

# Panamerican Trauma Society Basic Trauma Education Course Administration in Resource-limited Areas

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## ABSTRACT

**Introduction and objectives:** Injuries and noncommunicable diseases account for greater than 73% deaths and 76% disability adjusted life years (DALYs) in Latin America, where trauma care is challenging especially when resources are scarce. Education and training is a basic step in trauma systems development, which was shown to improve survival. Except for urban areas, trauma courses are unavailable and unaffordable in the Latin region. The aim of this study is to evaluate the feasibility of implementation of a basic trauma education course (BTC) for resource-limited areas adopted and promulgated by the Panamerican Trauma Society (PTS) since 2011.

**Materials and methods:** Basic trauma education course was administered in Paraguay, Medellín, Chile, and Panama during the PTS congresses (2011–2013). The two-day course was based on the patient's pathway system, addressing the management of the patient through various echelon of care from rural health centers to local provincial hospital and tertiary treatment facilities. It contained 20 hours of didactic lectures and hands on skill labs on basic trauma resuscitation, stabilization, and transport, as well as trauma system-oriented teaching (triage, EMS, kinematics, trauma registries). Panamerican Trauma Society international and national instructors administered the courses. Course logistics and coordination were carried out by international and local coordinators and by trauma league medical students. Pre and post (30 multiple-choice questions) tests were used to assess participants. Paired t-test was used to compare scores.

**Results:** Fifty-four students (rural physicians, EMS providers, students, nurses, and administrators) participated. Pre and posttest score comparison showed significant improvement 74% vs 85% respectively, p-value <0.0001.

**Conclusion:** A tailored trauma course and evaluation can be feasible in educating local providers. The PTS can promulgate the application of BTCs that may serve as a model for continuing trauma care education in developing countries. Course follow-up evaluation is pending.

**Keywords:** Basic trauma course, Trauma care in low and middle income countries, Trauma education.

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## RESUMEN

**Introducción:** Las lesiones y las enfermedades no transmisibles representan más del 73% de muertes y 76% de años de vida potencialmente perdidos (AVPP) en América Latina; dónde la atención de trauma es un reto, especialmente cuando los recursos son escasos. La educación y capacitación son pasos fundamentales en el desarrollo de sistemas de trauma que han demostrado mejorar la supervivencia. A excepción de las zonas urbanas, los cursos de trauma generalmente no están disponibles o son inasequibles en la región de Latino América. El objetivo de este estudio es evaluar la viabilidad de implementación de un curso básico de educación en trauma (BTC) para las áreas de recursos limitados adoptadas y promulgadas por la SPT desde 2011.

**Materiales y métodos:** BTC se administró en Paraguay, Medellín, Chile y Panamá durante los congresos de la SPT (2011–2013). El curso de 2 días se basa en la vía de recorrido del paciente a través del sistema; abordando el manejo del paciente a través de varios escalones de atención de los centros de salud rurales hacia hospitales provinciales locales y las instalaciones de tratamiento terciarias. Consistió en 20 horas de charlas didácticas y prácticas de destrezas en reanimación básica de trauma, estabilización y transporte, así como la enseñanza orientada a sistema de trauma (triage, EMS, kinemática, los registros de trauma). Participaron instructores miembros de la SPT tanto internacionales como nacionales. La logística del curso y la coordinación fue llevada al cabo por coordinadores internacionales y locales y estudiantes de medicina de la liga de trauma de Ecuador. Se utilizaron pre y post pruebas (30 preguntas de opción múltiple) para evaluar a los participantes. Una prueba t pareada se utilizó para comparar las puntuaciones.

**Resultados:** Cincuenta y cuatro alumnos (médicos rurales, proveedores de EMS, estudiantes, enfermeras y administradores) participaron. La comparación de puntaje pre y post-test mostró significativa mejora 74% frente a 85% respectivamente, valor p<0,0001.

