

# The teaching of trauma management in undergraduate medical education

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## SUMMARY

**Background:** The teaching of trauma in medical schools faces many educational and logistic challenges. Issues on what to teach, how to teach, when to teach, who will teach and whether medical students with insufficient exposure to clinical medicine can benefit from a trauma course are unclear.

**Materials and Methods:** A well-designed one day intensive trauma course concentrating on the primary survey was taught to semester seven and semester eight students by a multi-disciplinary team comprising of surgeons, anaesthetists, emergency physicians and trained medical officers. The course comprised of a pre-test of 30 multiple choice questions followed by three hours of lectures, three hours of skill stations and a post-test. The pre-test and post-test scores were analysed using the paired sample t-test and the independent t-test.

**Results:** The pre- and post-test scores showed significant improvement for both semester seven and semester eight students. Semester seven students, who only had a seven-week posting in Surgery had pre-test and post-test scores of only 4% less than semester eight students who had an additional six weeks in Orthopaedics and two weeks in Accident and Emergency postings. The use of a multi-disciplinary team reduced the logistic burden of finding sufficient surgeons to teach trauma management.

**Conclusion:** Trauma education can be taught to undergraduates by a multidisciplinary team as early as year three, in semester seven. However, the mean score of semester eight students is only at 66%, suggesting that a refresher course prior to graduation at semester ten will be useful.

## KEY WORDS:

*Trauma; Undergraduate; Medical; Education; Teaching*

## INTRODUCTION

The teaching of trauma evaluation and management is one of the most neglected areas in undergraduate medical education in most medical schools in the world. The first report of the United Kingdom (UK) major trauma outcome study in 33 British hospitals showed that approximately 60% of cases of severe trauma with an Injury Severity Score of greater than 16 were managed by junior medical doctors.<sup>1</sup> It

was therefore no surprise that the study found great variation between hospitals in terms of timely operations and mortality. In addition, it was noted that mortality for blunt trauma was generally higher in UK hospitals than comparable hospitals in the United States.<sup>1</sup> Several authors have drawn attention to the inadequacy of trauma training in the undergraduate curriculum but little progress has been made by most medical schools.<sup>2,3</sup> A study among medical students in the UK reported on their awareness of the severe inadequacy of training in trauma medicine. Their desire to have more trauma teaching prior to graduation has led to student-initiated trauma conferences in some medical schools.<sup>4</sup>

The teaching of trauma in medical schools faces many educational and logistic challenges. The educational issues include the requirement for students to have sufficient prior knowledge of basic science, surgical principles, diagnostic skills, maturity to be able to prioritise and make rapid decisions in a systematic and safe manner. The logistic issues revolve around teaching a large number of medical students, curriculum time, space and scarcity of surgeons to teach. The emphasis on patient safety and work preparedness compels us to find a solution to the problem of trauma training in medical schools.

Issues on what to teach, how to teach, when to teach, who will teach and whether medical students with insufficient exposure to clinical medicine can benefit from a trauma course are unclear. This paper attempts to clarify these issues from our experience in conducting a Basic Trauma Life Support (BTLS) course in the International Medical University, Malaysia since 2012.

## MATERIALS AND METHODS

This is a retrospective cohort study conducted in the International Medical University (IMU) among 168 medical students in semester seven and semester eight from 2012-2013. The medical course in IMU is a five-year course spread over 10 semesters of six months each. Semester seven students are at the middle of their third year and semester eight students are at the early half of the fourth year in medical school.

The principal author is a course director of the Advanced Trauma Life Support (ATLS®) program in Malaysia. He designed the Basic Trauma Life Support (BTLS) course of the

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**Table I: Performance of semester seven and semester eight students**

	n	Pre-test % pass*	Post-test % pass*
Semester 7	113	32	98.2
Semester 8	55	51	100

\*A pass mark is taken to be 50%

**Table II: Pre- and post-test single best answer scores for semesters seven and eight students**

Knowledge Scores	n	Pre-test Mean (SD)	Post-test Mean (SD)	Mean of Score difference (95% CI)	t statistic*	p-value
Semester 7	113	43.8 (9.7)	62.0 (8.0)	18.2 (16.3, 20.0)	19.2	0.001
Semester 8	55	48.2 (9.2)	66.1 (6.6)	17.8 (15.3, 20.4)	14.2	0.001

\*Paired sample t-test

**Table III: Pre- and post-test-scores in semesters seven and eight students**

	n	Semester 7 Mean (SD)	Semester 8 Mean (SD)	Mean of Score difference (95% CI)	t statistic*	p-value
Pre-test	168	43.8 (9.7)	48.2 (9.2)	4.5 (1.4, 7.5)	2.8	0.005
Post-test	168	62.0 (8.0)	66.1 (6.6)	4.1 (1.7, 6.6)	3.3	0.001

\*Independent t-test

**Table IV: Difference in pre- and post-test scores of semesters seven and eight students**

Variable	Semester 7 Mean (SD)	Semester 8 Mean (SD)	Mean of Score difference (95% CI)	t statistic*	p-value
Post-test minus Pre-test	18.2 (10.1)	17.9 (9.4)	0.3 (-2.9, 3.5)	0.19	0.85

\*Independent t-test

IMU in 2012 along the lines of the ATLS course, reducing the duration to a one-day course. The course content concentrates on the primary survey of trauma. Course notes were provided online and students were reminded to read them before coming for the course.

