

Trauma Responders Unify to Empower Communities in Santa Cruz, Bolivia: Course Participants and their Feedback

Erica K Ludi¹, Alexandra CW Reitz², Pablo O Peñaranda Dávalos³, Gustavo Moraes dos Santos⁴, Morgan E Jackson⁵, Lucy Lopez Quiroga⁶, Leah C Tatebe⁷, J Esteban Foianini Gutierrez⁸, Mamta Swaroop⁹

ABSTRACT

Introduction: More than half of all trauma deaths occur in the prehospital setting with low- and middle-income countries assuming the greatest burden. Coordinated prehospital responses to trauma, including layperson first responders, can reduce the mortality. Trauma first responder courses (TFRCs) in Bolivia have improved participant knowledge and confidence levels. This study aims to analyze participant baseline characteristics and postworkshop evaluations to inform future course promotion and development.

Materials and methods: Trauma responders unify to empower (TRUE)-Bolivia is a 4-hour didactic and practical TFRC covering scene safety, basic airway management, bleeding control, and pelvic binding. Participants, recruited from Santa Cruz, Bolivia, completing all pre- and post-course assessments were included. Quantitative data were aggregated and analyzed in SAS v9.4 with Chi-square analyses, and qualitative data were analyzed for thematic content in Microsoft Excel.

Results: A total of 269 people, with an average age of 35.4 years, participated in 18 courses. Most participants were male ($n = 211/269$, 78.4%) with $n = 149/253$ (58.9%) working in public transportation, $n = 64/253$ (25.3%) in medical training, and $n = 40/253$ (15.8%) working in other fields. Of the 246 and 205 participants who responded to the safety behavior questions, respectively, 55.7% ($n = 137/246$) of participants wore seat belts less than 50% of the time and 60.5% ($n = 124/205$) wore helmets less than half the time while on a motorcycle. On post-course evaluation, $n = 118/250$ (47.2%) quoted skill acquisition to be the greatest benefit of the course, $n = 37/250$ (14.8%) quoted helping others, and $n = 64/250$ (25.6%) stated a combination of the two. Suggestions for improvement included adding content on burns, head injuries, and cardiopulmonary resuscitation.

Conclusion: Understanding participants' background and incorporating feedback allowed us to tailor the course to participants' interests while maintaining the focus on trauma prevention and initial management. To maximize course impact, a local partnership has been formed with the municipal government to provide the courses to public transportation drivers who are likely to arrive first at a scene of trauma.

Clinical significance: The didactic and practical content of TRUE-Bolivia empowers participants to save lives in the prehospital setting where ambulances can take over an hour to arrive.

Keywords: Community-based education, Course evaluation, Course participation, First response, Trauma.

RESUMEN

Introducción: Más de la mitad de todas las muertes por trauma ocurren en el marco prehospitalario, y los países de ingresos bajos y medianos (LMIC) asumen la mayor carga. La primera respuesta coordinada al trauma, incluyendo la capacitación de los primeros respondedores laicos, puede reducir la mortalidad. Los cursos de primeros auxilios en trauma (TFRC) en Bolivia han mejorado el conocimiento de los participantes y los niveles de confianza. El objetivo del estudio presente se trata con el análisis de las características de referencia de los participantes y las evaluaciones posteriores al taller para informar la promoción y el desarrollo del curso en el futuro.

Materiales y métodos: (Los Respondedores de Trauma se Unifican para Empoderar la Comunidad TRUE)-Bolivia es un TFRC didáctico y práctico de 4 horas que se trata con temas como la seguridad de la escena, el manejo básico de la vía aérea, el control de hemorragias y la faja pélvica. Se incluyeron participantes, reclutados de Santa Cruz, Bolivia, que completaron todas las evaluaciones previas y posteriores al curso. Los datos cuantitativos se agregaron y analizaron en SAS v9.4 con análisis Chi-square, y los datos cualitativos se analizaron para el contenido temático en Microsoft Excel.

