

Executive Summary

For more than two decades, NFPA has published annual reports on the impact of sprinklers on fire losses, focusing exclusively on civilian fire deaths and direct property damage. The latest estimates, very similar to previous estimates, for sprinkler impact on *home* fire losses are at least an 80% reduction in civilian deaths per 100 fires and about a 70% reduction in direct property damage per fire. (More recently, sprinkler impact on firefighter fireground injuries was estimated using the same years of fire data and the same methods. That analysis resulted in an estimate of **65% reduction in firefighter fireground injuries per 100 fires.**)

The current analysis goes beyond analysis of impact on number of injuries to examine impact on injury costs. A death is a death and a dollar of property damage is a dollar, but there are great variations in injury severity and in the associated costs of injury. The hypothesis was that, by making fires smaller, sprinklers might reduce not only the frequency of injuries but also the average severity of injuries when they occurred.

Analysis of injury costs and the effects of reduced fire size required a more sophisticated form of analysis. A probabilistic tree model was developed that would permit use of data from multiple sources.

The model was used to examine sprinkler impact on *injuries per 100 fires* and on *injury costs per 100 fires*. Cost data was available on (a) medical costs, (b) legal and liability costs, which are typically quite small, (c) costs associated with lost work time, which are typically of the same order as the medical costs, and (d) pain and suffering costs, which tend to dominate the total and are based in large part on analysis of jury awards. Sprinkler impact was estimated for total injury costs – the combination of (a) through (d) – and for medical costs alone.

Differential impacts were estimated for three victim age groups – children (ages 0 to 14), older adults (ages 65 and over), and other adults (ages 15 to 64) – and for four types of injury – burn only, smoke inhalation only, burn and smoke inhalation, and other injury.

The primary results of the analysis are as follows:

- Sprinkler presence is associated with a **29% reduction in injuries per 100 reported home fires;**
- Sprinkler presence is associated with a **53% reduction in medical cost of injuries per 100 reported home fires;** and
- Sprinkler presence is associated with a **41% reduction in total cost of injuries per 100 reported home fires.**

In terms of actual cost reductions, the 53% reduction in medical cost of injuries per 100 reported home fires would translate into about \$50,000 in medical cost savings per 100 reported home

fires. The 41% reduction in total cost of injuries per 100 reported home fires would translate into about \$210,000 in total injury cost savings per 100 reported home fires.

During 2006-2010, there were just under 350,000 reported home structure fires per year in homes without automatic extinguishing equipment. If all had been sprinklered, the impacts would have been as follows:

- Deaths reduced by 83% means a savings of 6.0 lives per 1,000 reported fires per year, which means \$10.4 billion a year, if a statistical life is valued at \$5 million, as is done in NFPA's annual *Total Cost of Fire* study.
- Direct property damage reduced by 69% means a savings of \$14,000 per reported fire per year, which means \$4.8 billion a year.
- Civilian fire injury medical costs reduced by 53% means a savings of \$50,000 per 100 reported fires per year, which means \$0.2 billion a year.
- Civilian fire injury total costs reduced by 41% means a savings of \$210,000 per 100 reported fires per year, which means \$0.7 billion a year.