

FIRE INVESTIGATION

**CIGARETTES:
HOW OFTEN THEY CAUSE FIRES?**

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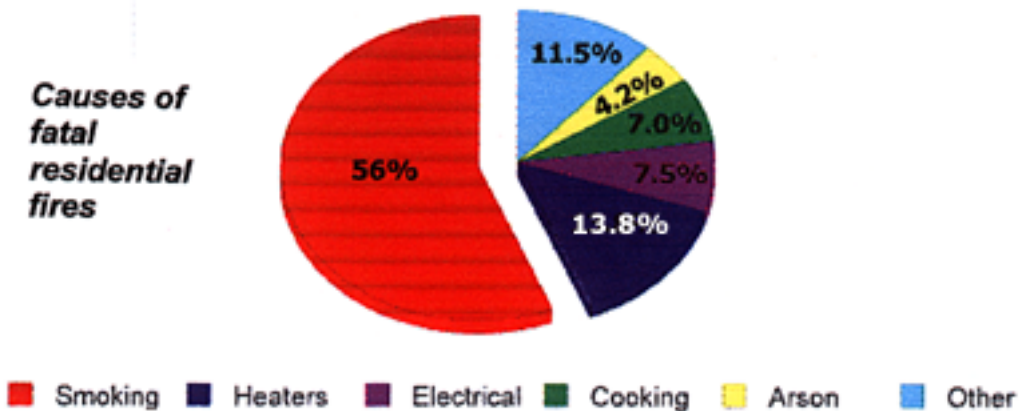
INTRODUCTION:

Many people know that smoking is considered the nation's leading preventable cause of death. But it is less widely known that cigarettes also are the leading cause of fatal fires, responsible for about a quarter of all U.S. fire deaths. Often , the 1,000 victims each year are not just smokers who drifted off to sleep, but children and other innocent bystanders.

Cigarette fires cause close to 1,000 deaths and 3,000 injuries each year in the united states, according to the National Fire Protection Association (NFPA). As the ignition source in fires responsible for over 20% of all fire deaths , cigarettes are the nations largest single cause of such deaths. Property losses alone are over half a billion dollars. The economic costs in health care and productivity losses, and the human costs of pain and suffering raise total annual costs to an estimated \$4 billion dollars.

The modern legislative history of fire-safe cigarette movement dates to 1979, when the Trauma Foundation in San Francisco commissioned an in depth review of the issue. Shortly after that study was published , a fire started by a cigarette killed five young children and their parents in the suburban Boston district of Massachusetts Congressman Joseph Moakely. The Congressman developed a special interest in cigarette fire safety, and five months later introduced a bill calling on the U.S. Consumer Product Safety Commission (CPSC) to regulate cigarettes as a fire hazard.

The National Fire Protection Association (NFPA) compiled a chart of residential fires resulting in one or more fatalities



EPIDEMIOLOGY:

Among all injury profiles, the one for cigarette fire injuries is usually lethal. In fires attributed to dropped cigarettes, there is one death to every four injuries.

A typical scenario in which such injuries occur is when , dropped cigarettes, because they are expressly manufactured not to go out until totally consumed, burn through the cover of a seat cushion or a mattress, starting fires which may smolder for hours. These hidden fires produce toxic gases which render sleeping victims even more unconscious before the cushion or mattress bursts into flame. At this point, the superheated air in the room of origin quickly reaches flashover, and any people in the residence are seriously threatened. Those who survive such fires normally have a severe inhalation injury. When they are also burned, they are normally transferred to burn treatment centers. There, they are frequently the most critically ill patients in a setting already dedicated to serious burn injury.

The age profile for cigarette fire mortality in NFPA data shows a moderate death rate among young children, a low rate for ages 10 to 17 , and then a steadily rising rate which peaks above age 85. Since the smoking rate among the elderly is half that of younger adults, those elderly who do smoke, especially males, and those with whom they live, are exceedingly vulnerable to smoking -fire death and injury. This vulnerability is even greater if the elderly smoker uses alcohol or sedating medications.

