

Measuring Functional and Patient-Reported Outcomes After Treatment of Mutilating Hand Injuries: A Global Health Approach



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KEYWORDS

- Patient-reported outcomes • Impairment and disability • DALY • Global health
- Mutilating upper extremity trauma

KEY POINTS

- Measuring outcomes after mutilating upper extremity trauma is key to understanding disability after these injuries, and holds major implications for addressing the global burden of extremity trauma.
- Patient-reported outcomes are necessary for understanding disability and associated quality of life after these injuries.
- Owing to the complexity and variability of massive upper extremity trauma, understanding outcomes requires a multimodal approach, along with improvements in data collection.
- Using outcomes measures to determine disability after extremity trauma is critical to understanding the value of associated surgical care delivery and resource use.

INTRODUCTION

Inadequate access to high-quality surgical services is a notable gap in the World Health Organization's (WHO) goal of improving health care delivery for all nations.^{1,2} This is especially true of surgical services related to trauma, because injuries account for the greatest annual welfare lost among low and middle-income countries.^{3,4} To address the deficit of surgical services, various organizations have aligned to understand and

improve access to safe surgery and anesthesia to meet 80% of the world's needs by 2030.² The foundation of this objective lies in the coordination of multiple disciplines, including governmental organizations, nongovernmental organizations, local physicians and surgeons, and international funding sources. To achieve this 80% goal, we must first understand the global burden of surgical conditions and the resultant impact on society.⁵

Trauma to the upper extremity accounts for the majority of musculoskeletal trauma in wealthy as

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well as developing nations.^{4,6-10} Musculoskeletal trauma is projected to contribute 20% of the overall global burden of disease by 2020, owing largely to disability caused by these injuries.¹¹ Disease burden is magnified with upper extremity injuries when considering many patients who sustain these injuries are young and otherwise healthy, with much of their productivity and financial stability depending on working with their hands.^{9,12-14} In developing nations, where machinery and motor vehicle injuries are more common, mutilating upper extremity trauma is a frequent cause of disability and resultant loss of productivity.^{11,15,16}

Disability reflects limitations in an individual's cognitive or physical capacity that prevents completion of activities of daily living (ADLs).¹⁷ Vulnerable populations, including those living in lower income nations, experience disability with greater prevalence than those in higher income nations.¹⁸ As a result of a growing population of people with chronic illnesses and age-related diseases, the WHO has recently launched new programs to invest in services for the disabled and improve public awareness of these conditions.¹⁹

Another focus for the WHO has been on improving research strategies and quantification of data important to improving conditions among those with disabilities. The disability-adjusted life-year (DALY) is one of the most commonly used metrics to define the economic consequences and effects of morbidity and mortality on the burden of disease (Fig. 1). Introduced in the World Development Report in 1993, DALYs sum the total years of life lost and years of life lived with disability.²⁰⁻²² A step beyond the quality-adjusted life-year that some researchers are more familiar with, the DALY uses age weighting that helps to highlight the value of interventions that improve conditions affecting younger patients with longer time spent disabled.²³ This makes the DALY an important tool for evaluating upper extremity injuries.

By comparing the calculation of DALYs lost with and without an intervention, or between 2 interventions, it is possible to demonstrate potential economic and societal growth attributable to changes in care delivery.²⁰ Because the DALY quantifies

the amount of time "lost" rather than "gained" owing to a particular treatment, this metric can be used to demonstrate potential improvements foreseeable as a result of changing systems and practices currently in place. However, a major challenge in implementing these types of analyses, especially for upper extremity trauma, is how to define surgical outcomes as they relate to function and associated disability. Disability weights are notably lacking for most upper extremity conditions, especially those related to trauma.²⁴ Considering that upper extremity use is intricately linked to economic growth and productivity, accurately and thoughtfully measuring outcomes of upper extremity trauma treatment is critical. This is especially true for complex injuries in mutilating upper extremity trauma.

The outcomes research movement has grown as a result of an increased focus on patient-reported outcomes (PROs). As techniques for measuring and analyzing outcomes have substantially improved, the value of PROs in guiding high-quality, high-value care has been demonstrated frequently.^{25,26} Although radiographs, range of motion, wound healing, or bone healing were the primary outcomes of early research, PROs, composite functional tests, and complex movement analysis are now used to provide more objective, direct measures of hand surgery outcomes. Although the value of some of these complex approaches is not yet clear, understanding the outcomes of care in terms of cost and quality has come to the forefront of research, clinical care, and health care policy around issues of resource use and distribution.

An improved understanding of outcomes has progressively changed hand and upper extremity care delivery, but these research approaches are made more difficult by the complex nature of mutilating upper extremity injuries. When considering the various mechanisms, anatomic injuries, extent of contamination, reconstruction options, and other anatomy- and injury-related variations, gathering organized and valuable data about these patients is difficult.²⁷ These challenges are more pronounced when evaluating mutilating upper extremity injuries across the international

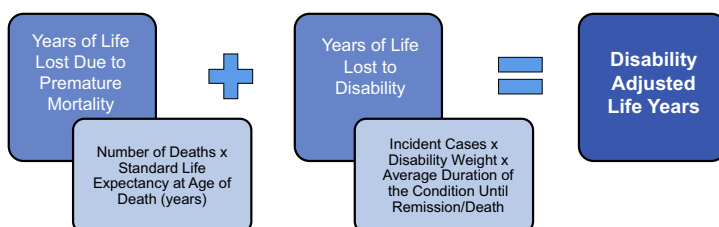


Fig. 1. Components used to calculate disability-adjusted life-years (DALY).

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