Major Hospital Fires

Marty Ahrens
Fire Analysis and Research Division
National Fire Protection Association

November 2012

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471
www.nfpa.org

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

Keywords:

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7443.

Copies of this analysis are available from:

National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7443

You can also find us on…

NFPA Index No. 1766

Major Hospital Fires

Hospitals are in the business of preserving and restoring health and comfort. At the same time, they must protect their patients and staff from fire and other hazards. A variety of National Fire Protection Association (NFPA) codes and standards, notably NFPA 99, *Health Care Facilities Code*, and NFPA 101®, *Life Safety Code®,* help health care facilities prevent fires from starting and minimize the impact of any fire that does start. These documents are revised regularly to reflect changes in knowledge, technology, and the health care environment. NFPA 99 addresses the special systems and equipment unique to health care and emergency management while the Life Safety Code® addresses the building and staff preparedness to cope with emergencies. Major incidents often indicate a need for change.

Over the years, great progress has been made. In 1980-1984, the earliest years of detailed national data, U.S. fire departments responded to an estimated average of 7,100 hospital fires annually, resulting in an average of five deaths per year. In 2006-2010, they responded to an average of only 1,400 such fires that caused less than one death per year. The implementation of smoking bans in many hospitals was accompanied by a drop in the percentage of fires started by smoking materials from 35% in 1980-1984 to 7% in 2006-2010. In the recent period, three out of five hospital fires involved cooking equipment. More details about hospital and other health care fires be found in NFPA's 2012 report, *Fires in Health Care Facilities,* by Marty Ahrens.

During 1980-1984, automatic extinguishing equipment was present in less than half (47%) the reported hospital fires. In 2006-2010, such equipment was present in four out of five (79%) hospital fires, and sprinklers were present in almost two-thirds (64%). See NFPA's 2012 report, *U.S. Experience with Sprinklers*, by John R. Hall, Jr. Flame damage was confined to the object of origin in 90% of recent fires and limited to the room of origin in 97%.

Considerable progress was made before reliable statistics were available. A review of some of the deadliest US hospital fires in the past century shows environments that are hard to imagine today in terms of: fuel load; lack of compartmentation to prevent fire and smoke spread; lack of sprinklers; and limited use of notification systems to alert staff and fire departments early in a fire. Because people sometimes succumb to fire injuries months later, it is not unusual to find different accounts listing different death totals.

1929 Cleveland Clinic fire killed more than 120 people

The deadliest US hospital fire since 1900 was the May 1929 Cleveland Clinic fire that killed more than 120 people. The clinic used nitrocellulose X-ray film instead of the safer cellulose acetate film. The 1925 NFPA recommendations on the safe storage and handling of nitrocellulose films were not followed either. Several tons of films were stored in a basement coal bin in the fire-resistive Ohio building. The storage area was adjacent to several heat sources, no sprinklers were present, and openings between floors allowed fire and smoke to travel upward. Nitrocellulose film starts to decompose at 300°F, releasing heat and toxic and explosive gases. Once decomposition started, gases spread throughout the building and several explosions occurred. Cleveland Clinic Fire

41 women were killed by a 1950 fire in an Iowa locked-ward psychiatric facility.
Forty mostly elderly female mental patients and one attendant died after a patient ignited curtains in her first floor room of the St. Elizabeth's Women's Psychopathic Building of Mercy Hospital, in Davenport, Iowa. The two-story brick wood, joist building was 60 to 80 years old and part of a medical complex. Windows were barred or had heavy wire screens screwed to the framing. Interior wood partitions were either wood lath and plaster or light weight pressed wallboard on wood studs. The corridor had a suspended combustible fiberboard acoustical ceiling. Two attendants were on site. The fire department received the alarm from the main switchboard in another building. When they arrived, fire had already spread to the upper floor. Barred windows made rescue more difficult. They were able to rescue on 25 of 64 occupants. Two of the rescued later died. Mercy Hospital