Given the limited scope and availability of national data, the regional burn center registry begun by the Burn Foundation in 1987 is an important source of data on the cause of burn injuries and the hospital treatment experience of those with both fatal and non-fatal who survive the incident and enter the health care system. The 13 million population of the Middle Atlantic states region served by the five burn centers which participate in this registry, and their 900 annual admissions, represent 4-5% of national totals. At least 5% of Burn Foundation registry, admissions are linked to smoking.

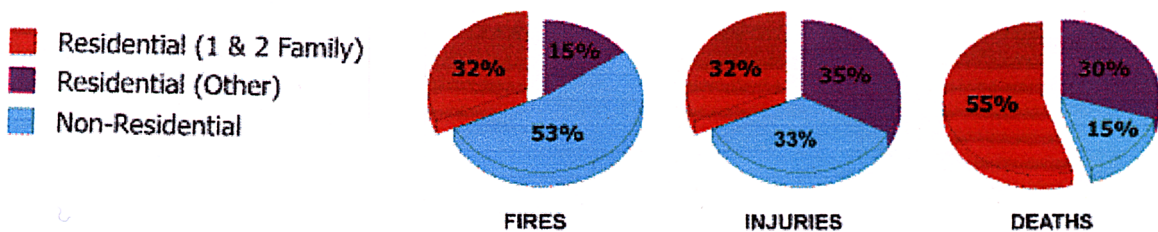
During a recent five-year period, the five burn centers admitted 103 patients injured in fires in which a cigarette was known to have ignited upholstery, bedding or clothing. Of these patients, 29% did not survive their initial hospital stay. This is five times the overall burn center fatality rate of about 6%.

In addition, many of the elderly victims who survived their burn center stay were discharged to nursing care facilities from which they would never go home.

These survivors of cigarette fires remained in the hospital an average of 33 days on their initial admission. This is 60% longer than the burn center average of 20.5 days. Per diem costs were one-third higher than the burn center average. Cigarettes fire admissions thus consumed twice as many resources as other burn center patients, with hospital charges alone averaging over \$ 100,000 per admission.

These conservative regional totals project nationally to an estimated 650 annual burn center admissions resulting from cigarette-ignited fires with the greatest potential to be prevented by a more fire safe cigarette. Treatment charges for the initial hospital stay of these patients, at \$100,000 per admission, were estimated to exceed \$65 million. This does not include lesser burns or inhalation injuries treated elsewhere, nor other types of injury incurred escaping a cigarette fire. These raise total cigarette fire injuries to the 3,000 level estimated by NFPA.

EXTENT OF INJURIES AND FATALITIES IN ALL PROPERTIES



CIGARETTES: A Scientific View

Although cigarettes seem like nothing more than tobacco wrapped in paper, they are in fact carefully engineered to look, taste, smell and burn a certain way --and to go on burning when not being puffed.

This spares smokers the trouble of lighting up again , and pays off in higher sales from cigarettes burning out in ashtrays. But it also means that a cigarette rolling off the lip of an ashtray onto a mattress, or into the crack of a sofa, can smolder undetected for 30 to 40 minutes before bursting into flames.

Smouldering Combustion

Smouldering is a form of flameless combustion which can occur in cellulosic and similar materials capable of charring. Smouldering can occur at very low oxygen concentrations, and proceeds at a very slow rate.

A common example of smouldering combustion is the burning of a cigarette. Heat from the glowing combustion zone (which is normally at a temperature of 600°C or more) chars adjacent tobacco, releasing distillation and pyrolysis products.

As the combustion zone progresses down the cigarette, compounds are released from the tobacco in any particular region, in a sequence which depends upon the volatility and ease of production of each compound. The tobacco immediately adjacent to the glowing front becomes almost pure carbon. If air is drawn through the cigarette, the temperatures of the combustion zone rises and the rate of progression of the smoulder along the cigarette increases.

The presence of an air flow can substantially increase the smoulder rate, perhaps by up to ten times. As the air flow is increased, flaming may result. Fires with smouldering origins require very special conditions for their development. Suitable materials , finely divided cellulosic substances, can smoulder provided that a suitable sustained heat input combined with insulation is available.

Typical materials capable of allowing smouldering to develop include:-

- Traditional furniture
- Piled Sawdust
- Baled cotton
- Latex foam
- Corrugated cardboard
- Baled hay
- Cellulosic fabrics (cotton or rayon)

Smouldering from a cigarette end requires a pile of materials which are not only susceptible as the above mentioned materials are but which must also be arranged so that the cigarette or, at the very least, in firm contact.