The one-day BTL course was taught to 168 medical students from semester seven (n = 113) and semester eight (n = 55) in the 2012 / 2013 cohort. All students had completed a seven-week surgical posting in semester six. Those in semester eight had completed an additional six weeks in orthopaedics and two weeks in the Accident and Emergency rotation.

The course consisted of a pre-test of 30 multiple choice questions (Single Best Answer) followed by three hours of lectures, three hours of skill stations and a post-test. The pre-test and post-test questions were essentially similar. The faculty consisted of a multidisciplinary team comprising general surgeons, orthopaedic surgeons, anaesthetists, emergency physicians and medical officers. Of the instructors, five were active ATLS instructors and another 4-5 were medical officers with exposure to the ATLS course.

The pre-test and post-test scores were analysed with SPSS version 19 using the paired sample t-test and the independent t-test. Significant difference was taken as  $p < 0.05$ .

## RESULTS

A mark of 50% was arbitrary taken as the passing mark for both the pre-test and post-test. With this criterion, only 32%

of semester seven students and 51% semester eight students passed the pre-test. However, in the post-test, 98.2% of semester seven students and 100% of semester eight students passed (Table I).

The effectiveness of the course (Table II) was measured by the pre- and post-test scores. The mean score of semester seven students improved from 43% to 62% while that of semester eight students improved from 48% to 66% ( $p = 0.001$ , paired t-test).

Table III shows that semester eight students performed better than semester seven students in both the pre-test and post-test ( $p = 0.005$ , Independent t-test). However, both semester seven and eight students derived equal benefit from the course. Table IV shows that the benefit derived by semester seven and semester eight students did not differ significantly ( $p = 0.850$ , Independent t-test).

## DISCUSSION

Trauma is the third leading cause for admissions in the Ministry of Health hospitals in Malaysia and accounted for 9% of hospital admissions in the year 2013.<sup>5</sup> It has been reported that even in the United Kingdom, the majority of severe trauma is managed initially by junior doctors.<sup>1</sup> Despite attention being drawn to the inadequacy of trauma training prior to graduation<sup>2,3</sup> medical schools have found efforts to train its graduates basic competency in managing polytrauma before graduation very challenging.

It is a myth that competency in managing polytrauma is imparted after the Surgery posting in medical school. This study clearly shows that despite a seven-week posting in Surgery, only one third of semester seven students passed the pre-test. Even after a further six weeks posting in Orthopaedics and two weeks in Accident and Emergency, only 51% of the students passed the pre-test. This can be attributed to the surgical posting's emphasis on topics unrelated to trauma and the growth of subspecialisation, which has reduced overall general surgical experience.

Training medical students to be competent in the management of polytrauma is a difficult challenge for most medical schools in the world due to many logistic and educational issues. These arise from the large student numbers, insufficient surgeon-teachers with interest in trauma in the age of subspecialisation, curriculum time and physical resources. The strategy we employed include e-learning with a one-day trauma course conducted by multidisciplinary teachers. Medical student behaviour towards e-learning is interesting. Despite the course content being made available online and the students reminded to read the contents before coming for the course, only a third of the semester seven students and half of the semester eight students passed the pre-test. The poor performance in the pre-test suggest that a significant number of them have not read the online course before coming for the course because most of the pre-test answers were in the e-learning module.

The Advanced Trauma Life Support (ATLS) course of the American College of Surgeons was inaugurated in Malaysia in 2010.<sup>67</sup> A major spin off from the ATLS course was that a pool of multidisciplinary trainers became available as instructors and trauma teaching need not be wholly dependent on the scarce number of general surgeons. This study shows that a well designed one-day intensive trauma course taught by a multidisciplinary team comprising surgeons, anaesthetists, emergency physicians and trained medical officers is effective in improving the teaching-learning experience of students. The passing rate after attending the course was 100% for semester eight students and 98.2% for semester seven students. An immersion course comprising lectures followed by skill stations to reinforce learning is superior in terms of time and efficacy in imparting knowledge, skills and attitudes than online lecture notes or self-study.

Adult learning principles suggest learning is incremental and builds on prior learning and experience.<sup>8</sup> This may suggest that trauma training in later years may be more beneficial. This was not found to be an important issue in this study. The difference between the mean score of the pre-test and post-test marks of semester seven and eight students was only 4%. This suggest that trauma education can be taught as early as semester seven with good results and need not be delayed till later years when time may be more scarce. Due to the positive results observed, our institution has continued our BTLS course in its present form and content till date. However, it must be pointed out that learning the complexities of managing polytrauma requires exposure, practice and time. Even after the intensive BTLS course, the mean score in semester eight students was only 66%. This suggest that a refresher course prior to graduation at semester ten will be useful.

## CONCLUSION

This study shows that a well-designed one-day intensive trauma course concentrating on the primary survey of trauma with pre-test, skill stations and post-test can effectively impart knowledge, skills and attitudes in medical students as early as semester seven and eight. The delivery of the course by a multidisciplinary team can overcome the problem of getting sufficient surgeons to teach the large number of students. In addition, the authors suggest a refresher course prior to graduation at semester ten will be useful.

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