

Education on Advanced Disaster Medical Response: Initial Experience in Brazil

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ABSTRACT

Background: One of the most important mainstays in disaster management is preparedness. In partnership with the International Trauma & Disaster Institute, Massachusetts General Hospital, Boston, and the Panamerican Trauma Society (PTS), the Brazilian Society of Integrated Assistance to the Traumatized (SBAIT) has been promoting, for the last 4 years, education and training through the “Advanced Disaster Medical Response” (ADMR) course for health care providers. The aim of this study is to evaluate the impact of the ADMR course on medical staff learning.

Materials and methods: Between 2011 and 2014, 23 ADMR courses (each of 8 hours duration) were conducted in Brazil. Attendees answered a pretest and posttest survey to evaluate their experience in disaster medicine and acquired knowledge during the course. Each test consisted of the same 10 objective questions, resulting in a score of 0 to 10. Attendees had to do both tests in order to qualify for a course certificate.

Results: In 4 years, 1,398 students participated in the courses. Participants were predominantly physicians and medical students of the male gender. Posttest scores were significantly higher than those of the pretests: 9 (± 1.22) and 7 (± 1.67) respectively, representing an increase of 34.1% in acquired knowledge. Students with prior experience in disaster medical response ($p < 0.05$) or participation in multiple-casualty simulations ($p < 0.05$) or theoretical training ($p < 0.05$) scored better on pretests than those without similar experience. For every kind of prior experience, posttest scores were higher than pretests ($p < 0.05$).

Conclusion: The ADMR course is an effective learning tool for medical personnel and health care providers, increasing knowledge of disaster medical response.

Keywords: Advanced Disaster Medical Response course, Disasters, Education in trauma.

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INTRODUCTION

The World Health Organization (WHO) estimates that 9% of the world’s population die from injuries and violence (external causes), totaling 5 million people annually.¹ In addition, eight of the 15 leading causes of death amongst young people aged 15 to 29 are related to trauma, whether from traffic accidents, homicides, suicides, burns or war injuries, amongst others.²

The “Center for Research on the Epidemiology of Disasters” (CRED) mentions that since the beginning of the 20th century, there has been an increase in the number of disasters and catastrophes, and as a result, there has been an increase in the number of deaths. According to CRED data, 525 disasters were recorded in the year 2000 alone, while in the year 2005, the death toll due to disasters reached 97,490.^{3,4}

In recent years, Brazil has become a host for grand musical events, festivities in general, and particularly sporting events, such as the FIFA World Cup and the Summer Olympics, thus becoming a possible target for disasters and catastrophes.^{5,6} In contrast, the Brazilian trauma care system is in flux, making medical care for these events less effective than they ought to be.^{7,8}

Because of this, since 2011, the “Brazilian Society of Integrated Assistance to the Traumatized” (SBAIT) has conducted the “Advanced Disaster Medical Response” (ADMR) course, a course which was created by the International Trauma & Disaster Institute, Massachusetts General Hospital in Boston, and sponsored by the Panamerican Trauma Society (PTS). Its purpose being to train doctors and health professionals, as well as students, in the systematization of care in situations of disaster or catastrophe. The principal aim of these organizations is to reduce mortality in such situations, and this course improves the performance of teams when responding to multiple-victim incidents. The course also considers the approaches adopted within the prehospital environment to keep patients alive until they reach hospital.⁹⁻¹¹

This study aims to describe and evaluate the use of the ADMR course as a teaching tool in preparation for

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situations of disasters and catastrophes and to present the statistics from 4 years' of courses conducted in Brazil.

