Simulation training for ADF surgical and intensive care teams: a pilot study.

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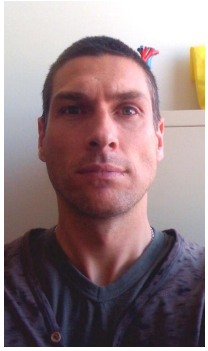

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Abstract.

This paper describes a pilot program to develop pre deployment simulation training for health personnel including surgeons, intensivists, nurses and medics. The initiative was prompted by the need to provide realistic wartime surgical experiences and to develop pre-deployment teamwork. Success was measured in terms of participantsô satisfaction and the observations of team performance by the training faculty.

Introduction

Medical simulation in training is accepted practice in many areas of health and it has been demonstrated that group behaviour and improvement in team performance occurs with training[1-11.] Difficulty in obtaining realistic team-based medical experience prior to specialist health teams arriving in a battlefield environment makes medical simulation an attractive option for military training.

Military medicine faces similar challenges in all countries: to train medical personnel in peace for the realities of war or conflict. In Australia what corporate experience there is, resides in civilian practice and with Australian Defence Force (ADF) health specialists, who are almost exclusively reservists and who volunteer at times of need. As a result, groups of people who may have never worked together are placed in situations where they are required to work as an effective team in a very short period of time and under difficult and challenging circumstances. Sub-specialisation in medicine in Australia means that there is no specialised ótrauma surgeonô who routinely performs resuscitative or damage control surgery. Combat injury patterns from current operations are different from most civilian trauma. Combat trauma is characterised by multisystem blast, burns or ballistic injuries. These are complex injuries and successful outcomes require collaborative and multidisciplinary management.

The training gap both in skills and team-based training is significant. As Moses et al state:

> ó[M]ilitary medical personnel have almost no chance during peacetime to practice battlefield trauma care skillsé With some of todayôs training methods disappearing the challenge of providing both initial and sustainment training foré medical personnel is becoming insurmountableô[12].

Simulation can provide a risk-free simulated learning environment where medical teams train across a range of medical procedures including trauma surgery. These óhands-onô training opportunities in a simulated environment help teams to ótrain in peace as we would practice in warô[2]. The military environment is a complex and dynamic working environment in which crises develop both on the battlefield and in the operating/medical theatre. These may lead to danger or adverse outcomes- both to the medical personnel and to their patients. Once a crisis has developed, sound medical knowledge or military protocols may not be enough to resolve it. Military medical personnel must be equipped to recognise, avert or manage impending crises. This requires training in Crisis Resource Management (CRM) [1]. Although the relevance of such training models is increasingly recognised by the health community[13], to our knowledge no formalised curriculum or course exists in the ADF that provide these

skills to senior specialist clinicians. However, sophisticated combat medical simulation centres do exist in the US, Israel and elsewhere.

Parallels exist with the airline industry which also functions in a high risk environment. Research in that industry has identified that most airline disasters are not due to equipment failure, but due to human error and failures in decision making, communication and leadership [14]. As a result, a flight simulation- based curriculum called Crew Resource Management was developed to teach the necessary teamwork and leadership skills. [15] Crew Resource Management training is a requirement for all Australian and US flight crews. Medical Crisis Resource Management (CRM) has developed out of the principles of aviation CRM.[1]

Medical CRM was identified as a core requirement of the mission specific training for specialist ADF surgical and intensive care teams deploying into a multinational facility within the Middle East Area of Operations. This paper addresses the recent simulation experience used to enhance the operational readiness of Surgical and Intensive Care teams (AUSMTF-1 and 3) prior to their deployments to Afghanistan.

Methods

Study Design and Population. This report is based on a follow-up survey given to participants after completing the Military Emergency Crisis Management (MECM) course at the Sydney Clinical Skills and Simulation Centre (SCSSC), Royal North Shore Hospital. The ADF personnel who participated in the two courses included twelve specialists (made up of anaesthetists, intensivists and surgeons), seven medics and ten nurses. All the specialists were reservists. All medics and some nurses were full time members of the ADF. Each of them gave informed consent prior to participating and the study was granted ethics approval by the Northern Sydney Area Health Service.

Overview of the MECM Course.

All the participants were provided with pre-reading that outlined theories of communication, team leadership, teamwork, graded assertiveness and CRM. This reflected the brief given to the course director, in regards to the AUSMTF needs and the construct of the mission specific training.