Resultados: Un total de 269 personas, con una edad promedio de 35.4 años, participaron en 18 cursos. La mayoría de los participantes eran hombres $n = 211/269$ (78.4%) con $n = 149/253$ (58.9%) trabajando en transporte público, $n = 64/253$ (25.3%) en entrenamiento médico, y $n = 40/253$ (15.8%) trabajando en otros campos. De los 246 y 205 participantes que respondieron a las preguntas de comportamiento de seguridad respectivamente, el 55.7% ($n = 137/246$) de los participantes usaron cinturones de seguridad menos del 50% del tiempo, y el 60.5% ($n = 124/205$) usaron cascos menos de la mitad del tiempo en moto. En la evaluación posterior al curso, $n = 118/250$ (47.2%) citó la adquisición de habilidades como el mayor beneficio del curso, $n = 37/250$ (14.8%) citó ayudar a otros, y $n = 64/250$ (25.6%) declaró una combinación de los dos. Las sugerencias para mejorar el curso incluyeron agregar contenido sobre quemaduras, lesiones en la cabeza, y reanimación cardiopulmonar (RCP).

Conclusión: La comprensión de los antecedentes de los participantes y la incorporación de comentarios nos permitieron adaptar el curso a los intereses de los participantes, manteniendo el enfoque en la prevención del trauma y el manejo inicial. Para maximizar el impacto del curso, se ha formado una asociación local con el gobierno municipal para proporcionar los cursos a los conductores de transporte público que probablemente lleguen primero a una escena de trauma.

Significado clínico: El contenido didáctico y práctico de TRUE-Bolivia facultó a los participantes para salvar vidas en el marco prehospitalario donde las ambulancias pueden tardar más de una hora en llegar.

Palabras clave: Educación comunitaria, Evaluación del curso, Participación en el curso, Primera respuesta, Trauma.

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INTRODUCTION

Trauma and surgical emergencies contribute significantly to the global burden of disease, and the incidence has been increasing over the last 16 years.¹ Approximately, 5.8 million people die each year secondary to trauma and resulting injuries, with 90% of those deaths occurring in low- and middle-income countries (LMICs).^{2–4} In some LMICs, prehospital trauma mortality approaches 40–50%.^{5–8} Specifically in Bolivia, injuries accounted for 6,500 deaths or 9.5% of all-cause mortality and 383,000 or 11.5% of disability-adjusted life years in 2016, with the death toll increasing each year.⁹

Coordinated prehospital system implementation, including ambulance coordination and first responder skill trainings, can reduce prehospital mortality, both in high-income and low-income settings. Implementation of emergency medical systems and prehospital services faces numerous obstacles, including deficits in financial, infrastructural, and human and technical resources, in addition to poor distribution and underutilization of existing assets.^{10,11} Nevertheless, reductions in short- and long-term morbidity and mortality are observed with implementation and successful maintenance.^{10–14} A meta-analysis examining prehospital trauma systems in LMICs demonstrated a 25% decreased risk of mortality for trauma patients in areas with a prehospital trauma system.¹⁵ Paramedics, medical first responders, and trained layperson responders are a crucial component to the success of a prehospital system.^{11,16} Studies analyzing the effects of paramedic and first responder courses in LMICs demonstrated a reduction in prehospital mortality from 27% to 13.5% and 40% to 14.9%, respectively; these effects were sustained long-term.^{7,17,18}

Preliminary research in Bolivia demonstrates that trauma first responder courses (TFRCs) significantly improve confidence and skill levels for first responders.^{19,20} An 8-hour TFRC pilot that took place in 2013 in La Paz and Potosi, Bolivia, with the majority of participants in the medical field demonstrated an improvement in knowledge from 48% to 76% and an increase in confidence on a 5-point Likert scale improving from 4 to 4.5.¹⁹ A modified and condensed version of the course was piloted in Santa Cruz de la Sierra, Bolivia, in November and December 2018 to a majority layperson audience. Similar and significant improvements in knowledge (33% pretest vs 59% posttest) and first aid provision confidence (3.65 pre-course to 4.5 post-course) occurred.²⁰ Knowing the course to be effective, wider dissemination ensued in partnership with the Santa Cruz Municipal Government.

