario.

Advanced Trauma Life Support (ATLS) is a gold standard course developed by American College of Surgeon to deliver uniformly good trauma care for treating severely injured trauma patients in developed counties.⁹ ATLS talks the management of an injured patient in an ideal situation where all the facilities and resources are available. However, the feasibility and practicality of this approach in Low Medium Income Countries (LMICs) is less evident. Barriers include the lack of organized health care infrastructures, human resources, funding and trauma management education.^{10,11} Despite the lack of facilities in developing or underdeveloped countries, the medical approach should be the same.

Emergency Room Trauma Course (ERTC) is one of the standard trauma courses designed and being implemented worldwide by International Committee of the Red Cross (ICRC). ERTC is actually a philosophy which helps freshly graduated medical personnel and the specialist emergency room physicians, surgeons, orthopedicians and anesthesiologists identify, prioritize and save the lives of severely injured people with the use of the principles of airway, breathing and circulation (ABC). The primary aim of this course is to make the participants familiar with different situations potentially fatal to life and focus on the stabilization of the patient before proceeding into definitive management. ERTCs are conducted all over the world where ICRC is present and where there is the actual need, like in conflict zone and area of unrest. ERTC is based on applying the ABC principles in less optimal circumstances with limited resourced conditions sometimes even working in hostile environments.⁸ Although, we had received positive remarks from the participants, we did not have a concrete

evidence to support the continuation of the course. This study provided the support for need and effectiveness of the ERTC for novice doctors.

We had male participants almost two times more than the female participants, which might be attributed to two issues. Firstly, the current status of medical education is still dominated by males in general in MBBS and secondly, female doctors need to be encouraged more in leading management of trauma victims. This hypothesis is also supported by the fact that there are lesser numbers of female surgeons and even scarce lady orthopedic surgeons. Nogaró et al. reported similar trend of male dominance in medical field (3:1) and need of encouraging more ladies to come into surgical stream in developing countries in east, central and south African countries.⁶

The current study shows the effectiveness of the course in improving knowledge and skills of the participants as evident by significant improvements in respective pretest versus post-test scores. The average baseline pretest score in knowledge test was much higher (almost double) than in the skill test. This showed most of the participants were aware of the theoretical aspect of trauma management however, lacked in the practical aspect. Although the improvement in both knowledge and skill is evident but the average post test scores of skill test is still less compared to knowledge test. This might point to the fact that learning the practical skills requires more time, dedication and practice. This observation is consistent with that of study done by Wanjiku et al. in Kenya, who also emphasize, simulation as a key tool for the effective teaching of a student trauma course in developing country.⁴ The higher percentage improvement in simulation based practical test was merely due to very less average pre-test scored in the same owing to greater gap in pre and post test scores.

The “self-perceived” confidence developed among the participants according to objective structured and subjective feedback analysis is an encouraging fact. We believe this represents a gross measure of a candidate’s self-efficacy. However, these measures of “confidence” should not be taken as a measure of clinical competence or performance as some studies have demonstrated that confidence levels have poor predictive value in clinical performances.¹² Nevertheless, study by Bandura A et al. has shown that higher the confident participants feel, more is the likelihood that they would apply what they have learned into practice.¹³

One limitation the current study suffers, is that it analyzed only the immediate outcome and confidence built up in the participants. A longitudinal study, following the participants who have taken the course, and seeing how the course has changed their behaviors in managing the trauma victims efficiently would have given a better insight into the long term impact of participating in the course and hence overall improvement in the trauma care management.

With all the evidences so far, it seems logical to recommend that the course should be integrated in the curriculum of the medical students. This will allow all the novice doctors get opportunity to go through the course before they practice independently to handle trauma patients.

CONCLUSION

The ERTC is an effective way to update the knowledge and improve skills in novice doctors to manage trauma victims. The freshly graduated medical doctors should be encouraged to participate in such standard trauma course which include theoretical and practical real life scenarios thus developing his/her overall confidence in managing a trauma victim.

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Annex 1. Agenda of The Course

Emergency Room Trauma Course (ERTC) - Program Schedule

Day I

Pre Test : 8:00 to 9:00

- A. Practical : Simulated Patients (Case Scenario) : 10 Participants then rotate
- B. MCQs : 10 Participants then rotate.
- Introduction to the Trauma course (15mins) 9:00 – 9:15
- Initial Assessment and Principles of ABCDE (30 mins) 9:15 – 9:45

Demonstration/ Role Play

- (Correct way of Patient evaluation) (15 mins) 9:45 – 10:00
- Assessment and Management of Airway (30 mins) 10:00 – 10:30
- Patient in Shock (30 mins) 10:30 - 11:00
- Chest Trauma (30 mins) 11:00 – 11:30
- Abdomen & Pelvis Trauma (30 mins) 11:30 – 12:00
- Spine Trauma (30 mins) 12:00 – 12:30

LUNCH (12:30 TO 13:00)

Practical Station 45 min each:

- Station 1 : Airway : Basic and Advanced Airway along with Video: – Cricothyroidotomy
- Station 2 : Shock : Discussion with case scenario and Intra Osseous
- Station 3 : Chest Tube Insertion : Case Scenarios and Video Demonstration and Discussion
- Station 4 : Abdomen : FAST examination and DPL Video Demonstration and Discussion.
- Station 5 : Logrolling and C spine immobilization, Secondary survey with Myotome and Dermatome evaluation

Review of the day and Closure : 17:00

Day II 8:00 AM

- Head Injuries (30 mins) 8:00 - 8: 30
- Trauma in Pregnant women (30 mins) 8:30 - 9:00
- Burn and Cold injuries (30 mins) 9:00 - 9:30
- Pediatric Trauma (30 mins) 9:30 - 10:00

Tea Break 10:00 – 10:15

- Limb Trauma (30 mins) 10:15 – 10:45
- Movie: Wound Debridement (30 mins) 10:45 – 11:15
- What happens when there is NOT Triage! (15 mins) 11:15 – 11:30
- Triage (30 mins) 11:30 – 12:00
- Movie : Ballistic injuries (30 mins) 12:00 – 12:30

Lunch (12:30 to 13:00)

- Station 1 : Head (Simulation exercises with attention to head injuries) 45 min
- Station 2 : Limb Splint (Upper extremity : LAS, U Slab, Thomas Splint)45 min
- Station 3 : Helmet Removal and CT Scan Discussion
(Video + Demonstration in a dummy model + CT Scan discussion) 45 min
- Station 4 : C Spine and LS Spine X ray Discussion 45 min
- Station 5 : Triage : Case Scenario 45 Min

Review of the day and Closures : 17:00

Day III, 8:00 AM

MCI (30 mins) 8:00 to 8:30

- Table Top Drill (Team work)
- i. Workshop (60 mins) 8:30 to 9:30
- ii. Presentation and Discussions (60 mins) 9:30 to 10:30

Tea break

Simulation Exercises on Case Scenarios (Team Work) : 4 parallel sessions, 5 person in each group, rotate every 30 min => 2

Hrs

Lunch Break (1 to 2 PM)

Post Test

- C. Post Test (Practical) : Simulated Patients (Case Scenario), 10 Participants
- D. Post Test (MCQs) : 10 Participants and then rotate.

Objective Structured and Subjective written Feedback from participants followed by answers discussion

Closing Ceremony with Certificates Distribution and vote of thanks.