

# Development of a Comprehensive Trauma Training Curriculum for the Resource-Limited Environment

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**OBJECTIVE:** The goal of this project was to create a multitiered trauma training curriculum that was designed specifically for the low-resource setting.

**DESIGN:** We developed 2 courses designed to teach principles and skills necessary for trauma care. The first course, "Emergency Ward Management of Trauma (EWMT)," is designed to teach interns the initial assessment and stabilization of trauma patients in the emergency ward. The second course for mid-level surgical residents, "Surgical Techniques and Repairs in Trauma for the Low-resource Environment" (STaRTLE), is a cadaver-based operative trauma course designed to teach surgical exposures and techniques. The courses were rolled out at Mbarara Regional Referral Hospital in the low-income country of Uganda. Precourse and postcourse tests and surveys were administered.

**SETTING:** This study took place at Mbarara Regional Referral Hospital (MRRH). This is a hospital in southwest Uganda with a subspecialty care, a medical school, nursing school, and multiple residency programs.

**PARTICIPANTS:** Students in the EWMT course were interns at MRRH. After 1 year of training, most of these

interns will become medical officers as the only provider at a district hospital in Uganda. The students in the STaRTLE course were second-year residents in the general surgery program at MRRH.

**RESULTS:** Scores on knowledge based tests improved significantly with both courses. Survey results from the EWMT course suggest that participants feel better prepared to care for the injured patient (median Likert [IQR]: 5.0 [5.0-5.0]) and that their practice improved (5.0 [5.0-5.0]). Similarly, following the STaRTLE course we found participants felt significantly more comfortable with performing 20 of the 22 operative procedures taught.

**CONCLUSIONS:** These courses represent a feasible, cost-effective, and resource appropriate trauma education curriculum that if standardized and implemented may improve trauma care and outcomes in the resource-limited setting. (J Surg Ed ■■■-■■■. © 2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** trauma, curriculum development, low and middle-income country (LMIC), Uganda, low-resource setting

**COMPETENCIES:** Patient Care and Procedural Skills

## INTRODUCTION

Injury represents a growing global healthcare crisis. Today, injury accounts for 10% of the global burden of disease<sup>1</sup>; which is 32% more than malaria, TB and HIV combined.<sup>2</sup> Traumatic injuries are the leading cause of death for 15 to 29 year olds, are responsible for nearly 6 million deaths

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Resource-Limited Trauma Curriculum.

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annually, account for 11% of lost disability-adjusted life-years, and cause gross domestic product losses of nearly 3%.<sup>3-5</sup> What makes these statistics even more disconcerting is the fact that this is a problem that is only expected to worsen. For example, although road traffic injuries alone are the fifth leading cause of death worldwide today<sup>6</sup> they are projected to rise to be the third leading cause by 2030.<sup>7</sup>

Low- and middle-income countries (LMICs) are most affected by the burden of traumatic injuries with 90% of the nearly 6 million annual global injury related deaths occurring in LMICs.<sup>6,8</sup> The potential number of lives saved by improving the care of the injured patient in LMICs is staggering, with Mock et al.,<sup>9</sup> estimating that almost 2 million lives could be saved if the injury related mortality in LMICs were to be brought down to the current level in high-income countries (HICs). Needs assessment surveys in some low-resource settings have shown a lack of knowledge, skills, and experience in the care of the trauma patient and highlight this as one of the highest priority areas for improvement.<sup>8,10,11</sup> Despite this, there is no consistent trauma-related education in LMICs and, as a result, the vast majority of frontline healthcare workers in LMICs take care of the multiply injured patient with no formal training in trauma.<sup>12-14</sup>

Improving the care of the injured patient requires a multipronged approach aimed at both improving trauma-related education and knowledge while also working to build effective and sustainable trauma systems and infrastructure.<sup>15-17</sup> In addition, education of frontline providers is one of the 11 core Essential Trauma Care services that should be considered a “Right of the Injured” according to the Essential Trauma Care Project.<sup>18</sup> In HICs this trauma education occurs through several courses like those established by the American College of Surgeons, such as the Advanced Trauma Operative Management (ATOM) and Advanced Surgical Skills for Exposure in Trauma (ASSET) courses.<sup>19-22</sup> Although the efficacy of these courses is well-established in HICs, in their current form these courses are not entirely relevant for the low-resource setting.<sup>23-26</sup> Moreover, the cost associated with running these courses as they are currently designed makes feasibility and sustainability in the low-resource setting a challenge.

We sought to establish a relevant, educational, and cost-effective trauma education curriculum for the low-resource setting. To that end, we created a multitiered curriculum aimed at teaching the appropriate management of the injured patient in the emergency ward (EW) and in the operating theater. To the best of our knowledge no other trauma-related education curriculum designed for low-income countries has incorporated operative skills training in this way. Some courses developed in HICs, such as the Definitive Surgical Trauma Course, have been run in upper-middle income countries such as South Africa<sup>27</sup> but none

have been developed and implemented in a low-income country like Uganda. Herein, we report on the details of the educational curriculum and the results from a pilot roll-out at a regional referral hospital in Uganda.

## MATERIALS AND METHODS

### Setting

Mbarara Regional Referral Hospital (MRRH) is a 400-bed, regional referral hospital in southwest Uganda that serves a catchment area of over 4 million people and is the specialty referral center for a region of 8 million.<sup>28,29</sup> It is a government hospital associated with a university, medical school, and nursing school with residents training in various specialties. The hospital has an intensive care unit, 4 operating theaters, 5 anesthesiologists, and 11 surgeons—including surgical subspecialists. The subspecialist surgeons include an orthopedic surgeon, a neurosurgeon, a pediatric surgeon, and a plastic surgeon. There is no trauma surgeon.

### Emergency Ward Management of Trauma Course

The Emergency Ward Management of Trauma (EWMT) course was designed to teach a systematic approach to the initial assessment and stabilization of the trauma patient. It also includes procedures that can be performed in EW and decision making for appropriate disposition of the injured patient. This course was targeted toward intern physicians because these individuals are typically the first to provide care to injured patients in the EW.

We used several existing courses as models when designing the curriculum. These courses included Advanced Trauma Life Support,<sup>21</sup> Primary Trauma Care (PTC),<sup>23</sup> Tactical Combat Casualty Care,<sup>30</sup> and the Pan-American Trauma Society’s Essential Trauma Course.<sup>31</sup> With the exception of PTC, these courses were primarily targeted toward the medium and high-resource setting. As such, significant modifications were made both to the content and the equipment necessary to teach the course to make it relevant and feasible for the low-resource setting.

The end result was a 2-day course that combines didactics with skills stations and moulage scenarios. The lecture topics and details of the skills stations, including materials necessary, are listed in [Table 1](#). In order to teach all of the interns with minimal disruption to clinical duties the course was taught 2 times over the course of 1 week.

### Surgical Techniques and Repairs in Trauma for the Low-Resource Environment Course

The Surgical Techniques and Repairs in Trauma for the Low-Resource Environment (STaRTLE) course was designed to teach mid-level surgical trainees how to manage

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