While the effectiveness of these courses and the impact on trauma morbidity and mortality is established, limited information exists in the literature regarding participant characteristics and course feedback. A better understanding of participant demographics and current safety behaviors could allow for more tailored course content potentially maximizing short- and long-term information retention. We hypothesize the resulting demographic and feedback analysis to provide a structure for course modification, improved teaching strategies, and more advanced course development.

MATERIALS AND METHODS

Trauma responders unify to empower (TRUE) the community is an evidence-based, bystander trauma first aid training course developed by surgeons and community members for use in an urban, US city.²¹ The TRUE course and the 8-hour pilot TFRC in

^{1,2}Department of General Surgery, Emory University, Atlanta, Georgia, USA

³Health Services Department, State Government, Santa Cruz de la Sierra, Santa Cruz, Bolivia

⁴Department of Surgery, Universidad Aquina de Bolivia School of Medicine, Santa Cruz de la Sierra, Santa Cruz, Bolivia

^{5,9}Department of Surgery, Division of Trauma and Critical Care, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA

⁶Urban Mobility Sector, Municipal Government, Santa Cruz de la Sierra, Santa Cruz, Bolivia

⁷Department of Surgery, Northwestern University, Chicago, Illinois, USA; Department of Trauma, Cook County Health, Chicago, Illinois, USA

⁸Department of Surgery, Clínica Foianini, Santa Cruz de la Sierra, Santa Cruz, Bolivia

Corresponding Author: Erica K Ludi, Department of General Surgery, Emory University, Atlanta, Georgia, USA, Phone: +1 404-727-4310, e-mail: eludi@emory.edu

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Conflict of interest: None

Potosi and La Paz¹⁹ were utilized to develop a condensed didactic and practical TFRC in Spanish: TRUE-Bolivia.

Course participants were recruited in Santa Cruz, Bolivia, with the assistance of the state-level Department of Health, the municipal-level urban mobility branch of government, and a local university. In the recruitment material, the course was advertised to all community members, including medical providers, students, police, firefighters, and laypersons. Direct communication with community leaders, flyers, and WhatsApp messages were used to recruit participants. No participants were excluded in the recruitment phase. All participants signed a written or virtual consent upon enrolling in the course.

TRUE-Bolivia takes place over 2 days with a 2-hour didactic session and a 2-hour practical session. The didactic session includes the written consent, a 12-item baseline demographic survey, and a 9-question pre-course knowledge assessment. It also includes an hour lecture that covers universal precautions, scene safety, safe victim transfers, basic airway management, bleeding control, and pelvic binding. The practical session includes four hands-on skill stations, a nine-question post-course knowledge assessment, and a course evaluation. Participants who completed all pre- and post-course assessments were included in this study. Participants who only attended one session or who did not complete all four of the evaluations were excluded.

The baseline demographic assessment is distributed virtually or by hand, and all other assessments are completed by hand in person. After completion of the course, the assessments are coded and de-identified. For this study, SAS v9.4 was used to perform Chi-square analyses. Qualitative data were analyzed and coded by

thematic content. Primary outcomes of the study include providing descriptive analytics of the characteristics of the participants in this course and their feedback. Secondary outcomes included examining how safety behaviors, previous trauma experiences, and feedback provided varied based on participant occupation. This study was approved by the Northwestern Institutional Review Board and the local Department of Health.

