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Review Paper

Hand injuries in low- and middle-income countries: systematic review of existing literature and call for greater attention



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ABSTRACT

Objectives: Hand injuries result in major healthcare costs from lack of productivity and disability. With rapid industrialization, the incidence of hand injuries is expected to rise in low- and middle-income countries (LMICs). However, estimates of burden and validated outcome tools are needed for effective resource allocation in the management of these injuries.

Study design: We conducted a systematic review to evaluate the burden of hand injuries in LMICs according to Preferred Reporting Items for Systematic Review and Meta-Analyses guidelines.

Methods: We searched PubMed, Scopus, Embase, Cochrane Library, PAIS International, African Index Medicus, Global Health, IMMEMR, IMSEAR, Wholis and Bdenf, Lilacs, Scielo, WPRIM, and WHO International Clinical Trials Registry Platform to detect eligible articles with no restrictions on length of follow-up, type of hand injury, or date.

Results: We included 17 articles after screening 933 eligible articles based on title, abstract, and full-text screening. There was significant heterogeneity and low quality of evidence. All included articles suggest that hand injuries were associated with work limitations for the majority of patients, and residual pain can further limit their activities. Direct and indirect costs related to treatment account for a major healthcare burden with limited evidence on estimates of long-term cost from disability.

Conclusions: The present systematic review highlights the paucity of high-quality data on the epidemiology, management, and burden of hand injuries in LMICs. The data are

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heterogeneous, and comprehensive metrics are lacking. Because hand injuries can account for a significant proportion of injury-related disability, reducing the overall burden of hand injuries is of utmost importance.

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Introduction

Injury to the hand leads to major healthcare costs and high economic burden from lack of productivity, disability, and mental health problems.¹ According to the Global Burden of Disease (GBD 2015) study,² ‘injuries’ collectively account for 10.12% disability-adjusted life years (DALYs), which is greater than tuberculosis (2%), HIV/AIDS (2.84%), and malaria (2.68%) combined. Although the GBD study does not categorize injuries based on location or part of the body involved, population-based estimates from developed countries show that hand and wrist injuries account for approximately 28–29% of all injury-related visits to emergency departments.³ A recent review of data from several developed countries, including the United States, China, and Sweden, among other countries, estimated that the median total cost of an acute hand injury is approximately US \$6951.⁴ With rapid industrialization and dependence on mechanized production, the burden of injuries, in particular hand injuries, poses a challenge for global health in developed and even more in developing countries.

In comparison to other injuries, hand injuries are peculiar in nature because optimal management requires a unique skill set, and the majority of economic burden results from disability rather than mortality.¹ For instance, when accounting for loss of productivity, hand and wrist injuries result in higher costs compared to lower limb or hip fractures and even brain injuries at a population level.¹ From a conceptual standpoint, the rise in occurrence and severity of these injuries in low- and middle-income countries (LMICs) is to be expected in the light of rapid industrialization. Since the majority of hand injuries are preventable and often occur in young and otherwise healthy members of the workforce,^{5,6} population-based data that can guide decision-making and evidence-based practice can have a profound impact on the economy of LMICs.

We conducted a systematic review to analyze the existing literature on the burden of hand injuries in LMICs to guide proper allocation of resources and preventive strategies.

Methods

Literature search

We conducted this systematic review according to the checklist suggested by the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA).⁷ We did not register a review protocol before the completion of the study. An informationist performed the database search using the

following terms: ‘arm,’ ‘upper extremity,’ ‘hand,’ ‘cost of illness,’ ‘burden of disease,’ ‘quality of life,’ ‘developing countries,’ ‘less developed country,’ and ‘low income country’. The database search included PubMed, Scopus, Embase, Cochrane Library, PAIS International, African Index Medicus, Global Health, IMMEMR, IMSEAR, Wholis and Bdenf, Lilacs, Scielo, WPRIM, and WHO International Clinical Trials Registry Platform and was completed on August 19, 2016. Specific search terms and strategies are available in the [Appendix](#).

The reference lists of relevant articles were screened for other potentially eligible studies. We included published experimental and observational cohort, case-control and cross-sectional studies if they provided information about health-related financial or occupational burden, disability, and hand injuries among the residents of LMICs. We did not apply restrictions on length of follow-up, type of hand injury, or date. Only articles in English were included. We excluded case reports, reviews, conference proceedings, and letters to the editor. Two authors independently completed article screening based upon the eligibility criteria. Discrepancies were resolved by the senior author. A flow diagram of the literature search is presented in [Fig. 1](#).

Data extraction

Two authors independently extracted the necessary data. These included the year of publication, location of study, study design, number of patients, type of hand injury, etiology of hand injury, associated burden or disability, treatments received, the effect of these treatments, and the duration of postoperative follow-up. For each study, we also extracted the characteristics of the study population including demographic data such as age, gender, body mass index (BMI), and comorbidities if applicable.

Quality assessment

To assess the quality of the included studies, we used the level of evidence (LOE) rating scale adopted by the American Society of Plastic Surgeons.⁸ This particular scale was created by a multispecialty group of journal editors and society leaders to serve as specialty-wide evidence rating tool. It is a simple and straightforward tool for rating LOE in plastic surgery literature, such as hand surgery, that takes into the account the type of research question and the study design. LOE I corresponds to the highest level of evidence (high-quality randomized trials with adequate power), whereas LOE V corresponds to the lowest (expert opinion or case reports). During quality assessment, we blinded the studies by removing authors' names and hospital affiliations.

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