

# EFFECTS OF THE EMERGENCY TRAUMA TRAINING COURSE ON THE CONFIDENCE OF FINAL-YEAR MEDICAL STUDENTS DEALING WITH TRAUMA PATIENTS

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Trauma is an important issue that has been neglected in the training of medical students. This study evaluated the effects of the Emergency Trauma Training Course (ETTC), after completion of standard medical training, on seventh-year medical students. The ETTC was designed in Taiwan by the Taiwan Society of Emergency Medicine to train physicians and registered nurses who care for trauma patients in the emergency department (ED). We implemented the course for our medical students' internship. One hundred and fifty-one participants were divided into three groups: Group A included 36 medical students before they entered their internship in hospital; Group B included 41 medical students who had received 6 months of internship training in hospital; and Group C included 74 ED nurses. Group C was used to test Cronbach's alpha coefficient of the questionnaire. After the training course, the participants had a final examination and filled out a questionnaire about the training course and their levels of self-confidence. There were no differences in scores between the medical students in Groups A and B ( $p=0.064$ ). Using repeated measures analysis of variance, we found that confidence before training was low, with no difference between Groups A and B. Confidence improved after training, but there was still no significant difference between the groups ( $p=0.875$ ). However, there were significant differences between confidence levels before and after the training course ( $p<0.001$ ). Therefore, although in-hospital training for 6 months failed to increase confidence, the confidence of final year medical students after completion of their training was improved by the ETTC. This indicates that the ETTC could increase the confidence of participants. This is the first evaluation of the implementation of the ETTC for final-year medical students in Taiwan. Based on our results, we highly recommend that this training course be taught to final-year medical students before they practice in hospital.

**Key Words:** education, Emergency Trauma Training Course, medical student  
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The Emergency Trauma Training Course (ETTC) is a training course developed by the Taiwan Society of Emergency Medicine based on the Advanced Trauma Life Support (ATLS) guidelines for the training of physicians and registered nurses in emergency departments (EDs). This course was developed to provide

a consistent method of care for the resuscitation and evaluation of injured patients. Similar training courses focusing on different types of trauma patterns have been developed in other countries, including Japan and in Europe [1,2]. The ETTC is simpler and more acceptable than the ATLS training course in Taiwan, due to its lower cost and simplified criteria, which make it easier for participants such as nurses and emergency medical technicians to learn and implement it during different types of trauma.

Junior hospital residents working in the ED are often involved in the early management of major trauma [3]. The seventh year is the last year of training for medical students in Taiwan and students complete their internship in a hospital. Although they are expected to participate in the care of trauma patients in the ED, the limited trauma training received in medical school means that they lack confidence in their knowledge of how to do their job. No studies have reported on the effects of ETTC on the training of medical students. We therefore trained medical students using the ETTC and analyzed its effects on their confidence. The results of this study may assist in the design of training courses for medical students during their internship in hospital.

## METHODS

### *Sampling and sample*

The total study sample comprised 94 final-year medical students from Kaohsiung Medical University and 79 nurses from the ED of Kaohsiung Medical University Hospital. One hundred and twenty-nine of the participants volunteered, and 22 were requested to take part. They were divided into three groups. Group A included 42 medical students before they entered their internship in hospital. Group B included 52 medical students who had received 6 months of internship training in the hospital. Group C participants were ED nurses who were used to test Cronbach's alpha coefficient for the questionnaire. No medical students had received similar training before. The final exam scores were compared between the two groups of students and differences between self-confidence levels before and after the training were analyzed. Twenty-two participants who did not take the final examination were excluded. Only 74 of the nurses were used to test for the coefficient. Thirty-six

students in Group A and 41 in Group B participated in the final examination. Thirty-two nurses who had attended the same course before were excluded from Cronbach's alpha test.

### *The ETTC*

The ETTC was run over 2 days. On day 1, faculty members presented slide lectures on primary survey, airway management, shock, trauma to the head and spine, and wound treatment. In the afternoon, lectures on trauma to the abdomen, extremity trauma, and trauma in women and children were given. On day 2, all participants participated in six workshops dealing with primary survey, trauma to the thorax and abdomen, head and spine, extremity trauma, airway management, and shock. During the afternoon of day 2, four different assessment scenarios were presented. All participants had to complete one scenario run by an instructor using criterion-based assessment. Each participant was allowed one retest. A final examination was given and subjects failed if their score was below 70. The faculty members consisted of seven experts in trauma, representing two different medical centers.

### *Participant feedback*

The 151 participants who took part in the final examination were sent a comprehensive questionnaire to assess their views on the process, structure, and content of the course, using a 5-point Likert scale (1: strongly disagree to 5: strongly agree) and an option for free-text comments. The areas assessed were the course in general, its organization, the manual, lectures, demonstrations, the skill stations, workshops and assessments. The aim was to identify the strengths of the course and areas that could be improved. Thirty-nine and 48 questionnaires were returned from Groups A and B, respectively, giving a return rate of 92.6%.