RESULTS

Between November 1, 2018, and September 30, 2019, 18 courses took place. While 418 participants enrolled in the course and attended at least one session, 269 participants (64%) completed the entire course, attending both the didactic and practical sessions and completing all pre- and post-course assessments. There were an average of 15 people in each session.

Baseline Assessment

Primary Outcomes

Average age of the course participants was 35.4 years ($n = 250$) with a range of 16–74 years, and $n = 211/269$ (78.4%) were male ($p < 0.001$). Regarding education, $n = 80/260$ (30.8%) were university educated, $n = 136/260$ (52.3%) completed high school, $n = 39/260$ (15%) completed primary school, and $n = 5/260$ (1.9%) did not complete any type of formal education ($p < 0.001$). For current employment, $n = 149/253$ (58.9%) reported working in public transportation, $n = 64/253$ (25.3%) were in medical training, and $n = 40/253$ (15.8%) worked in education, house labor, or another field ($p < 0.001$). The majority of participants ($n = 162/259$, 62.5%) had no prior first-aid course exposure ($p < 0.001$).

Almost 90% $n = 239/269$ (88.8%) of participants witnessed a traumatic event in the previous 6 months, including road traffic incidents ($n = 198$), falls ($n = 103$), burns ($n = 48$), attacks with or without firearms ($n = 32$), or another type of trauma ($n = 29$). When questioned whether they provided any type of first aid during or after the witnessed traumatic event, 56.3% ($n = 135/240$) reported they did not. "I did not know what type of medical assistance was needed" or "I had other responsibilities and couldn't stay to help" were cited as the most common reasons for not helping. Nevertheless, $n = 73/228$ (32%) reported transferring the injured in their own vehicle after an event ($p < 0.001$), and 38.7% ($n = 83/214$) admitted witnessing the death of a victim in the street or knew someone who died at the scene of a trauma incident ($p < 0.001$).

The baseline survey additionally asks about safety behaviors and trauma preventative measures. Regarding seatbelt use, $n = 41/246$ (16.7%) participants reported never ("0% of the time") wearing a seatbelt when driving or riding in a car, and $n = 96/246$ (39.0%) reported only wearing a seatbelt 25–50% of the time while in the car. On the contrary, 27.6% of participants report wearing a seatbelt 100% of the time ($p = 0.005$). When asked about helmet use while riding a motorcycle or bicycle, $n = 87/205$ or 42.4% reported never wearing a helmet, and only $n = 37/205$ (18.0%) wear a helmet 25–50% of the time. While $n = 64/205$ (31.2%) wear helmets 100% of the time while on a motorcycle or bicycle ($p < 0.001$).

Secondary Outcomes

In a subset analysis, 27.0% ($n = 38/141$) of public transportation drivers had participated in a previous first-aid course at some point in the past compared with 70.3% ($n = 45/64$) of the participants in medical training ($p < 0.001$). When asked about any previous trauma

exposure, $n = 135/149$ (90.6%) observed one of some kind, whereas $n = 61/64$ (95.3%) medical providers witnessed a traumatic event ($p = 0.25$). Looking at differences in safety behaviors between the two groups, 38.9% ($n = 58/149$) of transportation drivers reported wearing their seatbelts 75% of the time or greater, and 46.9% ($n = 30/64$) of medical providers wore their seatbelts 75% of the time or more ($p = 0.28$). A total of 26.8% ($n = 40/149$) of transportation drivers reported wearing a helmet greater than 75% of the time while riding a bike or motorcycle when compared with 37.5% of medical providers ($n = 24/64$; $p = 0.12$).

Post-course Evaluation

Primary Outcomes

On post-course evaluation, participants were asked to evaluate course content and provide recommendations for improvements. On a 5-point scale, participants rated the themes of the course as 4.64/5 ($n = 245$) on average and the general content of the course as 4.55/5 ($n = 237$). In free response, $n = 118/250$ (47.2%) quoted skill acquisition as the greatest benefit of the course, $n = 37/250$ (14.8%) quoted helping others or saving a life as most notable, and $n = 64/250$ (25.6%) stated a combination of the two.

