

Does undergraduate emergency medicine teaching equip junior doctors for ward emergencies?

MICHAEL ARDAGH, ANNE-MAREE KELLY

ABSTRACT

Objectives:

1. To assess the competence of junior doctors in recognising and managing life-threatening ward emergencies.
2. To compare the competence of a group which had received emergency medicine teaching with one which had not.

Method:

Sixty seven final year medical students participated in a structured written clinical examination designed to test their competence in recognising and managing four life threatening ward emergencies.

Papers were marked numerically against a pre-determined marking schedule and were also reviewed for the presence of fatal management errors.

Comparisons were made between the group which had received emergency medicine teaching and the group which had not.

Results:

1. For the group which had not received emergency medicine teaching ($n = 15$) the average total score was 218/400. The group

which had received emergency medicine teaching ($n = 52$) had an average score of 290/400. There was a significant difference between these groups ($p < 0.0001$).

2. The group which had not received emergency medicine teaching committed 0.28 fatal errors per student per case. The group which had received emergency medicine teaching committed 0.07 fatal errors per student per case. This difference was significant ($p < 0.001$).

Conclusions:

1. There is considerable scope to improve the competence of junior doctors for dealing with life-threatening ward emergencies.
2. Junior doctors who received emergency medicine teaching scored significantly better than those who did not.
3. Emergency medicine teaching is a suitable tool to help equip junior doctors to deal with life threatening ward emergencies.

Key words:

Undergraduate education, emergencies, emergency medicine

Introduction

The transition from medical student to junior doctor is abrupt and carries with it the burden of responsibility of direct patient care. This burden is greatest at the time of an emergency when the junior doctor must mould his or her theoretical knowledge and limited experience into a suitable clinical response. It is well documented that such responsibilities exert a negative effect on the junior doctor's professional development, nurturing such emotions as anxiety, depression, anger and hostility¹.

Junior doctors perceive gaps between their theoretical knowledge and the practical role expected of them, with almost half of 159 interns surveyed by Egerton recognising shortcomings in their ability to diagnose common problems presenting to hospital².

The Accreditation Committee of the Australian Medical Council in its report "The

Michael Ardagh MB ChB
Registrar
Emergency Department
Christchurch Hospital
New Zealand

Anne-Maree Kelly MBBS FACEM
Senior Lecturer Emergency Medicine
Christchurch School of Medicine
Christchurch
New Zealand

Address for correspondence
Dr A M Kelly
Emergency Department
Christchurch Hospital
Private Bag 4710
Christchurch
New Zealand
Tel | + 643| 3640270
Fax | + 643| 3640286

Assessment and Accreditation of Medical Schools in Australia"³ lists among its objectives of basic (undergraduate) medical education "the ability to perform common manual and life-saving procedures such as caring for the unconscious patient and cardiopulmonary resuscitation". Similarly, the Postgraduate Medical Council of New South Wales describes a need for the junior doctor to display "the ability to organise, synthesise and act upon information gained from the patient and other sources so as to exhibit sound clinical judgement and decision making as well as the ability to act effectively in emergency situations". They include 'competence in emergency care' at the top of their list of knowledge, skills and attitudes that require special attention in the first two clinical years⁴.

But how can the learning of emergency care be addressed in undergraduate education? One potential solution is the inclusion of emergency medicine in curricula. As the general principles of managing emergencies on the wards and in the emergency department are the same, learning emergency medicine might provide new graduates with the knowledge and skills necessary to deal with the emergencies they encounter on the wards.

Emergency medicine was introduced into the fourth year (first clinical year) of a six year MB ChB program at the Christchurch School of Medicine in 1991. Two years later, the opportunity arose to compare two consecutive final year classes. The 1992 class were soon to commence their first posts as junior doctors while the 1993 class were just beginning their trainee intern (final) year. The 1993 class was the first in the School to have been exposed to the philosophies and practices of emergency medicine through a formal undergraduate program. The 1992 class had no such exposure.

The objectives of this study were to assess the competence of senior students (soon to be junior doctors) in recognising and managing life threatening ward emergencies and to determine whether having received emergency medicine teaching influenced the results.

Method

Sixty seven final year medical students

participated in a structured written clinical examination involving responses to four clinical scenarios. Each of the scenarios describes a life-threatening emergency which could confront a junior doctor on a hospital ward.

Question 1 required the recognition and management of a case of haemorrhagic shock.

Question 2 described a cardiac arrest secondary to penicillin-induced anaphylaxis and assessed priorities in the management of cardiac arrest.

Question 3 outlined a case of upper airway obstruction in a post-ictal epileptic patient.

Question 4 described a case of tension pneumothorax in a young patient and was diagnostically the most demanding case.

Case details are summarised in Table 1.

