International Disease Burden of Hand Burns
Perspective from the Global Health Arena

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KEYWORDS

• Burden of disease • Global surgery • Hand burns • Burn contractures

KEY POINTS

- Burn injuries to the hands are particularly disabling relative to burn injuries in general.
- This added significance of burn injuries to the hands is exacerbated in the developing world because of the lack of compensatory assistance devices or societal adjustments.
- Because of the specific and varied nature of hand burns, enumerating their contribution to global burden of disease (BoD) is difficult, but it seems that there are approximately 18 million living with hand burn injuries.
- Approximately half of surviving burn victims in low-income and middle-income countries (LMICs) have significant hand injuries.
- As appropriate attention and resources are given to surgical needs in LMICs, it is anticipated that more people will survive burn injuries and that more prevention and resolution of hand burn contractures will occur. The increased overall survival figures might paradoxically result in an increase in the BoD due to hand burns.

INTRODUCTION

With the possible exception of severely disfiguring burns to the face, burns to the hands are arguably the most devastating in terms of human productivity and utility. With little affected surface area, and sometimes little overall injury, burns to the hands can result in complete loss of the ability to perform the functions necessary to provide a livelihood for self and family and even to perform activities of daily living. Compounding these effects is the increased risk of sustaining burns to the hands – unlike the core of the body, to which the heat or chemical agent must reach the body to inflict harm, the hands often reach out to that agent in an effort to ward off injury, to assist others, or in the course of usual work, such as cooking, manufacturing jobs, motor vehicle accidents, and so forth.

Burn injuries are most often a function of poverty. For a variety of reasons, there is a strong correlation between the incidence of burn injury and poverty, both within the developed world and among the global population.[1–4] In the developing world, there are many reasons for this

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correlation, depending on degree of poverty, cultural characteristics and customs, rural versus urban locale, or other available health care. The use of open fires for cooking is a frequent cause, especially among smaller children (Fig. 1). Unmanaged seizure disorders result in numerous burn injuries in LMICs.[1] Exposed electrical wiring, including unauthorized attempts to tap into electrical grids driven by the desperation of poverty, is a frequent cause[5] and undoubtedly disproportionately affects the hands. Kerosene stoves, also associated with poverty in the developing world, are a common cause of major burn injuries.[5] The hands, of course, are usually handling the object of injury when the accident occurs.

BURNS OF THE HAND AND MEASURING THE BURDEN OF DISEASE

Assessing the BoD due to burns is difficult for several reasons. The overarching issue is the vast spectrum of injuries, both incident and prevalent, that fall under the category of "burns." Many people, even in the face of significant injuries, do not (or are unable to) seek medical care, so never appear in any database of health care provision. These people conceivably may be counted by field studies carried out in the slums and villages of LMICs, but the task is gargantuan and has not been done to date. The methodology of surveys, such as is done by the Monitoring and Evaluation to Assess and Use Results Demographic and Health Surveys (MEASURE DHS), is perhaps the best concept for such assessment but is complicated by the relatively small proportion of victims, even in high-prevalence countries. The overall task is further complicated by the complexity of possible injuries, which is magnified still more for hand burns. This is illustrated in the following hypothetical example.

Fig. 1. An unattended child around an open fire stirring hot liquid with an instrument that could easily overturn the receptacle, spilling the hot liquid on the child. Loose clothing would have essentially completed the risk factors present in this situation. (*Photo by* Phil Borges for ReSurge International. Used with permission.)

A US worker sustains full-thickness burns to the dominant hand. After proper care, including débridement, grafting, aggressive hand therapy, and scar management, the patient is left with some tissue loss and with decreased range of motion of the thumb, index, and long fingers, such that she/he has a somewhat impaired dominant hand that may result in an alteration of duties in her/his former job. This patient is assessed through the American Medical Association *Guides to the Evaluation of Permanent Impairment*, which requires a lengthy assessment of loss of range of motion, sensation, and tissue loss to derive a reasonably precise valuation of impairment. The evaluation of this impairment is lengthy not necessarily because the US legal industry demands it but rather because the injury is complex, the functional effects on the hand are complex, and no abbreviated methodology can provide a true assessment of the injury.

In contrast, a rural villager in a sub-Saharan African country sustains the same injury. The care consists of little more than wound care directed by local custom and common sense (unless, of course, the patient has the misfortune of getting to a health care facility without basic burn expertise and the hand is immobilized for a prolonged period of time, resulting in complete loss of range of motion affecting the entire upper extremity). When the burn wound is finally healed, it likely has resulted in complete loss of reasonably normal use of the hand, but, regardless of the level of impairment, the only statistical representation of this patient in the summary measures of the Global Burden of Disease (GBD) study appears as a burn injury of less than 10% total body surface area (TBSA), with hand involvement, with long-term effects. The patient is postulated to have 98.8% utility in overall life for the rest of her/his life. This example is not pejorative toward the GBD in any way, because its goal is much more global in scope and it is constantly improving in its thoroughness,[6] but rather this is an indication of the difficulty of epidemiologically quantifying the nature of hand burns from a functional point of view.

The actual incidence and prevalence of burn injuries to the hands in the developing world are unknown. As the GBD study becomes increasingly sophisticated, this knowledge deficit presumably will decrease. The most recent iteration of the GBD study expanded the scope of assessment to 306 diseases and injuries in 188 countries,[7] and presumably each subsequent iteration will continue to expand into what is an almost infinite