Effectiveness of Cardiac Resuscitation Course for Final Year Medical Students during Anaesthesia Rotation

Thiruselvi Subramaniam, Tan Ann Jee, Siti Ramlah Abdul Rahman

Department of Anaesthesia & Critical Care, International Medical University, Negeri Sembilan, MALAYSIA

ABSTRACT

Introduction: Many tasks seem daunting for a new medical graduate who is starting houseman posting; as educators, we must ask ourselves whether our graduates are ready to face emergency situations as the first responders during a crisis. Exploration of undergraduate students' perceptions highlights needs in some areas, including acute care, practical skills and prescribing. Armed with basic resuscitation skills, students could face emergencies with more confidence and skill. **Method:** Seven cohorts of final-year students completed a one-and-a-half day cardiac life support course and were assessed using megacode and pre- and post-course multiple choice questions. **Results:** The pre- and post-test analysis using paired sample T-test demonstrated significant performance improvement ($p < 0.001$) in all cohorts. **Conclusion:** The structured cardiac life support course conducted for final-year students effectively improved students' knowledge in advanced cardiac resuscitation.

Keywords: *Cardiac life support, Resuscitation, Undergraduates, Work preparedness, Internship*

CORRESPONDING AUTHOR

Thiruselvi Subramaniam, Senior Lecturer, Department of Anaesthesia & Critical Care, International Medical University, 70300, Seremban, Negeri Sembilan, Malaysia | Email: thiruselvi_subramaniam@imu.edu.my

INTRODUCTION

Many tasks appear daunting for a new medical graduate who is starting houseman posting; questions of major relevance include: "What do I do if a patient collapses on my watch?" and "Am I ready for this?" We must ask ourselves whether our graduates are ready to face these emergency situations, which they invariably do, as they are usually the first responders in major hospitals. Are they confident and prepared when faced with a crisis? Studies appear to indicate that they are not (1, 2).

Medical school education has been changing to meet changes in environment, technology and the personalities of the medical students that we educate. A common emphasis is on the production of graduates who are equipped with adequate clinical competence, zeal for lifelong learning and the ability to ensure patient safety.

House officers and nurses are usually the first responders faced with the task of initiating management in most acute emergency situations in the wards. Exploration of undergraduate students' perceptions of work-preparedness seem to indicate a need to be more prepared in some areas including acute care, practical skills and prescribing (1, 3, 4, 5, 6). We believe that it is important for medical students completing their final year to be equipped with basic resuscitation skills to face real life

crisis situations. The objective of this study is to determine the effectiveness of a cardiac life support course for final-year medical students by reviewing the results of pre- and post-course multiple choice questions (MCQ).

METHODOLOGY

This is a prospective cohort study involving seven cohorts of final-year students (n = 611) who completed a structured course on advanced cardiac life support. Performance of the students in an MCQ test before the course is compared with their performance after completion of the course.

The students participating in this course are in the final year of medical school and have completed postings in major disciplines (surgery, internal medicine, family medicine and obstetrics and gynaecology) during their third and fourth years. They have also had exposure in emergency medicine, otorhinolaryngology and ophthalmology. Their first exposure to anaesthesia is in the final year. These students have also had exposure to basic life support in the third year.

All final year students are expected to participate and successfully complete the MCQ and megacode assessment after the course. The course, including the assessment over one and a half days is conducted during their anaesthesia posting. They complete a pre- and post-course test consisting of 30 (MCQ) as part of the training. A cardiac life support manual prepared with reference to the latest American Heart Association (AHA) guidelines is provided online in the university's e-portal to help students prepare for the test and course. MCQs are provided online as practice samples.

The course is conducted in the skills lab using high fidelity manikins for megacode training and three other skills stations, which consisted of (1) resuscitation drugs and application; (2) airway and breathing devices; and (3) defibrillator and technique

of use. All stations are facilitated by faculty who have had briefings about the content of delivery and are provided with an online facilitator guide with instructions on the devices and teaching content. This is to ensure that the teaching content and delivery are standardised keeping to the theme of the learning, which is identifying a crisis and cardiac resuscitation. Each station is conducted over 20 minutes, allowing small groups of 8–10 students an opportunity to practice on the devices with the help of facilitators. Further details regarding the flow of the course are provided in Table 1.