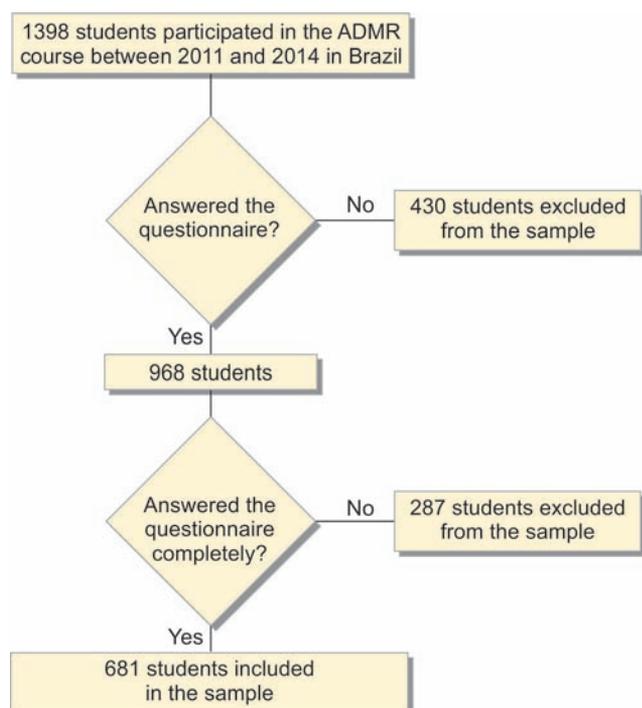
MATERIALS AND METHODS

During the period 2011 to 2014, SBAIT organized 23 ADMR courses throughout Brazil, each consisting of 8 hours of lectures, conducted over one or two consecutive days. Course registration was linked to a precourse questionnaire, which aimed at evaluating the students' knowledge of disaster situations and previous experience in this type of scenario. Upon completion of the course, the students were asked to answer the same questionnaire, as a type of postcourse test.

Of the 1,398 students who took the ADMR course, 968 answered the questionnaire, and of these, 681 answered the questionnaire completely. Students who answered the questionnaire incompletely, and/or left some blank answers, were excluded from the sample (Flow Chart 1).

The results were tabulated and analyzed using Microsoft Excel®. Blank answers were excluded from the analysis. The performance between the pre and postcourse tests were compared. Descriptive variables were summarized as frequencies and percentages. Continuous variable data are presented as means and standard deviations or medians and ranges, depending on the distribution. For statistical analysis, we used the chi-square test, Fisher's exact test, and the Mann-Whitney test. The assumed statistical significance was $p < 0.05$. Blank data and invalid responses were excluded from the analysis.

Flow Chart 1: An ADMR course student sample in Brazil during the period 2011–2014



Map 1: Map of Brazil showing the states and cities where the ADMR course was conducted in Brazil in the period 2011–2014

The project was submitted to the Ethical Research Committee of the School of Medical Sciences of the University of Campinas (Unicamp), under the protocol number 279/2015.

RESULTS

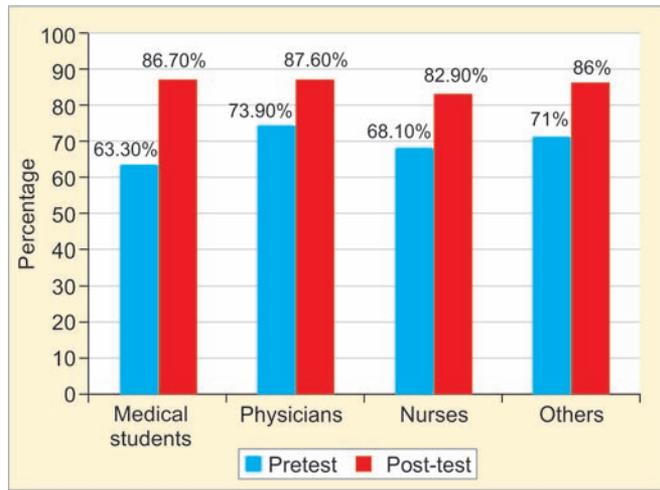
A total of 23 courses were conducted between the years 2011 and 2014, ranging from five to seven courses per year in 14 cities in 9 different states of Brazil (Map 1). In total, 1,398 students (55.8% masculine) took the course, originating from 14 different states and 54 different cities; 968 students answered the questionnaire, representing a 69.2% participation rate, and 681 students answered the questionnaire adequately.