The majority of participants found the course to be useful ($n = 247/254$, 97.2%), would recommend it to a friend or colleague ($n = 255/261$, 97.7%), and learned a technique they would use in the future ($n = 262/265$, 98.9%). When asked specifically what technique they deemed most helpful or useful, $n = 126/234$ (53.8%) mentioned hemorrhage control (direct pressure, tourniquet application, or pelvic binding), $n = 43/234$ (18.4%) mentioned basic airway management, $n = 28/234$ (12.0%) said victim transfers, and $n = 59/234$ (25.2%) made a general comment about the overall course and the ability to provide first aid in the future.

Thematic Review

To improve the course content, participants were asked to evaluate the themes of the course. The majority of participants did not want to eliminate any theme from the didactic lecture ($n = 247/254$, 97.2%) or any content from the practical session ($n = 235/244$, 96.3%). Nearly half ($n = 122/248$) of the participants wanted to add a theme to the didactic portion. The most common suggestions were cardiopulmonary resuscitation (CPR; $n = 33$), burn injury management ($n = 16$), more advanced first-aid courses ($n = 4$), and road traffic safety courses ($n = 4$). Almost 30% ($n = 71/246$) suggested adding a skill to the practical session including CPR ($n = 20$) and Heimlich maneuver for choking or more advanced airway management ($n = 8$). Other suggestions included adding more practical stations, more videos, management of head and neck injuries, snake bite management, mass casualty events, and offering more courses in general.

Participants were also given the opportunity to give general feedback on the course at the end of the evaluation. Most comments were appreciative or included further feedback on how to improve the course in the future. A few examples include "I liked this workshop that they taught and presented to us. It was understandable and had very clear objectives. I give thanks to them for teaching us so much and for bringing us confidence," "This course was beautiful, and [I hope] it's not the first and not the last. My suggestion would be to plan another workshop but add more advanced themes about first aid," and "This is a very important course for daily life that thanks to you all I can now help any victim from any trauma that they have suffered."

Secondary Outcomes

To determine whether course feedback differed based on occupation, the most helpful learned skills and course improvement recommendations were compared across transport drivers and medical providers. Respectively, transportation drivers and medical providers mentioned bleeding control (40.2% vs 65.6%, $p < 0.001$), victim transfers (7.3% vs 21.8%, $p < 0.001$), airway management (16.8% vs 14.1%, $p = 0.62$), and “everything” (25.5% vs 12.5%, $p = 0.03$) as the most helpful techniques learned ($p < 0.001$). When asked if they would like to add any themes to the course, $n = 42/64$ (65.6%) medical providers provided written suggestions in contrast to $n = 37/149$ (24.8%) transportation drivers ($p < 0.001$). Medical providers more frequently requested CPR ($n = 22/42$) and advanced trauma training, such as advanced trauma life support and burn management. The transportation drivers similarly requested CPR ($n = 4/37$) but also asked for education in road safety, fire evacuation, and pregnancy-related emergencies.

DISCUSSION

This descriptive review is one of the first of its kind taking an analytic approach to understanding the composition of course participants in a trauma first-aid course and interpreting their feedback. Demographic analysis demonstrates the majority of participants are young males with primary- and secondary-level education working in transportation. Considering this course was adapted from previous courses in Chicago and other cities in Bolivia, the authors were interested to determine whether the courses reached different demographics. Compared with TRUE-communities participants in Chicago with a population average age in their 20s and 39.7% male participants²¹ and the TFRC in La Paz and Potosi, Bolivia, with an average age of 32 years and 43.6% male,¹⁹ TRUE-Bolivia participants are more predominantly male (78.4%) and older (35.4 years) on average. The participants in Chicago are mostly recruited through community groups with courses taking place in high schools while the TFRC in La Paz and Potosi was predominantly with medical professionals (88%). The majority of participants being public transportation drivers in our study population likely accounts for these differences.