When the course begins, students first complete a pre-test, followed by a short lecture summarising all the important latest issues on cardiac life support before they start the training.

Pre- and post-course test results from the seven cohorts of students who attended the course were collated and reviewed. A passing score was 70%. At the end of the course, the students completed an evaluation questionnaire.

STATISTICAL ANALYSIS

Data from the MCQ results were recorded and analysed using Statistics Programme for Social Science (SPSS) Version 20. The number of students who passed the pre-test was compared with the number of students who passed the post-test. Statistical analysis was performed using the paired sample T-test.

Results

The feedback from students as acquired from the evaluation questionnaire is summarised in Table 2. There is strong evidence that the course improved student performance in terms of knowledge in all cohorts (P = 0.000) (Table 3). Overall, the students found it very useful as they felt that the course prepared them in skills and knowledge for when they graduate and function as interns.

Table 1: Program for cardiac life support course

First session (Training)	
Pre-test	**30 multiple choice questions**
Introduction	Objectives of the course and expected learning outcomes to ensure that the students are aware of the course content, expected knowledge and skills.
Short lecture session on cardiac resuscitation	To summarise and help consolidate what they learned during their preparation and to note common errors that participants often commit.
Video session (produced by the department)	Demonstration of the correct and incorrect methods of managing a patient with a cardiac emergency.
Instructor facilitated skills stations (4)	1. airway equipment and use; 2. defibrillator functions and technique of use; 3. drugs related to resuscitation; 4. megacodes (hands-on simulated training with facilitator on manikins).
Instructor facilitated practice sessions	Samples of scenarios are provided to students in groups, and the students use role play within the groups to practice. A facilitator guides them.
Electrocardiograph (ECG) interpretation	Interactive lecture where students are guided on how to interpret the common ECG rhythms that occur during cardiac events (arrest, tachyarrhythmia, bradyarrhythmia)
Second session (Assessment)	
Post-test	30 multiple-choice questions (same questions as pre-test).
Megacode – hands on skills assessment	Individual student assessment using prepared cardiac life support scenarios.

Table 2: Qualitative feedback from students

1	Give competence to perform as houseman during emergency
2	Good addition to students learning
3	Helps to build confidence resuscitating patients
4	More confidence analysing ECG rhythms
5	Simulation practice was very effective
6	Stressful but fun

DISCUSSION

The Institute of Medicine (IOM) report, *To Err is Human,* revealed a major shortcoming in healthcare in 1999, when it reported that 98,000 patients in the USA died annually as a result of medical errors (7, 8). There is increasing concern regarding patient safety and by beginning resuscitation training as early as in medical school, as we have attempted in our institution, we could make a difference in terms of early crisis identification, early calls for help and correct management strategies resulting in better patient outcomes (9).

Studies show that there is a lack of knowledge among students regarding cardiopulmonary resuscitation techniques as recommended by international guidelines (4, 10, 11). It is imperative that universities take on the role of initiating change in the culture of safety and ingrain awareness that does not change when they join the workforce where the patient safety culture is still not optimal. Training students on resuscitation is only one approach to creating this awareness and change. The reality is that perhaps 50% or more of what is learned is forgotten by graduation. However, the management of acute crises and resuscitation would not be totally new to them, having had this exposure, and we hope that they attain required competency of a junior doctor faster than they would otherwise and cause less harm to patients in the process (12).