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**Conclusiones:** Un curso de trauma adaptado al medio y su evaluación pueden ser viables en la educación de los proveedores locales. La Sociedad Panamericana de Trauma puede promulgar la aplicación de cursos de formación de trauma básicos que pueden servir como modelo para la educación continua en atención de trauma en los países en desarrollo. La evaluación de seguimiento del curso está pendiente.

**Palabras Clave:** Curso Basico de Trauma, educación en trauma, atención del trauma en LMIC.

## INTRODUCTION

Mortality due to trauma accounts for 5 million deaths every year; 90% occurring in low and middle income countries (LMIC).<sup>1,2</sup> Latin American countries are no exception to this disease, with injuries and noncommunicable diseases claiming 73% of deaths and 76% of disability adjusted life years (DALYs); a number expected to rise by year 2020.<sup>1,3,4</sup>

Rapid urbanization, rural–urban migration, aging of the population, social inequality, a lack of adequate trauma system development, and scarcity of resources are responsible for this epidemiological shift.<sup>3</sup> In addition, a large number of deaths are due to the clinician's failure to identify, investigate, and treat life-threatening injuries; an occurrence that can be improved by allocating resources to health care capacity building, such as medical staff education guided toward initial trauma patient management.<sup>5,6</sup>

An important step to trauma system development is continuing education courses. This was shown to improve the process and outcome of trauma care. Standardized courses for the care of the trauma patient have been developed and successfully used in high-income countries (HIC).<sup>7</sup> Nonetheless, little consideration is given to such courses by developing countries.<sup>8</sup> In addition, trauma courses are rarely available, too costly, or do not mirror the needs of LMIC populations.<sup>7</sup>

In 2003, a basic trauma course (BTC) was developed by the International Trauma System Development Program (ITSDP) of Virginia Commonwealth University (VCU). The ITSDP developed the BTC to educate health care professionals (physicians, nurses, prehospital providers, health administrators) on the assessment and management of the injured patient from resources-limited rural areas to more resource-accessible urban areas. The ITSDP field-tested and validated the course over 5 years in the rural southeastern regions of Ecuador in collaboration with local ministry of health, foundations, and universities, such as Cinterandes Foundation, University of Cuenca, and University of Azuay.<sup>9</sup> In 2011, BTC was formally adopted and promulgated by the Panamerican Trauma Society (PTS), the leading academic trauma society in Central and South American, whose main objective is the development of organized trauma systems across the

Latin region with emphasis on provision of high quality, low cost, continual medical education, and training.<sup>10</sup>

The aim of this study is to evaluate the feasibility of implementation of a BTC for resource-limited areas adopted and promulgated by PTS since 2011.

## MATERIALS AND METHODS

The BTC is a 20-hour didactic and hands-on course administered by a multidisciplinary health care team composed of trauma surgeons, surgery residents, emergency medicine physicians, prehospital care personnel, and medical students.

The course was designed to be applicable and adaptable to existing local resources in Latin America, provided through a patient pathway system; addressing the management of the patient through various echelon of care from rural health centers to local provincial hospital and tertiary treatment facilities.

Didactic lectures included introduction to trauma and EMS, kinematics, evaluation and management, airway, shock and resuscitation, thoracic, musculoskeletal, pediatric, abdominal and pelvic trauma, neurotrauma, triage, thermal injuries, and trauma registry. Skills included initial patient evaluation, X-ray scenarios, EMS communication, kinematic, airway management, skeletal immobilization, thoracic practicum, and preparing the patients for safe transfer. Seven physicians from different countries participated as course instructors; 4 were trauma, critical care, and emergency surgeons (2 USA and 2 Ecuador), 1 general surgeon (Chile), 2 general physicians (Ecuador). Course coordination was undertaken by international and local coordinators and Student Trauma League. The course was delivered during the PTS yearly congress in Paraguay (2011), Colombia (2012), Chile (2013), and Panama (2014). The course targeted rural and emergency medicine physicians, general surgeons, EMS providers, nurses, residents, medical students, and public health workers. A pre and posttest course was used to assess participant baseline knowledge and information retention. Tests consisted of 30 multiple-choice questions. Twelve test topics included airway, head injury, shock, hemorrhage, thoracic trauma, abdominal trauma, pelvic injury, extremity injury, and burn, mechanism of injury, prehospital care, and patient evaluation adjuncts.