The course began with a brief introduction to the background and goals of MECM. The course director emphasised to the participants that the goal of MECM was not to evaluate each participantôs performance but to focus on understanding the key CRM principles (Table 1) and the human factor principles of leadership, teamwork, decision making and error identification and prevention.

Table 1. Crisis Resource Management Principles

1. Know your environment
2. Anticipate and plan
3. Call for help appropriately
4. Prioritise
5. Allocate attention wisely and use all available information
6. Distribute workload and use all available resources
7. Communicate effectively

The participants were introduced to a structured approach for thinking when confronted with any emergency. This included a risk/benefit evaluation of the plan of management and developing a contingency plan.

In order to emphasize the applicability and importance of the CRM principles (Table 1), the participants viewed an 8 minute video of a flight simulator re-enactment of an actual commercial airline crash. It contained examples of simple avoidable errors, made by the pilots and an air traffic controller which led to the disaster. The course director then used the video as a basis to discuss and explore CRM, team work and error. The participants were subsequently orientated to their simulated field hospital and mannequin simulators (METI High Fidelity Patient Simulator and Laerdal Simman).

In keeping with adult learning principles, a multimodal instructional approach was employed. The group took part in a desk activity exploring the issues of managing a mass casualty incident. This was followed by six high fidelity simulated case based scenarios. The participants took part in the scenarios in teams of four or five, assuming their usual roles in a deployed environment. (Fig 1 - 3). One of the nurses in each of the scenarios was a faculty member and wore a headset to allow private communication with the scenario director in the control room. (Fig 4).This ensured that each case met its planned learning objectives. Groups who were not involved remained in a separate room to observe via a video link.

The scenarios were structured to simulate the unique circumstances of the combat environment, which included a realistic laparotomy model, which required the surgeon to perform 4-quadrant packing and control ongoing bleeding. This proved to be a good model for reinforcing the principles of damage control surgery and ensuring that the team were each aware of their competing needs and priorities.

The director, a trained facilitator, concluded each scenario when the objectives of the scenario had been met and there was sufficient material for constructive debriefing. Participants, observers and instructors then debriefed each scenario together for about 20 minutes. The debriefing had several aims: to discuss the clinical, CRM and human factor issues raised by the scenarios, and then to consider how the lessons learned might be translated into their clinical practice.

Data Analysis. At the conclusion of the MECM course all the participants completed a post course evaluation. The evaluation consisted of a 5-point Likert Scale ranging from a score of one (strongly disagree) to five (strongly agree). The mean and standard deviation were calculated for each response.

Results

Twelve ADF Reserve Medical Specialists, 10 nurses and seven medics took part in the two courses. The results of the post course appraisal that were completed by the participants are summarized in Table 2. The participants considered the course very useful pre-deployment training: it provided teamwork opportunities and allowed them to understand each otherôs roles and capabilities. They particularly valued the realism of the clinical scenarios. The participants appreciated the chance to debrief and discuss the challenges of their future deployment.

Table 2. Results of the post course appraisal of MECM (Likert Scale: 1 – Strongly disagree to 5 – Strongly Agree)

Question	Response (mean ± SD)
The course was well organised	4.80 ± 0.41
The course was relevant for my practice	4.60 ± 0.50
The course was pitched at the right level	4.67 ± 0.48
The course satisfied my expectations	4.70 ± 0.47
The instructors taught the course well	4.87 ± 0.35
I would recommend this course to my colleagues	4.80 ± 0.41
The course increased my level of competency	4.63 ± 0.56
The course increased my ability to work in a team	4.65 ± 0.54
I found the presentations useful	3.63 ± 0.56
I found the familiarisation with the simulator environment useful	3.53 ± 0.63
I found the table top exercise useful	3.53 ±0.73
I found the scenarios useful	3.93 ± 0.25
I found the debriefing sessions useful	3.83 ± 0.38
The course objectives on teamwork, leadership, communication and human error were met	4.66 ± 0.48
I feel more confident managing trauma in a military environment	4.59 ± 0.63

Discussion

Deploying medical personnel have a crucial need for crisis management team training. Currently no formal training exists to prepare health personnel for the potential stress of the deployed military environment and mission.

