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Systems of provision and delivery of hand care, and its impact on the community

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Summary Hand injuries are important causes of impairment in the United States. They are one of the top causes for days lost from work and they impose a great economic burden on the country. In less affluent regions of the world, the impact of hand injuries on the population is even more dire, rendering the affected to life-long disability. When one considers that 85% of the world's population lives in low to middle income countries, the global deleterious effect of hand trauma becomes apparent. This paper is a review of pertinent literature available on the provision and delivery of trauma care around the world. While specific reference to hand surgery care is sparse, we will infer trauma management in these countries, synthesised from available literature, to the provision of hand surgery care. We will also examine programs around the world that are implemented at an affordable cost to the respective countries.
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Hand injuries are an important cause of morbidity and cost in both the United States (US) and the world. In 1996, the Center for Disease Control and Prevention reported the most commonly injured body part in occupational accidents in the US was the upper extremity, representing a quarter of all occupational injuries.[45] An estimated 30% of occupational injuries treated in US emergency departments are hand injuries, with half of these classified as lacerations of the hand or fingers.[45] A mean of 31 days of work are lost per upper extremity injury, resulting in three to four million working days lost each year in the US.[45,27,20]

Literature examining specifically the delivery of hand care around the world is lacking, and therefore, a search of the available literature on trauma care is being used to extrapolate the provision and delivery of hand care globally. Morbidity and mortality outcomes in trauma, in general, are significantly better in the US than in countries considered low and middle income.[32,18,46] For example, Mock et al. examined trauma mortality patterns in demographically comparable cities in three different countries of logarithmically declining annual per capita income: Seattle (US), Monterrey (Mexico),

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and Kumasi (Ghana). The per capita health care expenditures in 1996 were (in US dollars) $3500, $90, and $14, respectively. They found mortality declined with increasing economic level, with pre-hospital deaths accounting for the major differences in overall trauma outcome amongst the cities. Ghana had no established emergency medical system, and the one in Monterrey was poorly developed compared to the well-funded and well-staffed system in Seattle.[32] Therefore, the burden of hand injuries can only be assumed to be greater in low and middle income countries because infrastructure to care for hand injuries is still in the early phases of development.

One of the major factors impeding change in morbidity and mortality of injury in a society is the level of economic development.[47] With 85% of the world's population residing in low and middle income countries, improving the provision of trauma care globally may prove difficult, but is nonetheless an important challenge. By the year 2020, the World Health Organisation projects trauma to be the first or second leading cause of years of life lost throughout the world.[36]

Several reasons have been proposed to explain the discrepancy in outcomes of traumatic injuries between countries of high income and low/middle income: available pre-hospital care, efficiency of and factors influencing transportation to appropriate medical centers, available level of care at tertiary care centers, injury severity, effects of culture, geographic location, and economy.[32,49,50,35,3,18,38] In an effort to further examine these factors, as well as to investigate what is being done to prevent injuries, we will show the need for more support for global injury treatment and prevention. The emphasis for better trauma care will translate to improved hand injury care and prevention.

Provision and delivery

Multiple reasons for the discrepancy between high income and middle- and low-income countries in the area of traumatic injuries have been proposed. It is important to understand how health care is paid for and influenced by its method of delivery in order to approach this problem of discrepancy.

Available pre-hospital care and transport to medical facilities

The first step in delivery of care to an injured person takes place at the scene of the incident. The delivery of health care from the point of injury is variable around the world. Studies have shown it is often based on income level of the country, with mortality declining as economic level increases.[32] In addition, studies have shown pre-hospital time period decreases with increasing economic level.[32]

In many middle/low income countries, there are little or no established pre-hospital trauma services or designated transport system.[33] Some countries have no pre-arrival notification or inter-hospital notification for trauma transfers.[49] Taxi drivers, family members, or good Samaritans often bring injured patients to emergency departments.[49] Also, poor or absent roads can make travel to a medical center difficult. These factors obviously can lengthen the critical time to any form of treatment, contributing to the higher morbidity and mortality seen in these areas.[18,49,50] Also, some trauma centers in developing countries require a deposit prior to treatment. This results in family members having to delay treatment until they are able to save enough money to pay the deposit. A recent medical mission by the senior author (KCC) to Honduras and Cambodia confirmed the lack of access to hand surgery care because trained hand surgeons were not available and the medical facilities were not equipped to take care of hand trauma. Many of the hand trauma patients presented late to the hospitals, varying with severe burn contractures to advanced malunions of fractures.[11]

An estimated 60% of deaths from trauma occur in the first 4 h.[49] For complex hand injuries, the earlier the injuries are treated, the better the anticipated outcomes. An average of 5—6 h from time of injury to time of arrival in an emergency department is common in some countries.[35,49] Also, it is not known how many injured people in middle/low income countries never make it to a medical facility for treatment.[23] Consequently, they have an increased risk of mortality and morbidity from their injuries. This also results in an underestimation of frequency of injuries in these countries. It has been estimated that only 10% of all patients with surgical problems in a rural African population find their way to a facility capable of treating them.[3]

Interventions aimed at pre-hospital treatment of trauma patients are being or have been attempted. Coordinated emergency medical systems including EMS personnel, helicopter transportation, and sophisticated telecommunication networks have been established in high-income countries. In remote areas of Australia, major companies, especially mining companies, train their own personnel to act as first responders in industrial accidents.[13] Many of these interventions have resulted in improved mortality and morbidity outcomes in these areas.[9,8,16,34,40,42,48,28,39,4]

Interventions in low/middle income countries performed at minimal cost have also resulted in a

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