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## The development and implementation of a layperson trauma first responder course in La Paz, Bolivia: A pilot study<sup>☆</sup>

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### ABSTRACT

**Background:** Ninety percent of nearly five million annual global injury deaths occur in low- and middle-income countries (LMICs), where prehospital care systems are frequently rudimentary or nonexistent. The World Health Organization considers layperson first-responders as essential for emergency medical services in low-resource settings lacking more formalized systems. This study sought to develop and implement a layperson trauma first responder course (TFRC) in Bolivia.

**Materials and methods:** In March and April 2013 nine sessions of the eight-hour TFRC were held in La Paz, Bolivia. The course charged a nominal fee, and was led by an American surgeon and medical student. The TFRC built upon existing models with local stakeholder input, and included both didactic and practical components. Participants completed a baseline survey, and pre and posttests. The primary outcome was test performance, with secondary outcomes including demographic sub-group test score analyses and exam question validation. Data were assessed using nonparametric and psychometric methods

**Results:** One hundred fifty-nine individuals met study inclusion criteria. Participant median age was 28 (IQR 24, 36), 49.1% were male, 59.1% worked in a medical field, most had secondary (35.2%) or university (56.0%) level educations, and 67.3% had prior first aid training. Median test scores improved after course completion (48% vs. 76%,  $p < 0.001$ ), along with skill confidence (4 vs. 4.5,  $p < 0.001$ ). Most questions had appropriate item difficulty indices, point bi-serial correlation coefficients, and positive Pretest Posttest Difference Indices. Cronbach alpha coefficients for pre and posttest scores were 0.72 and 0.78, respectively.

**Conclusions:** This study presents data from the first offering of an original TFRC for laypeople in Bolivia. Increased participant knowledge and skill confidence after course completion, and acceptable overall psychometric test properties, indicate this model is valid and effective. Future aims include TFRC revision, and enrollment of more layperson first responders to increase population-level impacts.

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### Introduction

Ninety percent of nearly five million annual global deaths due to injuries occur in LMICs, highlighting a global disparity in trauma mortality [1]. While injury deaths in high-income countries are declining, the burden shouldered by LMICs is increasing [2]. Moreover, injury rates are projected to rise further as LMICs become progressively more industrialized and grow in population, with the development of appropriate infrastructure and safety measures lagging behind [2]. Furthermore, the traditional

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**Table 1**  
Exam Questions and Answers.

Pre (Post) <sup>a</sup>	Question	Pre (Post)	Answers <sup>b</sup>
1 (6)	The most secure way to stop bleeding is:	1 (2) 2 (1) 3 (4)	Using a tourniquet Pouring clean water on wound <b>Applying direct pressure &amp; elevating the wound</b>
2 (4)	When approaching the scene of an accident, the first step should be:	4 (3) 1 (1) 2 (3) 3 (2)	Elevating the wound & using a tourniquet Run to the victim Triage the victims <b>Make sure the scene is safe for you and others</b>
3 (12)	When evaluating an injured patient, what is the first thing you should do?	4 (4) 1 (2) 2 (3) 3 (1) 4 (4)	Continue driving carefully Check if he/she is bleeding Assess for signs of injuries Move the patient into a vehicle <b>Check if he/she is breathing</b>
4 (9)	What is the best position for transporting an unconscious patient who does not present with a trauma?	1 (2) 2 (1) 3 (3) 4 (4)	Lying on their back <b>Lying on their side</b> Lying on their abdomen Sitting upright
5 (15)	In an emergency, when transporting someone to a health facility, it is important to drive as fast as possible because it will make a difference because the patient's life is at risk.	1 (1) 2 (2)	True <b>False</b>
6 (16)	The "safety zone" around the scene in case of spills of hazardous materials must be at least:	1 (4) 2 (3) 3 (2) 4 (1)	30 m/100 ft 15 m/50 ft <b>6 m/20 ft</b> 3 m/10 ft
7 (17)	In case of mass casualties, you should prioritize the evaluation of the person who is:	1 (1) 2 (3) 3 (2) 4 (4)	Shouting for help Has a fractured leg and it is bleeding <b>Is not breathing and is turning blue</b> Has no breathing or pulse
8 (13)	For the unconscious patient, the first priority is to:	1 (2) 2 (3) 3 (4) 4 (1)	<b>Open the mouth with chin lift or jaw thrust</b> Keep warm with a blanket Begin CPR immediately Swipe mouth with two fingers to see if there's an object
9 (8)	When using a tourniquet to stop bleeding, you should:	1 (2) 2 (3) 3 (1) 4 (4)	Keep the bleeding site covered <b>Write the time of application on the victim's forehead</b> Make sure it is not too tight so it does not cut off all blood circulation in the extremity Never use a tourniquet to control bleeding
10 (5)	A patient with a pelvic fracture can lose up to:	1 (1) 2 (2) 3 (3) 4 (4)	$\frac{1}{2}$ L of blood 1L of blood <b>5L of blood</b> Not much blood because the pelvis has no blood vessels
11 (19)	Splinting of a fractured extremity is important because:	1 (1) 2 (2) 3 (3) 4 (4)	Alleviates pain Limits blood loss Facilitates transport <b>All of the above</b>
12 (24)	Splints should:	1 (2) 2 (1) 3 (3) 4 (4)	Be made as tight as possible Provide support only at the site of the injury <b>Should be long enough to immobilize the joints above and below the injury</b> A splint should not be used because it may worsen the injury
13 (2)	When there exists an impaled object, you should:	1 (2) 2 (3) 3 (1) 4 (4)	Remove it as fast as possible Cut the protruding portion of the object Pour water and keep it wet <b>Protect the object and maintain its position using bulky dressing around it</b>
14 (14)	In a burned patient:	1 (2) 2 (3) 3 (4) 4 (1)	Complete burns (3rd degree) are painful and moist Superficial burns (1st degree) should be treated with ointments or creams <b>Blisters indicate a 2nd degree burn</b> Blisters should be excised as soon as possible
15 (25)	When at a mass casualty scene, you should ask:	1 (3) 2 (1) 3 (4) 4 (2)	<b>Those who can walk to walk away from the scene</b> Those who can't move should wait until help arrives Victims to divide themselves in groups of 4 to facilitate their transport Do not approach mass casualty scenes until help arrives
16 (7)	When there are body fluids you should:	1 (3) 2 (1)	Use clean cotton materials to absorb the fluids Pour vinegar on the area of your body that is in contact with the fluids

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