



Editorial

Burns: the importance of prevention

Working in a regional trauma center, the two types of injuries that make me cringe when I hear a patient is coming into the hospital are head injuries and burns. These injuries share many similarities in that they are both relatively common, are important causes of death, and many of the victims have lifelong morbidity.

There are approximately 4000 deaths each year in the US from fire and burns.¹ A similar figure, proportional to population, is probably found in most developed countries. The problem of burns is even relatively greater in less industrialized countries where the absence of specialized burn care results in much greater morbidity, disability, and mortality for burn victims.²

The majority of fire deaths are due to smoke inhalation in residential fires, rather than from the burn itself. Smoke inhalation can increase the mortality rate 10-fold for the same size burn,³ and most of these deaths occur at the scene of the fire. Burn deaths include burns from residential fires, as well as scalds, clothing burns, industrial injuries, electrical injuries, and other sources of thermal energy. Medical care for burns has markedly improved survival. In 1940, 50% of patients with burns involving 30% or more of their total body surface area (TBSA) died. In contrast, a recent study reported no deaths for children with burns to 40% to 59% TBSA treated between 1991 and 1997. In fact, the death rate was only 14.3% for very large burns involving 60% or more TBSA.⁴ Another study from the same burn center reported a 3% mortality for individuals under 60 years of age admitted without smoke inhalation.³

This increased survival has come at a price, however, and that price is a large number of patients with disfiguring and disabling scars. The treatment of burns is relatively crude: cutting off normal skin from one area of the body and using it to replace the burned skin in another area. Many other areas of medicine have advanced to the point where treatment is based at the molecular level. We are only now beginning to understand the molecular basis of thermal wound healing and the pathophysiology of disfiguring hypertrophic scars in burns.⁵ Studies of fetal wound healing may ultimately make a difference in controlling burn wound healing.⁶ Further decreases in morbidity and mortality from fire and burns will almost certainly require improvements in prevention.

In this issue of *Injury Prevention*, three different papers examine the epidemiology of fire and burn injuries, with the hopes of providing information to guide prevention programs. Quayle and colleagues provide us with a more complete view of the epidemiology of burn injuries, because they have population based E coded data for injuries that are treated in the emergency department as well as

those requiring hospitalization.⁷ Not unexpectedly, the former were 10-fold more frequent than the latter, and children under 5 years had the highest rate of burns. Injuries were more common to poor children, and those living in urban areas. The causes of these burns were diverse and varied with the age of the child victim. Fires accounted for the minority of these burns; hot objects and hot liquids were much more frequent causes, especially for those under 5 years.

The study of DiGuseppi *et al* found somewhat different causes for burns resulting in emergency department visits, hospitalization, or death in inner city London.⁸ House fires were the leading cause, accounting for nearly two thirds of these injuries, followed by assaults, and clothing ignition. This report differs from the Quayle study in that it includes individuals of all ages; children and the elderly were those at greatest risk of burn injury as has been found in prior studies.⁹ The London study represents an incredibly ambitious data collection effort, with multiple sources of data examined to identify the 131 injuries. DiGuseppi and colleagues conclude the article with the sobering thought that, because the causes of fire and flame injuries are so varied, it is likely that "diverse interventions" will be needed to reduce the injury toll. Put simply, this means that they think there is no easy solution, no magic bullet.

The report by Clark *et al* is important in that it gives us a ray of hope that better prevention efforts may be possible.¹⁰ In the US, annual mortality from fire and flames decreased by 64% between 1961 and 1996. In rural Maine, the decrease was even greater—73%. More importantly, the rate of hospitalization for fire and flame injuries in this population decreased by 70% between 1973 and 1998. They ascribe the decreases in the rate of injuries to increased use of smoke detectors and better building codes.

Given the many different causes of these injuries, how should we proceed? One way to make sense of the data is to separate these burns into two groups: severe and fatal burns and fire injuries, and less severe non-fatal burns. Either way, passive strategies should be emphasized. There is little evidence that intervention programs based on education work to prevent burns,¹¹ but much stronger evidence that passive strategies such as smoke detectors, reducing water heater temperatures, fire safe cigarettes, and reduced flammability of fabrics are or could be effective.¹² We may finally be closer to a fire safe cigarette, an important cause of residential fire and burn deaths. This is largely due to the efforts of one person, Andrew McGuire, who has been working on its development and implementation for more than two decades.¹³ Other countries should follow and require similar flammability standards for cigarettes.

Smoke detectors work, but the difficulty has been in getting them used appropriately by households at greatest risk. As pointed out by DiGuseppi *et al.*,⁸ two non-randomized controlled trials of smoke detector promotion have shown an effect,¹⁴ although some have questioned the validity of these findings. The results of the randomized trial of smoke detector promotion by DiGuseppi are eagerly awaited and should help guide future promotion efforts. False alarms related to cooking appear to occur with a greater frequency with ionization smoke detectors and less commonly with photoelectric ones. An ongoing randomized controlled trial by Grossman should provide us with important information about the preferred type of detector. Thus, the tools (smoke detectors and fire safe cigarettes) for prevention of house fire injuries are at hand, but the details of implementation remain.

Prevention of less serious burns is, I believe, even more difficult, given the wide variety of mechanisms in which they occur. Victims are most commonly injured by hot liquids in an amazing variety of vectors: tea, coffee, soup, stew, pasta, grease, etc, etc. Although we have eliminated hot tap water burns in countries where the water heaters have been turned down, little advance has been made in eliminating these other kinds of scald burns. Telling parents or caretakers of young children and the elderly, the two age groups most likely to be scalded, to be careful is just not good enough. We need to team up with our engineers and manufacturers and design safer equipment. We also need to do more research on this area; I have been able to find only one case-control study of risk factors for scald burns in children.¹⁵

Teenaged boys have become the group at greatest risk for clothing burns, because of their interest in fire play and risk taking.¹⁶ The usual scenario is throwing a petroleum accelerant on a brush fire, with subsequent flare-up and ignition of clothing, resulting in severe, although not usually life threatening, burns. The US flammable fabrics standard of 1967 made infant sleepwear flame retardant and resulted in a marked reduction in clothing burns in this age group.¹⁷ Why can't the age range be extended for older kids or even to include adults?

Finally, little information is available on the long term outcome of individuals with burns. Few studies report the ability of burned individuals to go back to work or school, have a family, and lead full, meaningful, lives.

The consequences of fire and burn injuries are so large and potentially devastating that efforts for their prevention should be proportionally much greater than reflected in mortality statistics. Some individuals feel that large burns are a fate worse than death.¹⁸ The scars of burn victims should remind us very clearly that prevention of these injuries must be a high priority and for us to give the problem much more attention than we have in the past.

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