

U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES

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Medical Facility Fires

FINDINGS

- An estimated 2,500 fires occur each year in medical facilities, resulting in \$8.7 million in property loss.
- Injuries per medical facility fire are four times greater than that of all U.S. fires. Two-thirds of injuries are from smoke inhalation.
- The leading cause of medical facility fires is cooking, with the kitchen as the leading area of fire origin.
- Most medical facilities are equipped with smoke alarms or sprinklers or both.

Sources: NFPA and NFIRS

Each year in the United States, an average of 2,500 fires occur in medical facilities, resulting in approximately 5 civilian fire deaths, 125 injuries, and \$8.7 million in property loss.¹

Medical facilities include hospitals, clinics, infirmaries, and other facilities that provide care to the sick and injured. Fires in these facilities can be particularly dangerous due to the presence of oxygen and other flammable substances and the challenge of evacuating patients who may not be ambulatory.

LOSS MEASURES

Figure 1 compares the loss measures for fires in medical facilities to those for all fires and those in non-residential structures.

LOSS MEASURE	ALL FIRES	NON-RESIDENTIAL STRUCTURE FIRES	MEDICAL FACILITY FIRES
Dollar Loss/Fire	\$5,619	\$21,878	\$4,286
Injuries/1,000 Fires	15.7	22.1	59.2
Fatalities/1,000 Fires	2.4	1.7	2.2

Source: NFIRS only

WHERE FIRES START

Eighty-nine percent of medical facility fires occur in hospitals, and 10% occur in clinics. Fires most often originate in the kitchen (20%); additionally, 11% begin in patient rooms, and 9% in laundry rooms. This pattern resembles the pattern seen in residential structure fires, which is not surprising given that hospitals have characteristics similar to residential structures. For example, both hospitals and residential structures are occupied 24/7 and must support the activities of daily life (e.g., cooking, laundry).

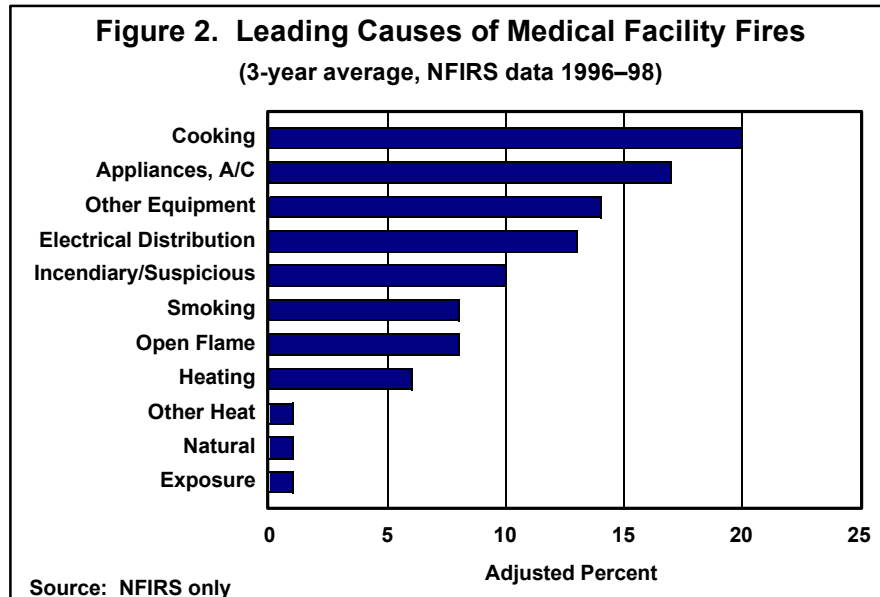
CASUALTIES

Medical facility fires tend to be more injurious than other categories of fires, but generally cause less damage. This pattern is likely because, although medical facility fires tend to be small, their smoke is deadly. For civilian casualties (both injuries and fatalities), the majority (66%) suffered from smoke inhalation; 44% percent of these casualties were attempting fire control at the time of their injury. Overall, about half of casualties were either intimately involved with the ignition of the fire or in the same room; 40% were on the same floor as the fire.

Virtually all reported civilian fire injuries and 100% of reported civilian fire fatalities occur in hospitals. Patients in hospitals are more likely than patients in other facilities to be incapacitated or otherwise unable to escape from a fire. Further, 48% of casualties in hospitals either are intimately involved with the fire's ignition (e.g., their clothing or bedding ignites) or are in the room where the fire ignites.