A paired t-test was used to compare pre and posttest scores and pre and posttest scores by individual topic. A p-value of less than 0.05 was considered statistically significant.

In addition, an objective structured clinical examination (OSCE), based on course design and one of two trauma scenarios (A or B), was administered to all students at the end of the course. Scenario A corresponded to a patient

fall and scenario B corresponded to a motor vehicle collision; both mechanisms common in LMIC. Each student practiced one scenario and was tested on another, and were randomly assigned. Students were required to communicate patient management following the patient pathway system. Instructors completed a checklist of required categories and subcategories to be addressed by the students. Students were individually scored and given an overall pass or fail, and those with instructor potential were also identified.

A course evaluation form was submitted by participants at the end of the course to score instructors, lectures, and scenarios. At the termination of the course, a certificate of course completion was provided to all participants.

## RESULTS

A total of 54 health care personnel participated in the four courses. Participants included: 2 EMS providers, 16 medical students, 23 general medicine physicians, 2 general surgery residents, 3 general surgeons, 1 ICU physician, 3 nurses, 1 dentist, and 3 firefighters. They all completed both the pretest and the posttest, with 60% considered a passing score. Mean test scores corresponded to 74 and 85%, on pre- and posttest respectively, showing an overall significant improvement ( $p \leq 0.00001$ ).

On pre-test, participants obtained the highest percentage correct in hemorrhage (93%), mechanism of injury (85%), head injury (84%), and pelvic injury (83%). Comparing pre-test to post-test scores, significant improvement was noted in prehospital care (30–79%;  $p < 0.00001$ ), shock (59–96%;  $p < 0.00001$ ), extremity injury (67–95%;  $p < 0.00001$ ), patient evaluation adjunct (72–99%;  $p < 0.00001$ ), and airway (75–98%;  $p < 0.00001$ ). Participants had no improvement in scores in the burns topic (Table 1).

Forty-one of the 54 students participated in the OSCE with a pass rate of 75.6% (31 passed and 10 failed) with >60% in overall score considered as passing. Prehospital management for airway, hemorrhage control and immobilization was adequate and corresponded to 97, 92, and 89% respectively. Students failed at obtaining the patient history (43%). Prehospital communication of mechanism, injury vital signs and transport was adequate (80%). Hospital management was adequate for obtaining a primary evaluation (65%), adjuncts (88%), and transport (71%) but inefficient in secondary patient evaluation (59%) (Table 2). Eleven participants were thought to possess instructor potential.

All 54 participated in course evaluation. The overall evaluation score value corresponded to excellent. Course comments and suggestions included; increase the duration of skills scenarios, insert the corresponding

**Table 1:** Multiple questionnaire test topics

Topic	Pretest (%)	Posttest (%)	p-value
Abdominal trauma	80	80	0.5000
Airway	75	98	0.0000
Burns	80	78	0.4055
Extremity injury	67	95	0.0000
Head injury	84	96	0.0040
Hemorrhage	93	93	0.5000
Mechanism of injury	85	96	0.0285
Patient evaluation adjuncts	72	99	0.0000
Pelvic injury	83	98	0.0019
Prehospital care	30	79	0.0000
Shock	59	96	0.0000
Thoracic trauma	76	87	0.0008
Total test average	74	85	0.0000

**Table 2:** Objective structured clinical examination categories and results

OSCE categories and subcategories*	% Addressed
Rural management	80
History	43
Airway	97
Hemorrhage control	92
Immobilization	89
Prehospital communication	80
Mechanism, injury, vitals, transport	80
Hospital	71
Primary evaluation	65
Secondary evaluation	59
Adjunct	88
Transport	71

\*Objective Structured Clinical Examination (OSCE) grading system is based on the specific categories and subcategories that each student is required to address during the scenario

practicum after each topic instead of at the end in order to reinforce topics and make the course more dynamic, provide more materials to follow, and improve audiovisuals used for the course.