The MECM course allowed participants to develop skills in communication, error recognition and prevention, teamwork and graded assertiveness in a safe learning environment. They practised key skills in highly realistic simulated clinical scenarios. This led to productive, frank discussion and debriefings.

Team performance improved successively over the course of the six simulated scenarios. Attitudes towards individual and team performance became more positive during the course of the training. By the end of the course the participants felt more competent in responding to medical emergencies and also more comfortable with their co-participants. These findings are consistent with Chen and Kanferôs [16] multilevel team model .Those researchers claim that effective team performance is more than áthrowing a group of people together with a common purposeâ each team member must understand their own, and othersô roles in order for the process to be effective. The MECM pre deployment courses aimed to expand on this model and allow the participants to experience the value of scripted roles. It was designed to facilitate an understanding of the roles, responsibilities and skills of their colleagues and the im-

pact of this on improving team performance and outcomes. It achieved those goals. The greater understanding within each team helped motivate and empower them and positively influenced their attitude to successfully respond to a medical/surgical emergency.

Medical simulation allows participants to experience team training in procedural and communication skills. This MECM course provided fully immersed medical simulation. The focus was not on medical procedures or knowledge, but rather on establishing a level of commitment and collective experience in each team. This enhanced their ability to make complex management decisions. The two teams were highly trained and experienced civilian professionals who were about to deploy. Their deployment would be to an unfamiliar environment and setting and, in a multinational environment that could challenge their perceived roles, responsibilities and clinical management practices. High fidelity simulation allowed us to create scenarios which would be considered unique in civilian practice .They would be impossible to recreate without simulation. The participants had the opportunity to learn by experience[17] and reflection[18], both are key components of adult learning theory[19] .They are also crucial for effective teamwork in challenging deployments. Learning occurs in a simulated environment which imitates, but does not duplicate reality. Participants are afforded opportunities to try out new strategies without risking adverse patient outcomes. They can also discuss outcomes in a safe, ôno blameô environment.

Few opportunities exist in a military environment for health personnel to formally debrief after a clinical case. Collegiate discussion about the conduct, management and potential for improved performance results in better clinical outcomes[6]. The ability of a military health specialist to deliver ôbest practiceô, often under very difficult circumstances[20,] depends not only on their technical skill, but good teamwork. Simulation training assists this process [21].

One goal for the course was to convince participants of the value of a ôteam time outô. This meant a preliminary brief discussion with all the team members about the proposed clinical approach and each personôs role .In civilian practice, team members often tend to work in isolation and assume that other team members understand their expected contribution. We placed value on good communication, preparation and planning-qualities which would be of particular value to medical teams in a deployed environment. In a multinational environment using unfamiliar equipment and different cultural expectations, clear communication becomes even more vital.

The command and leadership elements of the group witnessed how the team established its working dynamic and how it functioned under simulated stress. This provided valuable information and insight into further training and skills that may be required before a team is deployed. Individuals should not be chosen for remediation unless a particular behaviour or management concept is deemed unacceptable or dangerous. When necessary, this should always be done privately.

The results of this pilot study show that MECM was well accepted by the participants and indicated that this type of training was likely to benefit pre deployment medical teams.

Limitations

Despite the small size of this study, we believe the positive response to crisis management team training in the MECM course warrants further investigations at our

institution, as well as others. Our study did not evaluate long term crisis management knowledge, skills and attitude retention after training. Further study needs to be address how frequently medical teams should train in MECM and whether the lessons learnt in the simulated environment are transferable to the military environment. Most of the participants had little prior exposure to high fidelity simulation. Future studies would need to investigate how the learning experience for participants is affected as their familiarity with simulation is increased.

Conclusions

The positive results from this initiative were encouraging. Given the proven success of other simulation- based team training courses in the medical and aviation industries, further development and investigation of simulation based crisis management training for pre deployment military medical teams is indicated.

The MECM course is ideally suited to meet the ADFôs needs because it delivers realistic and relevant training. Simulation is increasingly being incorporated into lower order health training (e.g. team based resuscitation) However the needs of a specialised surgical and intensive care health team are qualitatively different, with less emphasis needed on technical competency and more on non-technical and communication issues. The MECM training has demonstrated a new way of delivering operationally- focused health training to military specialist health teams. The training is cost effective and can potentially increase the experience and confidence of specialist health teams in dealing with complex combat environments.

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Fig 1.

Fig 2.

Fig 3.

Fig 4

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