Students were asked to identify to which class they belonged and whether they had received emergency medicine teaching as an elective in addition to the core curriculum. No other demographic data were collected. Papers were randomly numbered for assessment and analysis.

Each question was marked according to a pre-determined marking schedule by the two investigators independently. The mark assigned for each question was the average of the two determined by the investigators. However, when there was a difference of greater than ten per cent between the marks determined, the answer was reviewed and a mark assigned by consensus. The possible mark for each question was 100, therefore each student was given an overall score out of 400.

Both investigators also assessed each answer for the presence of a fatal management error, defined as a course of management which would most likely result in the death of the patient. For a fatal error to be assigned, both investigators needed to be in agreement. The presence of a fatal error was determined independently of the numerical score for each question.

Comparisons were made between the groups which had and had not received emergency medicine teaching.

The tests were conducted during scheduled clinical teaching sessions. Students were unaware that the test would take place so no

specific preparation had occurred. Participation was voluntary, however no student declined.

Table 1. The questions

<p>Question 1. A 60 year old man is on the ward twelve hours after elective repair of an abdominal aortic aneurysm. Over the past hour he has become confused and restless. You find him pale, clammy, with a heart rate of 140/minute and a BP of 60/-.</p> <p>(a) What is the most likely cause of this problem? (b) What steps would you take in managing this patient?</p>
<p>Question 2. A 20 year old woman with cellulitis has just been given her first dose of IV penicillin. Within minutes she becomes flushed in the face, complains of difficulty breathing and then collapses unconscious. She is not breathing and has no discernible cardiac output.</p> <p>(a) What is the most likely cause of this problem? (b) List, in order or priority, the steps you would take in the immediate management of this patient.</p>
<p>Question 3. A 20 year old man is admitted for stabilization of his epilepsy. You are called to see him because he is fitting. On your arrival he has ceased convulsing. He is semi-conscious and lying supine. His breathing is laboured and noisy and he is clinically cyanosed.</p> <p>(a) What life-threatening problem is occurring? (b) Why is this happening? (c) List the steps in managing this problem, where appropriate outlining the methods to be used.</p>
<p>Question 4. You are called to the ward by the nurse to see a young, previously fit patient who has just returned from theatre after an appendicectomy. He was progressing well until five minutes ago when he suddenly complained of left sided chest pain and shortness of breath. Since then his condition has deteriorated rapidly such that he is severely distressed, P = 140, BP = 80/-, and he is clinically cyanosed. The chest is resonant and breath sounds are absent on the left.</p> <p>(a) What is the most likely cause of this problem? (b) Describe your immediate treatment of this condition. (c) Once the life-threatening situation has been controlled, describe your subsequent management. (d) What is the role of radiology in the diagnosis of this condition?</p>

Results

Sixty-seven trainee interns (TI) were examined. Their class and experience divided them into three groups, as follows.

Group 1. TI class of 1992 with no emergency medicine exposure (TI 92 No EM) (n = 15).

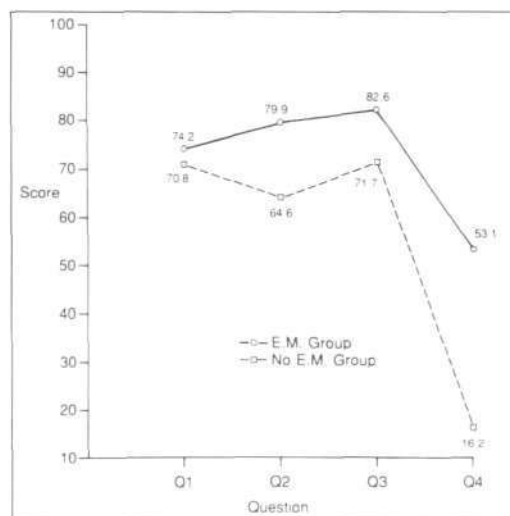
Group 2. TI class of 1992 with emergency medicine exposure as a student elective or as part of the final year surgical attachment (TI 92 EM) (n = 7).

Group 3. TI class of 1993, all of whom had received formal emergency medicine teaching in 1991 as part of their curriculum (TI 93) (n = 45)

The groups TI 92 EM and TI 93 were combined into an emergency medicine group (n = 52) for comparison with the TI 92 no emergency medicine group (n = 15).

Figure 1 compares scores on each question for the two groups. Table 2 compares average total score and fatal error rate for the two groups.

Figure 1. Average scores for each question, emergency medicine group versus no emergency medicine group



For the group which had not received emergency medicine teaching (n = 15) the average total score was 218/400. The group which had received emergency medicine teaching had an average score of 290/400. There was a significant difference between these groups ($p < 0.0001$) (Wilcoxon Rank Sum Test).