## DISCUSSION

Trauma education has been shown to be beneficial to reduce overall mortality and morbidity in LMIC where resources for effective trauma patient management are scarce.<sup>7,11</sup>

The concept of a “cascading training model” across the nine countries of the College of Surgeons of East, Central and Southern Africa (COSECSA) introduced by Nogaro et al,<sup>12</sup> Peter et al<sup>13,14</sup> is so far one of the largest series in the literature for sub-Saharan Africa. Such concept consists in the implementation of a primary trauma care program in which the primary course is delivered by a team of instructors and is followed by cascading courses to more rural regions led by local instructors.

A similar model was initiated by ITSDP for the creation and promulgation of the BTC with the additional



advantage of leveraging the resources of an academic institution with those of an international society to successfully promulgate the course throughout the Latin region. The course was initially developed by VCU's ITSDP in collaboration with health care providers in the Amazonian provinces of Ecuador as well as University of Azuay and the Cinterandes foundation. In Ecuador, the course is currently being administered by the local providers who were able to promulgate and modify it to fit their local need (personal conversation with Local partners Drs. Rodas and Salamea). The BTC course also served as a national model to be implemented and adopted at an international level through the PTS. It provides basic trauma training for health care workers in LMICs in Latin America taking into account the resources available (in the field, jungle, clinics, hospitals). It specifically provides a targeted approach to trauma based on the available resources along with a systematic approach to managing patients from the initial site of injury at rural health centers and through the various echelon of care to local provincial hospital and tertiary treatment facilities. Additionally, the course can be given to different level of health care providers and is easily reproducible throughout the region.

The role of a Society for the promulgation of a standardized course is essential, and training of international instructors is crucial for course continuation and delivery throughout the Latin America.

We see two approaches for the promulgation and sustainability of a BTC in LMIC. One is through local ownership, and two through an organized and established network as provided by an international society, such as the PTS. The two approaches are not exclusive and lead to external validation of the local efforts in sustaining a continuous education program. Trauma education courses in HICs also generally occur in expensive centers with complex mannequins that are not affordable to LMICs residents, such as the members of the PTS.<sup>6</sup> Through membership in the PTS the delivery of basic training courses could be provided at a significantly low cost making it affordable and feasible to those providers that needed it most. Our data show that the BTC course was successfully implemented in four separate Latin countries, with noted improvement in trauma, knowledge, and management.

Long-term effect of this course has already been validated through our initial study in Ecuador.<sup>9</sup> Evaluation by topic showed deficiencies in areas, such as burns and prehospital care, two areas that have not been greatly developed as part of trauma systems in Latin America.

The PTS has already developed a burn and a prehospital-specific course applicable for the Latin American

region, which highlights again the importance of a committed international society in the continuous education process and the additional resources that it can bring to the table.<sup>10</sup>

A main difficulty from a logistic point of view was the lack of local resources for delivery of the course such as lack of mannequins or airway devices for skills stations; international course coordinators overcame such difficulties by travelling with basic equipment needed for skills scenarios. Current limitations of this study includes lack of data that translates knowledge to clinical care, follow-up examination, and the analysis of all students as one cohort rather than separating them into specialties or by countries. It does not take into effect the geographical differences. This limitation was mainly due to the small sample size between each group, which would preclude a meaningful statistical comparison. We expect this limitation to be resolved as the course is promulgated within each country and the number of participants increase. Future follow-up and analysis are pending; authors will aim to analyze data by site categorization and their comparison and implement measures that will allow quantifying course effectiveness.

## CONCLUSION

A tailored trauma course and evaluation can be feasible in educating local providers. The PTS can promulgate the application of BTCs that may serve as a model for continuing trauma care education in developing countries for the different health care providers.

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