With respect to the professions of the participants who provided valid answers to the questionnaire over the period concerned, 52.5% were medical students, 25% physicians, 19% nurses, 2.3% nursing technicians, 0.5% firefighters, 0.5% psychologists, and 0.2% paramedics.

With respect to previous training, 53.1% of them had never participated in a course on disasters, 17.2% had theoretical training of no more than 2 hours, 11.9% between 2 and 6 hours, and 17.8% more than 6 hours. As for participation in simulations or practical training, 56.7% had never participated in such training, 17.6% once only, 17.3% between two and six times, and 8.4% more than six times.

With respect to previous experience, 58.4% of them had never been involved in a rescue situation involving more than five victims, 13.7% once only, 15.1% between two and six times, and 12.8% more than six times.

Pretest scores averaged 6.51 with a median of 7 ± 1.67 on a scale of 0 to 10, while posttest scores had an average of 8.73 with a median of 9 ± 1.22 (pretest \times posttest: $p < 0.05$), representing an increase of 34.1% (the average value of the increase in scores was 2 ± 1.62).



Graph 1: Scores obtained in the tests discriminated by professional category

Of the course participants 96.5% believed that disaster content should compose part of the medicine graduation course, in both a theoretical and practical way, while 3.2% believed only theoretical. 0.3% believed that such content should not be part of the curriculum at all. Graph 1 shows that all the evaluated professional categories had gains knowledge after ADMR course.

DISCUSSION

The teaching of trauma victim care remains a subject little incorporated in the curriculum of undergraduate medicine and health professionals in Brazil.¹¹ The problem becomes even more evident when it is necessary to discuss victim management and care in disaster situations where, in Brazil, like other countries in the world, the discussion of medical care in catastrophic scenarios has not yet been incorporated into medical training.¹² Based on this premise, the SBAIT conducted 23 ADMR courses throughout Brazil during the said period, from 2011 to 2014. More than 50% of their audiences was composed of medical students, demonstrating the quest for knowledge on the subject, bearing in mind that its content is absent from medical schools’ curricula. It is important to note that medical students represent a significant population, able to promote care in situations

of disasters and catastrophes.¹³ It should also be noted that over 95% of the course participants, including students, doctors, and nurses, believe that theoretical and practical training for response to disaster situations should be present in degree courses.

The course fee is consistent with that found in the literature for courses which do not offer financial assistance, an action which is prohibited in Brazil as a stimulating factor to participants in studies and scientific research.^{14,15} In this study, one of the factors, which led to the absence of data, was the number of invalid responses, which can be justified by the data-fill method. The way of providing the data was through an online questionnaire without assistance or explanation. Despite the use of objective questions, the authors believe that this questionnaire format could lead to doubts on the part of the participants, consequently generating many blank or incomplete responses.

Goldberg et al⁹ showed in their study that students of graduate medicine who took the ADMR course, increased their knowledge by the end of the course. This is corroborated by the findings of this research, where there was an increase of about 34% between the precourse test and postcourse test scores ($p < 0.05$), thus demonstrating the effectiveness in teaching the proposed content.

It was observed in this study that all kinds of previous experience are predictive factors for achieving better results in the precourse tests, against those who do not have previous experience in other theoretical courses, participation in simulations, or care of multiple victims. With this in mind, it is possible to predict the minimum training necessary in order to have dominion over the disaster response content. This analysis is presented in Tables 1 to 4 and they allow a minimum cutoff point in time or number of activities for training to be set for every type of experience.

In this study, it was observed that, with respect to variable theoretical training, those participants who had had more than 6 hours of previous training obtained better pretest scores than those who had undertaken lesser periods ($p < 0.05$). Thus, a minimum of 6 hours of theoretical training seems necessary to ensure the best learning. As for variable simulation participation,

Table 1: Comparison of pretest score results between students who had previous experience or not (medians and standard deviations)

Aspect analyzed	Never	Once or more	p-value
Previous theoretic course experience	6 ± 1.73 (n = 362)	6 ± 1.78 (n = 319)	<0.05*
Previous simulation experience	6 ± 1.66 (n = 386)	6 ± 1.85 (n = 295)	<0.05*
Previous multiple victim care experience	5 ± 1.73 (n = 398)	6 ± 1.74 (n = 283)	<0.05*