The reliability of the confidence questionnaire was calculated using data from the first group of 42 ED nurses and Cronbach's alpha coefficient was 0.907. This was therefore used as the feedback tool in the other groups.

### *Statistical analysis*

Analysis was performed using SPSS version 12.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were computed initially and then the repeated measures

**Table.** Scores and confidence levels in groups A and B

	Group A (n=36)	Group B (n=41)	p
Score*	86.154 ± 4.3243	88.625 ± 5.5295	0.064
Confidence*			
Before training	2.07 ± 0.531	1.93 ± 0.599	
After training	2.69 ± 0.499	2.86 ± 0.041	
	Type III SS	Mean square	F
Before – After	36.196	36.196	232.809
Group	44.804	0.009	0.025
			p
			<0.001 <sup>†</sup>
			0.875 <sup>†</sup>

\*Data presented as mean ± standard deviation; <sup>†</sup>confidence levels between Groups A and B were compared by repeated measures ANOVA.

analysis of variance (ANOVA) method was used to analyze confidence before and after the training course in the two groups. The scores were compared using Student’s *t* test. The level of significance was determined at  $p < 0.05$ . The internal consistency of the questionnaire was determined by Cronbach’s alpha coefficient.

## RESULTS

### *Characteristics of participants*

Thirty-six and 41 medical students were enrolled in Groups A and B, respectively, and 74 nurses were enrolled in Group C. Thirty-two ED nurses who had already attended the same course were excluded. The students’ final examination scores (mean ± standard deviation) are presented in the Table. Scores were compared using Student’s *t* test, as shown in the Table. There were no significant differences in scores between the groups ( $p = 0.064$ ).

### *Confidence in management of trauma patients*

The level of personal confidence in the treatment of trauma patients before participation in the ETTC was assessed in the first part of the questionnaire. Out of the 74 participants, 15.3% had no confidence in their ability to treat trauma patients, while 67.7% and 16.1% had low or better confidence, respectively. We compared the difference in confidence levels before and after the training course using repeated measures ANOVA between the two groups. There were no significant differences in confidence levels between the groups either before or after the training course

( $p = 0.875$ ). However, confidence levels were significantly higher after the training course ( $p < 0.001$ ).

### *Evaluation questionnaire*

The general comments indicated enthusiastic overall support and satisfaction with the program. However, several students suggested that there should be less didactic presentation and more interactive, case-based discussion. Several students wished to have the examination questions and answers discussed in an open forum.

## DISCUSSION

Major trauma is a leading cause of death among young adults in all developed countries [4]. The elimination of “preventable death” has been an important recent topic in the field of trauma care. Because patients’ prognoses and recovery rely heavily on the initial evaluation and care, particular responsibility falls on the physicians who first come into contact with trauma patients in the ED. In Taiwan, some hospitalized trauma patients are examined by general surgeons and emergency physicians, who currently have few opportunities for training in how to deal with such patients. With increasing attention focusing on the mortality and morbidity of trauma in recent years, it is important to train physicians in how to handle trauma patients. A generic approach (the ABC approach) was found to be applicable to the care of all critically ill or injured patients, and should be taught at the junior level [5]. We therefore implemented the ETTC in final-year medical students and evaluated the results of this training. The confidence of the students

in dealing with trauma patients was increased after the ETTC.

The ETTC was developed from the basic concept of the ATLS guidelines. The success of the ATLS guidelines has been demonstrated, not only by the large number of physicians trained using this course, but also by the appearance of a number of affiliated courses with similar structures, aimed at training medical, nursing, civilian and military personnel in how to deal with trauma in a variety of settings [6–8]. Nevertheless, ATLS courses are expensive to set up, run, and attend and their cost-effectiveness has been questioned. However, although ATLS addresses only one aspect of the spectrum of care, it has probably been evaluated more than other life support courses [9], and is recognized as increasing confidence, knowledge and skills (at least temporarily), and to lead to a change in practice [10]. In the United States and Canada, several medical schools have requested permission to teach ATLS to senior medical students and a few have done so successfully [11]. However, many educators have considered aspects such as the surgical skills taught in the ATLS course to be too advanced for senior medical students. In addition, the faculty and physical resources required to conduct standard ATLS programs are extremely difficult for many medical schools to provide. We therefore chose to implement the ETTC, rather than the ATLS course, in our study.

