The Increasing Burden of Injuries in Developing Countries

Direct and Indirect Consequences

Richard A. Gosselin, MD, MPH, FRCS

Summary: The burden of ill-health due to injuries is ever increasing in low- and middle-income countries. The epidemiology and global impacts of this pandemic are presented. Examples are given of the devastating physical but also economic impact for disabled trauma survivors, their family and their community.

Key Words: injury—burden of disease—developing countries.

(Tech Orthop 2009;24: 230–232)

Thok Po Sophean is a 21-year-old woman from a small south-east Asian country, a young mother of 1, that makes a living from rice farming on a small plot of land her husband received from his father when they got married. An unfortunate mishap with a sharp machete cleanly amputated her left hand at the base of the metacarpals 2 through 5, leaving the first ray intact. She was treated in a “private clinic” where, after paying the initial deposit, the hand was reattached by suturing (only!) the skin, immobilized in a splint, and she was given antibiotics and acetaminophen for pain. Eight days later, when they had no more money, and the fingers were getting darker by the day, she was told the repair “didn’t take”, there was no more to be done, and she was discharged. She was seen at our facility, where treatment is free: the hand fell off when the sutures were removed, and the stump was debrided and eventually healed uneventfully by secondary intention. By then, her husband had sold half their plot, their only buffalo, and had missed one of their 3-yearly harvests. It will take years to repay the debt incurred and recover from the economic hardship. Hopefully it will not prevent their eldest child from attending school.

Mohammed Kamara is a 28-year-old man that lives in a rural area approximately 100 kms from the capital of a small west-African country. He has 2 wives and 6 children, the oldest daughter already attending primary school. He is a subsistence farmer, bartering whatever excess food he can grow for other goods. The entire family lives on less than $2 a day. He was hit by a motorbike at the market and sustained what appeared to be a grade 1 open tibia-fibula fracture of his right leg. This was treated by the local traditional healer with bamboo splinting and herbal dressings. He was aware of our free facility in the capital, but the 4-day return trip by itself would cost more than the initial deposit, the hand was reattached by suturing (only!) the skin, immobilized in a splint, and she was given antibiotics and acetaminophen for pain. Eight days later, when they had no more money, and the fingers were getting darker by the day, she was told the repair “didn’t take”, there was no more to be done, and she was discharged. She was seen at our facility, where treatment is free: the hand fell off when the sutures were removed, and the stump was debrided and eventually healed uneventfully by secondary intention. By then, her husband had sold half their plot, their only buffalo, and had missed one of their 3-yearly harvests. It will take years to repay the debt incurred and recover from the economic hardship. Hopefully it will not prevent their eldest child from attending school.

Injuries sustained in road traffic crashes account for about 25% of all injuries, more than 1.2 million deaths a year.3,5 Over 90% of them occur in countries that together account for less than 50% of all motorized vehicles.14 Almost half of the deaths involve cyclists, motorcyclists and pedestrians.4,14 Contrary to developed countries, a much smaller proportion involves passengers of 4 wheel motorized vehicles. Injuries are projected to be the fifth overall cause of death and fourth overall cause of ill-health by 2030.15 In both Southeast Asia and sub-Saharan Africa, most road traffic injuries (RTI) related deaths occur in males aged 0 to 9 years.16,17 It is estimated that for every RTI-related death, there are up to 50 times more survivors with some type of permanent disability or disfigurement.7,17–19 In one study from Southeast Asia, for every death from RTI there were 20 hospitalizations, 50 emergency room visits and over 100 injuries.20 The pattern and distribution of road traffic...
fatalities varies dramatically across different parts of the world: pedestrians, for example, account for 55% of deaths in Sub-Saharan Africa but less than 15% in North America and Western Europe.\textsuperscript{21} Even within countries, the poorer population groups bear a disproportionate burden of avoidable mortality and morbidity due to injury.\textsuperscript{10} Falls account for approximately 10% of unintentional injuries, and are particularly common in mountainous countries, such as Bhutan, where they even outrank RTI.\textsuperscript{13} As populations are aging, the burden of injuries from falls will increase. The same can be said of work-related injuries. In LMIC development and industrialization most often relies on workers that are using unsafe equipment and materials, and that are not protected by proper safety gear or safety laws. Compensation after an injury, if present at all, at best covers treatment of the acute injury. There is no social safety net for the permanently disabled worker and his family. Intentional injuries and violence are also significant contributors to the global burden of injuries.\textsuperscript{6,22} Again, this is disproportionately high in LMIC, where mortality rates from violence are almost 3 times higher than in high-income countries.\textsuperscript{23}