*Parameters with statistical significance ($p < 0.05$)

Table 2: Comparison of pretest score results between students who had previous theoretical training (medians and standard deviations)

Aspect evaluated (median ± SD)	Up to 2 hours (n = 117)	2–6 hours (n = 81)	More than 6 hours (n = 121)
Up to 2 hours (6 ± 1.71)	–	$p > 0.05$	$p < 0.05^*$
2–6 hours (6 ± 1.77)	$p > 0.05$	–	$p > 0.05$
More than 6 hours (6 ± 1.8)	$p < 0.05^*$	$p > 0.05$	–

*Parameters with statistical significance ($p < 0.05$)



Table 3: Comparison of pretest score results between students who had previous simulation and/or practical training (medians and standard deviations)

Aspect evaluated (median \pm SD)	Once (n = 120)	2–6 times (n = 118)	More than 6 times (n = 57)
Once (6 \pm 1.85)	–	p < 0.05*	p < 0.05*
2–6 times (7 \pm 1.81)	p < 0.05*	–	p > 0.05
More than 6 times (7 \pm 1.6)	p < 0.05*	p > 0.05	–

*Parameters with statistical significance (p < 0.05)

participation in more than one showed superiority to those who had attended only one (p < 0.05) and there was no difference between those who had participated in more than 6 and those from 2 to 6, leading us to believe that an ideal practical training cutoff point would be between 2 and 6 calls for every professional. As for multiple-victim experience, the group who had attended more than six such cases had an advantage over those who had less experience, reinforcing the importance of practical training. Thus, we can draw a parallel with the study sponsored by Kelly and Rogers,¹⁶ which showed that students, residents, and surgeons all require continuing education in order to obtain better results and deliver more effective treatment in emergency and trauma surgery. In other words, professionals who are used to attending trauma patients perform better in specific knowledge questionnaires compared to those who are not, demonstrating that exposure to real trauma scenarios improves knowledge.¹⁷ This corroborates the findings of this study, as it shows that the minimum training cutoff points, to ensure the best dominion over disaster response content, would be 6 hours of theoretical training, 2 to 6 participations in simulations, and at least six calls to multiple-victim scenarios.

The trauma system in Brazil is incipient, especially when it comes to disaster response.¹⁸ According to data from the “Global Climate Risk Index”, developed by the organization Germanwatch, in 2013 alone 111 people lost their lives as a result of “natural disasters”, placing Brazil in 36th position in the ranking of countries which suffered most from extreme climate changes during the period studied.¹⁹ Thus, undertaking preparatory courses for disaster and catastrophe situations in Brazil is necessary. Courses, such as ADMR are of fundamental importance in the curriculum of medical schools, since accidents with multiple victims require adequate and ongoing training of care teams.^{20,21}

In conclusion, the ADMR course proves to be an effective teaching tool for increasing knowledge on disaster response, and there is a strong interest by students for the inclusion of the theme in medical school programs.

Table 4: Comparison of pretest score results between students who had previous experience in multiple-victim disaster situations (medians and standard deviations)

Aspect evaluated (median \pm SD)	Once (n = 93)	2–6 times (n = 103)	More than 6 times (n = 87)
Once (6 \pm 1.91)	–	p > 0.05	p < 0.05*
2–6 times (6 \pm 1.69)	p > 0.05	–	p < 0.05*
More than 6 times (7 \pm 1.41)	p < 0.05*	p < 0.05*	–

*Parameters with statistical significance (p < 0.05)

A minimum of 6 hours of theory, participation in two simulated and six real events, involving multiple victims, appear to be necessary to ensure an effective result.