Cigarettes are frequently blamed as a cause of fire even when the conditions are clearly not available. For e.g. a cigarette landing on a typical carpet would, at the most , merely produce a small burn which would not develop beyond the immediate locality of the glowing tip.

Similarly, a cigarette landing on a sheet of paper would be very unlikely to produce anything more than a slight localized charring.

Even in waste bins where there may be a considerable amount of torn and crumpled writing paper it is difficult to produce anything more than a minor smouldering fire which may last for only a few minutes . Absorbent tissue can however, smoulder for a considerable time.

Petrol vapor cannot normally be ignited by a glowing cigarette, a fact which has been verified by many experiments. Tests have been carried out under a wide variety of conditions, but petrol in common with many other flammable liquids and natural gas, cannot normally be ignited in this manner. A possible explanation is that the rather low value of the upper flammability limit for petrol (5.9%) indicates a high oxygen requirement for the ignition of petrol vapor. In the vicinity of the glowing tip of a cigarette, it may be insufficient oxygen is present for the petrol to ignite.

POSSIBLE PREVENTION:

The traditional approach to reducing these injuries consisted for a long time in little more than sloganising against careless smoking. More recently, state, federal or voluntary standards have been directed at the flammability of some of the products which might be ignited by cigarettes, such as clothing, furniture and mattresses.

There are limits to what can be accomplished by educational efforts, the installation of smoke detectors, and the attempt to regulate the fire-resistance capability of products that might be ignited by a dropped cigarette. By contrast, cigarette manufacture is highly standardised and concentrated in a few major companies, and the shelf life of cigarettes is only a few months. Any change in the process of cigarette manufacture would thus effect the entire product supply almost immediately, and would not depend on compliance by users.

Manufacturers might meet a test standard through such means as the following, employed alone or in combination:

- reducing diameter of the cigarette
- reducing the density with which it is packed
- reducing the porosity of the cigarette wrapper, thus allowing less oxygen to flow through the paper.

None of these steps is likely to improve the perceived pleasure of smoking. To the extent that such measures render smoking any less convenient, they may discourage some teenage smoking before it becomes addictive, or encourage some would be quitters. The impact of any such reduction in smoking on the hazard of fire will vary among individuals depending on their smoking behavior, but the impact on the tobacco industry will be consistent.

Cigarette makers are also very concerned about market share.

Since tobacco companies will have to alter their product substantially in response to any future fire-safety standard, they will be challenged to promote these products in a manner that avoids the question of fire safety and does not stimulate awareness of their past failure to produce a safer cigarette.

If one or more particular companies meet this challenge with a superior product and/or marketing campaign, market shares could be seriously disrupted.

CONCLUSION:

Fires Started by dropped cigarettes continue to extract a large toll in human life and property.

The pursuit of a fire safe cigarette, through the support of strategies combining public education, legislation and litigation, should remain a high priority of fire service and public health professionals and their organisations.

According to the NFPA, careless smoking habits have been responsible for 56% of all residential fire which loss of life has occurred. Of these fatalities , 46% resulted from burning bedding, 43% from burning upholstery, and 7% from burning clothing.

Litigation related to cigarette fire safety may have greater impact than other recent legal challenges to tobacco. When a cigarette starts a fire , the causal chain length to death and injury is brutally clear.

It can not be clouded by claims that the health effects are unprovable in any specific case, which is the normal defense in health related lawsuits.

When the fire started by a smokers dropped cigarette kills other household members, including young children , additional sympathy is likely to be generated among the general public and among potential members of a jury, if they can be persuaded that the industry knew how to make cigarettes more fire safe but choose not to.

REFERENCES:

- **Big Tobacco's Dollar DOUSE Push for fire - Safe Cigarettes. Myron Levin, January 1999.**
- **USFA - Bedroom Fire Safety The United States Fire Administration March 1999.**
- **USFA - Fire Safety Resource Directory The United States Fire Administration August 1999.**
- **National Fire Protection Association of USA.**
- **Fire and Arson Investigator**
- **Firepoint.**