The ETTC was developed by the Taiwan Society of Emergency Medicine to account for the differences in trauma patterns in Taiwan. However, no study has assessed the effect of the ETTC on medical students. The ETTC course provides an easily remembered method for evaluating and treating victims of traumatic events. It uses proven adult learning techniques and aims to teach initial in-hospital care that reflects the Taiwanese experience. The novel team training approach used in the course was successful and was highly appreciated by the participants. It offers an alternative to the ATLS course, and is built around a series of modules that can easily be adapted to meet differing regional requirements.

The purpose of the ETTC is to train physicians and nurses working in the ED in Taiwan. However, many traditional undergraduate medical curricula seem to lack trauma training [12], and we therefore evaluated the use of the ETTC for final-year medical students. The feedback from the questionnaires indicated that most participants considered this kind of training to

be necessary and useful, and we therefore recommend that the ETTC be provided as part of the final year training. Our results suggest that final-year medical students benefited significantly from this training course in terms of their confidence in managing trauma patients. Thus, the program seems to be appropriate for the education of final-year medical students, as well as nurses.

There were no significant differences in final examination scores or confidence levels between the two groups of medical students. This indicates that 6-months hospital training failed to increase students' confidence when dealing with trauma patients. Nevertheless, after the ETTC, all participants showed significant improvements in confidence levels. The ETTC training course is therefore suitable for trauma education in medical students both before and after their exposure to trauma patients.

Trauma education needs improving, because medical students lack confidence in dealing with trauma patients. In our study, 71% of medical students had little confidence and 10% had no confidence in facing trauma patients. The students' comments and their performance following this training program suggest that consideration should be given to including it in the standard undergraduate medical curriculum. It could replace or complement some aspects of the present curriculum dealing with trauma topics. One of its main advantages would appear to be the specific focus on trauma teaching, as opposed to the discussion of trauma topics in parts of the curriculum relating to the different systems, as is the current practice.

In Canada, Ali et al implemented the ATLS course for medical students and demonstrated that it prepared students more appropriately for managing trauma patients, as judged by trauma simulation scenarios. They also suggested that consideration should be given to including ATLS as an integral part of the senior medical student curriculum [13]. In Australia, the immediate effect on trauma-related knowledge of a trauma evaluation and management program applied to medical students was also addressed; there was significant improvement in cognitive skills following the program [12]. Our study also strongly supports the introduction of a trauma training course into the undergraduate curriculum, and most medical school postgraduate surgical trainees do complete a standard program early in their training. Completion of

the ETTC program in the undergraduate curriculum would better prepare the students for the full ATLS program. Several of the students in our study reported that the ETTC program improved their level of confidence in approaching patients with multiple injuries in the future. In addition, many students may not pursue postgraduate surgical training, and the ETTC program would fill a void for these trainees who would otherwise be unlikely to be exposed to full standard ATLS training. Our study revealed that current trauma education may not be sufficient for undergraduate medical students, and that the ETTC could be implemented to make up for this shortcoming.

To the best of our knowledge, this is one of the first studies to investigate improvements in medical students' trauma knowledge and to survey the effects of the ETTC on medical students and nurses. Nevertheless, the study had several limitations. First, our study was limited to the experience of undergraduates at a single medical school. Second, voluntary enrolment of seventh-year students could have been biased by their interest in trauma education.

In conclusion, medical students experience little trauma training in their traditional curriculum and therefore lack confidence when required to manage trauma patients. Early implementation of trauma training is important during medical education. Based on the results of our study, we recommend that the ETTC be included as a senior medical student educational training course.

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# 急救創傷訓練課程對實習醫師外傷病人處理信心之效用

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長久以來，外傷一直是被忽略的問題，包括在醫學教育中。這個研究的目的是在於評估急救創傷訓練課程用在七年級的實習醫師的成效，而這個課程之前是設計用來訓練急診醫師及護理人員。我們將這個課程導入到醫學生上並且以統計方式比較其表現與臨床護理人員之間的差異。151 個參加者被分成三個組別，36 個七年級的實習醫師在實習前被分成 A 組，41 個在實習半年後被分到 B 組，其餘是 74 個急診護士被用來檢視問卷的信度。課程最後，以筆試、情境口試並回答課程的相關問卷。在兩組醫學生中，筆試成績以 Student's *t* 檢定沒有顯著差異 ( $p = 0.064$ )。比較兩組有無實習在處理外傷病人的信心指標，在課程訓練前的指標皆低且無差異，在訓練後有增加但兩組也沒有差異 ( $p = 0.085$ )。但訓練前後比較其信心卻有顯著性差異 ( $p < 0.001$ )。表示雖然在醫院內實習對外傷處理的信心沒有增加，但訓練課程可以增加面對外傷病人的信心。我們是第一個在台灣評估將急救創傷訓練課程用在訓練實習醫師的效益，根據此結果，我們高度的建議將這個課程導入到即將進入醫院工作的實習醫師身上。

**關鍵詞：**教育課程，急救創傷訓練課程，實習醫師

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