Table 2. Comparison of average total score and fatal error rates

Group	Average total score (Max 400)	Fatal error rate/ student/case
Emergency medicine	290 (191-380)	0.07
No emergency medicine	218 (135-300)	0.28

The group which had not received emergency medicine teaching committed 0.28 fatal errors per student per case. The group which had received emergency medicine teaching committed 0.07 fatal errors per student per case. This difference was significant ($p < 0.001$) (Chi² test).

Discussion

The need for junior doctors to be able to deal with emergencies is well recognised^{3,4}. However, both junior doctors and senior clinicians have informally expressed doubts about the ability of junior doctors in this regard. This study was designed to objectively assess the ability of senior students to deal with ward emergencies and to determine whether having received teaching in emergency medicine influenced performance. The overall standard of students on this test was lower than expected (overall average score 275), and lower than we would consider adequate for students who would soon be managing similar situations as junior doctors. From 268 theoretical patient encounters there were 32 fatal errors, which we consider unacceptably high. This concern is tempered however by the fact that 23 of the fatal errors involved case number 4 which was without doubt the most demanding. It was also apparent that, even when it was judged that the patient would most likely have survived, many students were struggling with the basic concepts of emergency management.

Comparison of the two groups, both for average total score and fatal error rate, showed a clear superiority of the group which had received emergency medicine teaching over that which had not. Both of these differences were highly significant.

It is conceded that criticism could be levelled at the combination of groups 2 and 3 as the TI 92 EM were the highest scorers on

average and therefore this group might have biased results towards its combinant. However, the TI 92 EM group numbered only seven and their scores were not significantly different from those of the TI 93 group.

The results must be interpreted with caution, as the groups involved were not directly comparable. The first and most obvious difference was of group size, there being 15 in the group who had not received emergency medicine teaching compared with 52 in the group which had. This inequity was partly due to the 1992 students having commitments to their new postings elsewhere in the country which precluded participation in this study. It also arose in part from a growing recognition among students of the importance of emergency medicine which led some to seek out elective attachments in the field, thereby lowering the number of students without emergency medicine teaching from which to recruit.

Another difference between the groups was that the 1992 class had just completed its trainee intern year, a year in which practical clinical experience working on the wards was emphasised. Thus the 1992 class had the advantage of an additional year of clinical experience over their colleagues. One might have expected this to translate into higher scores on the test, however this was not the case. Our results suggest that the trainee intern year does not adequately substitute for emergency medicine teaching with respect to the development of knowledge and skills for dealing with emergencies.

Collaboration with colleagues in other centres is underway in order to assess the results with larger and more comparable groups.

Theoretically the best method of evaluating the appropriateness and effectiveness of medical training is to examine the quality of its graduates³. When the issue in question is the ability to deal with ward emergencies then the best assessment would be to assess performance in an actual emergency situation. To allow comparison, the emergencies and their assessment would need to be standardised. Alternatively, the number of emergencies, if random, would have to be very large. As this method is impractical, a structured written

clinical examination was used to reflect competence.

The structured written clinical examination was similar to the objective structured clinical examination (OSCE), however scenarios and responses were written rather than performed. The OSCE format is recognised as an appropriate method of testing specific skills and competencies³ and is considered more relevant for the assessment of clinical performance than traditional examination formats involving the simple recall and regurgitation of fact. The OSCE format requires the recognition and assimilation of relevant data, the formation of a working diagnosis and the planning and conduct of appropriate action much like the clinical process required on the wards. This structured written clinical examination shares several of these features. It does however have the disadvantage of being static rather than dynamic. Nevertheless it is hoped that performance on this test was an acceptable reflection of reality.

Conclusions

From this study the following conclusions are drawn. Firstly there is considerable scope for improving the ability of junior doctors to deal with life threatening ward emergencies.

Undergraduate emergency medicine teaching

Secondly, students who received emergency medicine teaching performed significantly better than those who did not.

Finally, the advantage afforded by emergency medicine teaching is evidence that emergency medicine teaching is a suitable tool to equip junior doctors for ward emergencies. This is further supported by the improved performance of students who received emergency medicine teaching over those who had had an additional year of clinical experience as trainee interns.

Efforts to further such teaching in the undergraduate curriculum would be to the advantage of both the junior doctor and the patient.

References

1. The Postgraduate Medical Council of New South Wales. Postgraduate medical training during internship and residency: Problems encountered by junior medical staff. Sydney: The Council. 1990
2. Egerton WE. The preregistration year in Queensland. (Unpublished report)
3. Accreditation Committee of the Australian Medical Council. The assessment and accreditation of medical schools in Australia. Canberra: Australian Medical Council. 1992
4. The Postgraduate Medical Council of New South Wales. Postgraduate medical training during internship and residency: Aims and objectives of the internship and general medical residency. Sydney: The Council. 1990

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