Table 3: Performance of the students in the pre-test and post-tests

Student cohort	n	Pre-test % pass n (%)	Post-test % pass n (%)	Mean (M)	Standard deviation (SD)	t^*	p value
A	70	7 (10%)	43 (61.43%)	0.53	0.50	8.796	< 0.001
B	77	23 (29.87%)	59 (76.62%)	0.53	0.50	8.796	< 0.001
C	90	20 (22.22%)	72 (80%)	0.58	0.49	11.036	< 0.001
D	88	15 (17.05%)	57 (64.77%)	0.48	0.50	8.913	< 0.001
E	86	21 (24.42%)	65 (75.58%)	0.59	0.49	11.129	< 0.001
F	121	20 (16.53%)	104 (85.95%)	0.69	0.48	15.602	< 0.001
G	79	17 (21.52%)	61 (77.22%)	0.57	0.49	10.160	< 0.001

*Paired sample t Test

Junior doctors provide feedback stating lack of confidence when having to resuscitate patients (13). This report from one hospital, if extrapolated, could translate to similar feedback nationally (14). There are studies reporting that many residents perceive deficits in their training and supervision in the care of acutely ill patients, prompting the need for teaching hospitals and medical schools to consider including more appropriate supervision, feedback, and further education for residents (15).

Initiating exposure to management of medical emergencies and resuscitation as early as in medical school could improve knowledge and skills, which could help junior doctors better face these situations and improve patient outcomes. The advanced life support training has become internationally recognised as an important component of training for newly graduated doctors and many medical schools expose their final-year students to this training to equip graduates to face medical emergencies in practice (1, 16).

Often, junior doctors report feeling confident with regard to knowledge and skills, but experience difficulties with patient management, practical matters and their role in the team (17, 18). Effective first responder resuscitations have shown improved survival outcomes, supporting the need to make crisis management a compulsory part of final year medical school training (19, 20).

Initial exposure to basic life support training in our university is in the beginning of Semester 5 (third year), which is then followed by a more advanced cardiac life support (CLS) training in Semester 9 (final year). The advanced CLS in the final year is structured based on the American Heart Association's (AHA) latest guidelines (21). This course is conducted during the anaesthesia posting as one of the expected learning outcomes of the anaesthesia curriculum, which is to enable students to identify an emergency/crisis situation and initiate resuscitation measures before help arrives. The course is conducted as part of the preparation of students for their exit to the real working environment and workplace preparedness. The importance of this kind of exposure for medical students is to improve knowledge, practical skills and confidence; managing a medical emergency should be recognised and considered when creating medical curricula. We feel that both basic life support in the initial period followed by more advanced training in the final year will help students to build better knowledge and skills based on resuscitation to face the challenges of a junior doctor who is usually the first responder. Although there has been very positive verbal feedback from graduates already in the workforce, we have been unable provide more constructive evidence at this point, which is currently being assessed.

Our study revealed that there was a significant improvement in terms of

knowledge after the course, which supports the need to continue in the present approach to delivery of the course. Reihani et al. reported similar results when they trained using simulation based on education for advanced cardiac life support skills (11). However, the issue of decay of knowledge over time when there is no continuity in exposure needs to be addressed (12, 22, 23). Most of the tertiary hospitals in the country conduct basic life support courses for the junior doctors but advanced life support training is yet to be mandatory. We believe this early exposure in medical school will be useful for our students when they graduate, especially in terms of basic building blocks for future exposure and continuity in exposure to reduce the rate of decay and to become better prepared to face medical emergencies (1, 12, 23).

CONCLUSION

The cardiac life support course has been effective at improving the knowledge of students who were exposed to it. Many acknowledged the usefulness of the course and some expressed the need for such exposure before graduating. Revisiting this information prior to graduation from the university will help to retain knowledge, confidence and skills, bringing about better performance in the workplace, although it could be a challenge in terms of logistics, workload and manpower. This study clearly indicates that students benefit from advanced cardiac resuscitation training and that the increased awareness of the need for knowledge on resuscitation we have noted could encourage life-long learning to keep abreast of new changes and guidelines to maintain skills.

The authors feel that if all schools in the country uniformly incorporate mandatory cardiac life support training into the curriculum, we will better prepare graduating doctors to manage medical emergencies, which is an important step toward achieving the WHO patient safety goals.

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