Similar to a first-aid course provided to taxi and bus drivers in Ghana,²² the majority of participants in this TRUE-Bolivia study completed a primary or secondary level of education, and 88.8% witnessed a prior traumatic event (almost identical to the 88% in the Ghanaian study). Interestingly, only 13% of participants in the Ghanaian study had prior first-aid training vs 37.5% of TRUE-Bolivia participants. However, 82% of Ghanaians provided assistance at the scene of the witnessed traumatic event compared with 43.7% of TRUE-Bolivia participants. There is likely a multifactorial explanation for this great difference in providing first aid at the scene. TRUE-Bolivia participants reported not only a lack of knowledge and other obligations preventing them from providing first aid but also reported legal fears. Medicolegal consequences have been a reoccurring concern during didactic sessions in multiple courses. In Ghana, a Good Samaritan law exists to protect laypersons in case an error occurs during the provision of first aid on the scene, but no laws or equivalent protections exist in Bolivia. Moreover, at times, police implicate bystanders in the incident or the injury of the victim, which serves as a serious disincentive to assist, similar to another study that identified medicolegal issues as a barrier to providing emergency care in Uganda.²³ Our study suggests enacting protective legislation may be beneficial to

improve prehospital bystander interventions. At the same time, we are increasing participant confidence and knowledge with signed certificates by the Urban Mobility Sector of the Municipal Government to empower participants to assist victims at the scene of a trauma within the scope of our course's instruction.

On post-course evaluation, the overwhelming majority found the TRUE-Bolivia course to be useful and learned skills they would use in the future. Almost all participants mentioned they learned something new and/or felt they would be able to save a life or provide first aid in the future. Similar to TRUE-communities in Chicago where 97.1% of participants would recommend the course to a colleague, 97.7% of participants would recommend the TRUE-Bolivia course. Noting the positive experience of participants in the course and providing the feedback to stakeholders helps sustain the course, improve its distribution, and ensure that the target audience is reached. In an environment like Santa Cruz, Bolivia, where ambulances can take more than an hour to arrive, and trauma accounts for 8 of the top 20 causes of prehospital death,²⁴ a course like TRUE-Bolivia empowers participants to help at the scene of a trauma.

Limitations of this study include those intrinsic to a course with participant attrition and a primarily survey-based study. Only 64% of participants who enrolled or arrived to a portion of the course actually completed the entire course and all four assessments. Therefore, there is an inherent selection bias in the final sample that was included for analysis. While beyond the scope of this study, future investigation will include analyzing statistical differences between these two populations and determining ways to improve participant retention in the course. Next, the baseline demographic survey requests information on safety behaviors or trauma event observations that took place in the last 6 months which can be subject to recall bias. Additionally, the pre- and post-course evaluations are not anonymous at the time of completion (coding takes place after the completion of the entire course), so there is a risk for providing answers that may appease study investigators instead of more honest responses that might be affiliated with a truly anonymous survey. Another limitation of this study is related to longitudinal skills decay. Poor knowledge retention is a well-known phenomenon of didactic courses, and our study does not include a long-term follow-up. Future directions of this study will include a 6–12-month follow-up survey.

CONCLUSION

In conclusion, the descriptive analysis presented here demonstrates that collaboration with local organizations allowed an effective layperson TFRC, TRUE-Bolivia, to be delivered to a population in Santa Cruz, exposed to many trauma incidents, but lacking knowledge and/or confidence to provide assistance. Participant feedback assists with course revisions while overall maintaining the focus on trauma prevention and initial victim management. TRUE-Bolivia empowers participants through didactic instruction and practical skill development. The hope is that this course will translate to decreased prehospital morbidity and mortality associated with trauma. Future investigation is needed to evaluate long-term knowledge retention and utilization of learned techniques.

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