At present, the increase in the burden of disease from RTI is borne almost exclusively by LMIC.\textsuperscript{10,18,24} Highly motorized countries in North America, Western Europe or elsewhere, have seen a plateau, followed in most cases by a decrease in the mortality and morbidity from RTI, as the capacity to prevent or manage crashes and their victims eventually have caught up with some by-products of economic development: increase in infrastructure, in kilometers of paved roads, in the number of motorized vehicle per capita and their users. Improvements in traffic management, vehicular safety features, personal protection gear, traffic laws and their implementation have also had a significant contribution. Most developing countries are still along the epidemiologic transition curve in which the increase in the burden of injuries is not matched by an increased capacity to deal with them.\textsuperscript{4,7,25} China had only 1 million 4-wheel motorized vehicles in 1975, but 10 million in 1987, 50 million in 1999, and over 100 million by now; RTI are the leading cause of working-life years lost in that most populous country.\textsuperscript{26} The same trend is seen in the second most populous nation, India.\textsuperscript{27,28} Worldwide, the costs of RTI are estimated at well over $500 billion a year, $65 billion in poor countries alone, well above the total of $50 billion spent annually on development aid.\textsuperscript{5,14} Developing countries lose close to 2% of their Gross Domestic Product to RTI.\textsuperscript{1} Many tertiary referral hospitals and teaching centers see their meager human and financial resources overwhelmed by the non-stop flow of incoming trauma patients.\textsuperscript{8} The problem is of such magnitude that the World Health Assembly dedicated their 2004 World Health Day to road safety. Yet resources allocated to researching prevention, treatment and rehabilitation of injuries in developing countries is woefully inadequate.\textsuperscript{29,30} Road safety in particular, it has been calculated that expenditures amount to $0.09 per capita in Uganda, and $0.07 in Pakistan, significantly less than what is spent in rich countries.\textsuperscript{31}

There is mounting evidence that prevention and treatment of RTI can be both effective and cost-effective in LMIC.\textsuperscript{9,32} One study has estimated the cost per disability-adjusted life-year averted to be between $5 and $12 for appropriately placed speed bumps, which compares favorably to vaccination programs, the most cost-effective of public health interventions.\textsuperscript{33} Another study has shown that a surgical trauma hospital in Cambodia functions with a cost-effectiveness ratio of less than $80 per disability-adjusted life-year averted, at least one order of magnitude better than what most health economist were expecting.\textsuperscript{34} A recent study from the same hospital showed that intramedullary nailing with the surgical implant generation network system was in fact cheaper and more cost-effective than conservative treatment with skeletal traction.\textsuperscript{35}

Males in their most formative and/or productive years account for over two-thirds of all injury-related mortality and morbidity in the developing world.\textsuperscript{3,4} The financial burden to the immediate and even extended families is significant. Health sector reforms imposed on LMIC in the 1980s seconds have focused on user fees for public health care, indirectly re-enforcing the for-profit private sector. Putting the burden of costs of care on the patient’s shoulders is particularly detrimental to those with the least capability of coping.\textsuperscript{36} Those who cannot finance their health care with income or savings need to borrow money or sell assets. This is the case for over two-thirds of the patient population in Burkina Faso.\textsuperscript{37} In India, the vast majority of poor households (89% urban, 71% rural) reported that at least one household member had to stop working or studying to care for another injured family member.\textsuperscript{14} Indirect costs are also significant barriers to access to care. Transport costs alone for a patient and at least one relative can be a deterrent. Mothers need to take their nursing baby with them, leaving the other children behind with relatives, often for prolonged periods. Unless they have a compelling reason (transportation paid, stipend, etc.) most patients, once discharged would not come back for mid to long-term follow up, especially if they are doing well, or if it is planting or harvesting season. Indirect costs also include lost wages from family members caring for a disabled relative, costs of supplies for chronic conditions, such as dressings, catheters or walking aids, informal or under the table payments, loss of educational opportunities, and social stigma (for example, it is more difficult for female amputees to get married). There is a point where this downward spiral into poverty and indebtedness is irreversible.

Injuries may not be a graphically pleasing, media friendly topic, with a powerful and often glamorous supporting lobby, but they are the scourge of developing nations. An increasing number of voices are calling for action.\textsuperscript{2,18,20,24,29,38} Prevention strategies will never be completely successful and there will always be a need for some curative management of injuries. Better pre-facility and facility care, including fracture care, and better rehabilitation are the best hope for Thok Po, Mohammed and their families, and all like them, for a rapid return to a full and productive life, so they can avoid this chronic cycle of poverty.

REFERENCES