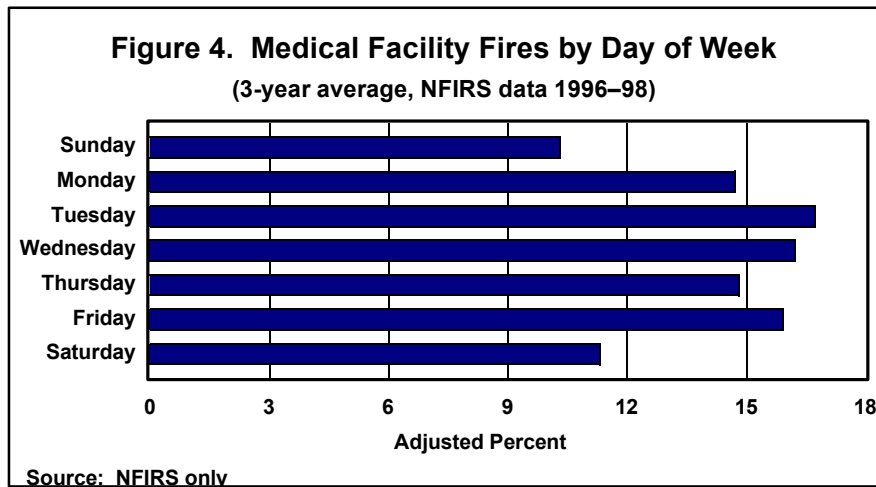
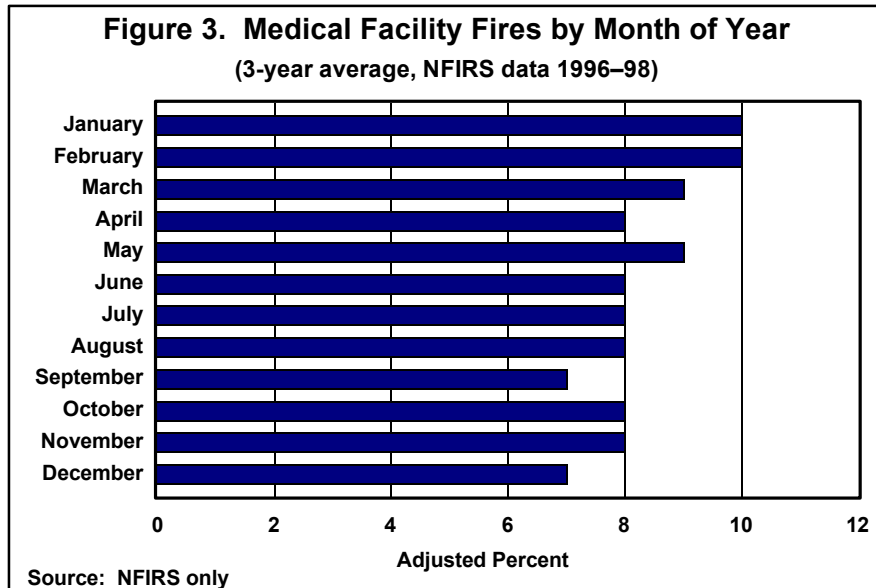
CAUSES

Figure 2 displays the causes of medical facility fires. Cooking is the leading cause of these fires, followed by appliances (including air conditioners) and other equipment. Factors influencing fire ignition include electrical short circuits (15%), leaving ignition materials unattended (12%), and abandoning/discarding ignition materials improperly (9%).



WHEN FIRES START

Figures 3 and 4 illustrate the occurrence of fires in medical facilities by month of the year and day of the week, respectively. Fires peak in the first two months of the year and occur more often during the workweek.



WHAT IS IGNITED

Figure 5 lists the leading types and forms of materials ignited in medical facility fires. Given the high incidence of cooking and various electrical fires as major causes of such fires, the prominence of fabrics, plastics (including wire insulation), and cooking materials (including grease) is not surprising.

Figure 5. Materials Ignited in Medical Facility Fires
(3-year average, NFIRS data 1996–98, adjusted percentage)

TYPE OF MATERIAL IGNITED	PERCENT OF FIRES	FORM OF MATERIAL IGNITED	PERCENT OF FIRES
Plastic	27.9	Electrical Wire	23.5
Fabric	19.5	Cooking Materials	18.4
Paper	17.3	Rubbish	8.0
Volatile Solid (including food, grease)	10.7	Bedding	5.7

Source: NFIRS only

SUPPRESSION/ALERTING SYSTEMS

Figure 6 compares the performance of sprinklers and smoke alarms during medical facility fires. A smoke alarm was present and activated in 63% of medical facility fires, a higher percentage than is found in other property types.

Figure 6. Smoke Alarm and Sprinkler Performance in Medical Facility Fires
(3-year average, NFIRS data 1996–98, adjusted percentage)

DETECTOR PERFORMANCE	PERCENT OF FIRES	SPRINKLER PERFORMANCE	PERCENT OF FIRES
In room of origin, operated	53	Fire too small to activate system	63
In room, fire too small to activate	15	No equipment present	29
Not in room or origin, operated	10	Equipment operated	6
None present	9	Equipment should have operated, but did not	2
Not in room, did not operate	7		
In room, did not operate	7		

Source: NFIRS only

Even though sprinkler systems operated in only 6% of medical facility fires, sprinklers were installed in 94% of the structures.

The presence of built-in suppression and alerting systems in medical facilities is tightly regulated, so it is not surprising that a preponderance of such properties are equipped with alarms and sprinklers. (For further information, see NFPA 99, *Standard for Health Care Facilities*, and NFPA 101 *Life Safety Code*, or contact the USFA.)

EXAMPLES

- In June 2000, 16 people (6 patients and 10 staff members) were evacuated from a medical facility when a lighting fixture caused smoke to enter the facility's HVAC vents.²
- In January 2001, a two-alarm basement fire at a New York hospital caused the temporary relocation of 32 patients. The fire's cause was not determined.³
- In August 2001, an electrical fire at Walter Reed Army Medical Center caused the relocation of 80 patients to medical facilities throughout District of Columbia, Virginia, and Maryland.⁴
- In December 1994, a patient smoking in his room ignited a small fire, which extended somewhat into an adjacent corridor. The fire generated heavy smoke, which killed four patients and injured several firefighters.⁵

NOTES:

1. National estimates are based on data from the National Fire Incident Reporting System (NFIRS) (1996–1998) and the National Fire Protection Association's (NFPA's) annual survey, *Fire Loss in the United States*.
2. "Smoke Causes 16 To Flee Medical Facility," *The San-Diego Union Tribune*, June 22, 2000.
3. Cuza, Bobby. "Fire in Flushing Hospital's Basement," *Newsday*, January 3, 2001.
4. "Fire, Power Outage Evacuates Hospital," *Associated Press*, August 29, 2001.
5. *Hospital Fire Kills Four Patients, Southside Regional Medical Center, Petersburg, Virginia*, Major Fires Investigation Project, U.S. Fire Administration, FEMA, 1995.

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