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 INVITED COMMENTARY

Educación sobre desastres avanzada Medical Response: experiencia inicial en Brasi

La colaboración es fundamental en la educación médica, y se vuelve especialmente importante al abordar el tema de la cirugía global. El presente manuscrito difunde un ejemplo exitoso de asociación entre América del Norte y América Latina en la formación de miles de proveedores en la preparación para la respuesta a desastres. Al desarrollar programas de intercambio de formación quirúrgica, el principio de reciprocidad con el país de acogida es clave para la longevidad de este tipo de iniciativas. Puntos brillantes como el que se describen en este manuscrito podrían servir como un modelo para el cumplimiento de las relaciones de beneficio mutuo entre instituciones y países.

Los cursos de Respuestas Medicas Avanzadas a Desastres (RMAD) han sido unas de las principales herramientas de la Sociedad Panamericana de Trauma (SPT) para el alcance y la formación del personal médico, incluyendo médicos, paramédicos y estudiantes de medicina y personal de enfermería en los principios importantes requeridos de triaje y para tratar a pacientes en situaciones de eventos de víctimas en masa.

La importancia de este manuscrito es multifacética. En este caso particular, la cooperación entre las instituciones dio lugar a la inclusión de más de 1300 estudiantes, con la integración de la sociedad local de trauma: La "Sociedad Brasileña de Asistencia Integrada a los Traumatizados" (SBAIT), además de servir como plataforma para mejorar actividades de promoción y alcance con el gobierno local para mejorar la asignación de los recursos. Tal colaboración con Brasil es oportuna, ya que este país ha sido el anfitrión de varios eventos culturales, con un potencial de eventos de víctimas en masa. Además, los Juegos Olímpicos están programados para comenzar en agosto de 2016.

La publicación de esta experiencia única es oportuna y las enseñanzas que estos cursos han proporcionados a los habitantes locales un valor incalculable. Esperamos y rogamos que no sean probados en la vida real durante los eventos entrantes.

La asociación establecida entre la sociedad SBAIT local y el SPT va más allá de los cursos. La conferencia internacional anual de la SPT se llevará a cabo en conjunción con SBAIT este mes de noviembre, que atrae a varios ponentes nacionales e internacionales y traerá nuevas oportunidades para la formación y la educación en varias áreas de trauma y cirugía de emergencia. La SPT, como la principal sociedad integrada de las Américas, estará lista para apoyar a SBAIT y a Brasil en la educación, la investigación, así como otros recursos, si es necesario.

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Education on Advanced Disaster Medical Response: Initial Experience in Brazil

Collaboration is pivotal in medical education, and it becomes especially important when addressing the subject of global surgery. The present manuscript broadcasts a successful example of partnership between North America and Latin America training thousands of providers in readiness for disaster response. When developing exchange programs in surgical training, the principle of reciprocity to the host country is key for the longevity of such initiatives. Bright spots like the one described in this manuscript could serve as a model for fulfilling mutual beneficial relationships between institutions and countries.

The Advanced Medical Disaster Response (ADMR) courses have been one of the main tools of the Pan American Trauma Society (PTS) as outreach and training of medical personnel, including physicians, paramedics, medical students, and nursing staff, in important principles of required to triage and treat patients during situations of mass casualty events.

The importance of this manuscript is multifaceted. In this particular case, the cooperation between institutions resulted in the inclusions of more than 1300 students, with the integration of the local trauma society: the "Brazilian Society of Integrated Assistance to the Traumatized" (SBAIT), as well as serving as a platform to enhance advocacy and reach to the local government to improve the allocation of the resources. Such collaboration with Brazil is timely, since this country has been the host for multiple cultural events, with a potential for mass casualty events. Additionally, the Olympic Games are scheduled to start in August 2016.

The publication of this unique experience is timely and the teachings that these courses have provided to the local habitants are invaluable. We hope and pray that they will not be tested in real life during the incoming events.

The partnership developed between the local society SBAIT and the PTS goes above and beyond courses. The annual international conference of the PTS will be held in conjunction with SBAIT this November, attracting multiple national and international speakers and bringing further opportunities for training and education in several areas of trauma and emergency surgery. The PTS, as the main integrated society of the Americas, will be ready to support SBAIT and Brazil in education, research, as well as other resources, if needed.

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