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Research review

Surgical and trauma care in low- and middle-income countries: a review of capacity assessments



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ABSTRACT

Background: Surgical and trauma capacity assessments help guide resource allocation and plan interventions to improve care for the injured in low- and middle-income countries (LMICs). To forge expert consensus on conducting these assessments, we undertook a systematic review of studies using five tools: (1) World Health Organization's (WHO) Guidelines for Essential Trauma Care, (2) WHO's Tool for Situational Analysis to Assess Emergency and Essential Surgical Care, (3) Personnel, Infrastructure, Procedures, Equipment, and Supplies tool, (4) Harvard Humanitarian Initiative tool, and (5) Emergency and Critical Care tool.

Materials and methods: Publications describing utilization of survey instruments to assess surgical or trauma capacity in LMICs were reviewed. Included articles underwent thematic analysis to develop recommendations. A modified Delphi method was used to establish expert consensus. Experts rated recommendations on a Likert-type scale via online survey. Consensus was defined by Cronbach's $\alpha \geq 0.80$. Recommendations achieving agreement by $\geq 80\%$ of experts were included.

Results: Two hundred and ninety-eight publications were identified and 41 included, describing evaluation of 1170 facilities across 36 LMICs. Nine recommendations were agreed upon by expert consensus: (1) inclusion of district hospitals, (2) inclusion of highest level public hospital, (3) inclusion of private facilities, (4) facility visits for on-site completion, (5) direct inspections, (6) checking surgical logs, (7) adaptation of survey instrument, (8) repeat assessments, and (9) need for increased collaboration.

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Conclusions: Expert recommendations developed in this review describe methodology to be employed when conducting assessments of surgical and trauma capacity in LMICs. Consensus has yet to be achieved for tool selection.

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Introduction

Injuries are a leading cause of mortality and morbidity worldwide, accounting for 10% of deaths and 16% of disability.^{1,2} Low- and middle-income countries (LMICs) disproportionately bear the burden, with more than 90% of the 5.8 million annual deaths due to injuries.¹ Young adults (15–29 year olds) in particular are affected, with road traffic injuries (RTIs), homicide, and suicide as the first, fourth, and fifth leading cause of death in this age group worldwide.^{1,2} As a result of growing populations and urbanization, it is estimated that by 2030 there will be a 30%–40% increase in the number of deaths due to injury, and RTIs will jump to being the third and fifth leading cause of Disability Adjusted Life Years and deaths, respectively.^{2,3}

Although health policy priorities in LMICs have traditionally focused on communicable diseases and child and maternal health, attention has recently turned toward trauma care and, more broadly, surgical care as important to consider in global health policy and interventions.^{4–14} An estimated two million lives annually could be saved if injury mortality rates in LMICs were the same as high-income countries, and 52 million Disability Adjusted Life Years averted if basic surgical care was scaled up in LMICs.^{15,16} The economic benefit from such a reduction in mortality and morbidity would be substantial, as RTIs alone cost countries between 1%–5% of their gross national product annually.² This shift in focus was codified by the World Health Assembly's (WHA) resolutions 60.22 and 68.15, passed in 2007 and 2015, respectively, which called on the World Health Organization (WHO) and its member governments to place an increased priority on emergency and trauma care services and to include surgical and anesthesia care as components of universal health coverage.^{11,17}

To make improvements in surgical and trauma care, health care facilities in LMICs need a means of assessing their systems to identify areas for targeted interventions.^{4,9–12,15,18–22} Although several survey instruments are available for conducting evaluations of surgical and trauma care capacity in LMICs, there is no literature describing how to most effectively conduct such assessments. With the passing of the WHA resolutions focusing on the development of surgical and trauma care systems, it is important to reach a consensus on the methodology of conducting these assessments to focus capacity building and follow progress in LMICs. This review aims to discuss the development and utilization of the WHO's Guidelines for Essential Trauma Care (Guidelines), WHO's Tool for Situational Analysis to Assess Emergency and Essential Surgical Care (TSAEESC), Personnel, Infrastructure, Procedures, Equipment, and Supplies (PIPES) tool, Harvard Humanitarian Initiative (HHI) tool, and Emergency and Critical Care (EaCC) tool; as well as to establish expert consensus on the most effective methodology to be employed with each

when conducting assessments of surgical and trauma care capacity in LMICs.

Methods

Tools for evaluation of trauma and critical care capacity

In 2001, the International Association for Trauma Surgery and Intensive Care formed a Working Group for Essential Trauma Care. Over the next 2 years, in coordination with the WHO's Violence and Injury Prevention group and trauma care providers from around the world, the Working Group developed the Guidelines.^{22–24}

Released in 2004, the Guidelines outline 11 essential trauma care services that should be available to every injured person around the world, regardless of their country's income status (Table 1). In addition, the accompanying survey checklist presents 260 individual human and physical resources necessary to provide the essential trauma care services. Checklist items are each rated as not applicable, absent, inadequate, partially adequate, or adequate. The Guidelines thus serve as a framework from which LMICs can make improvements to their trauma care systems.^{22,25–28} Since 2004, the Guidelines have been used to evaluate trauma care capacity in at least 12 LMICs.^{29–42}

Table 1 – Essential trauma services: “Needs of the injured patient.”²²

Obstructed airways are opened and maintained before hypoxia leads to death or permanent disability
Impaired breathing is supported until the injured person is able to breath adequately without assistance
Pneumothorax and hemothorax are promptly recognized and relieved
Bleeding (external or internal) is promptly stopped
Shock is recognized and treated with intravenous (IV) fluid replacement before irreversible consequences occur
The consequences of traumatic brain injury are lessened by timely decompression of space occupying lesions and by prevention of secondary brain injury
Intestinal and other abdominal injuries are promptly recognized and repaired
Potentially disabling extremity injuries are corrected
Potentially unstable spinal cord injuries are recognized and managed appropriately, including early immobilization
The consequences to the individual of injuries that result in physical impairment are minimized by appropriate rehabilitative services
Medications for the above services and for the minimization of pain are readily available when needed

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