1949 hospital fire in Illinois kills at least 7
In April 1949, at least 74 people died in the 100-bed Saint Anthony Hospital fire in Effingham, Illinois. The hospital, built in 1876, had no automatic detection or sprinklers and lacked smoke barriers. The fire began in a combustible laundry chute. The fire was discovered when one of the nuns on staff smelled smoke. The fire spread rapidly because of the structure's combustibility, open corridors and stairways. The structure had no automatic detection or sprinklers and lacked smoke barriers. St. Anthony's Hospital

Sixteen people died in the 1961 Hartford Hospital fire.
The 1961 Hartford Hospital fire in Connecticut started in a trash chute between the basement and first floor. The fire-resistive building, constructed in 1948, had linoleum wainscoting and plastic-covered fabric on corridor walls. Dead-end hallways meant occupants had to go through fire and smoke to reach the stairs. Sprinklers were located only in the basement, sub-basement and 13th floor service area. By the time flames burst through a ninth floor chute door and ignited ceiling tiles, staff members on upper floors had already noticed smoke and begun closing doors. When the adhesive failed, burning ceiling tiles fell and ignited flooring and wainscoting. Smoke travelled through the undivided concealed spaces above the ceiling. One smoke door in the corridor was opened, and stayed open during the fire, allowing smoke to spread throughout the entire 9th floor. Sixteen people died. The Hartford Hospital Fire
None of the hospital fires in the past forty years resulted in more than eight deaths.

Eight died in 1974 Missouri hospital fire
A 1974 Missouri fire in a facility built in 1969 claimed eight lives. Most rooms contained a significant fuel load, including two beds with foam mattresses, bedding, nightstands, cushioned chairs, curtains, etc. Detection in the corridors sounded at the hospital but did not alert the fire department. Sprinklers were in laundry and trash rooms only. Staff first noticed the fire near the ceiling of one room and then saw heavy black smoke gushing out. They were unable to close the patient room doors before escaping through closing smoke doors. The charge nurse called the fire department *after* calling the head nurse and the sheriff. An aide inadvertently shut off the oxygen valve to a patient in another part of the hospital, thinking the red plastic cover indicated a fire alarm. That patient died, as did seven of nine patients in the fire wing.
In Osceola, A Matter of Contents

A 1985 Michigan hospice fire claimed eight lives.
In 1985, a fire that started in a recliner in a patient's room killed eight people in a hospice located on the second floor of a five-story, five resistive medical complex. The structure was built in 1970 and had the life safety features specified in the 1967 edition of the NFPA 101, *Life Safety Code*®. Hospice patients were allowed to bring some personal possessions and recliners to create a more home-like atmosphere. The fire was discovered by two nurses who saw a light haze near the ceiling outside a patient's room. Flames coming from a recliner were starting to spread to the occupied bed nearby. She removed that patient from the room, but due to fire conditions, could not rescue the other patient and left the room without closing the door. The other nurse alerted staff and started closing doors. Staff used the manual pull station. The head nurse called the fire department and was on the phone when the local fire alarms operated and activated the magnetically operated smoke barrier doors, except for a wing smoke door. Smoke also spread through the bathroom ventilation system and stairways when opened. All the fatalities were in rooms in which the doors had not been fully closed and latched. All of the victims were in the wing where the fire started. Fire In Michigan Hospice Kills Eight Patients

Five died in a 1986 California hospital fire
In 1986, five patients died after a fire in a California patient's room spread through the open door. The patient was smoking in his room after attempting to shut off his medical oxygen without stopping its flow. Hearing screams, a nurse investigated, called for help, and pulled the patient to the hallway. Because of rapid fire growth, she could not close the room's door or extinguish the fire. Nurses closed other room doors, called the fire department, pulled the fire box, and began moving patients but were unable to complete evacuation due to deteriorating conditions. Hospital Fire Riverside, CA

1993 Hospital fire in New York killed three
In 1993, medical equipment malfunctioned and ignited in a patient's room on the seventh-floor of a fire-resistive New York hospital. Automatic detection was located in patient rooms, hallways and other occupied spaces. The corridors were protected by sprinklers. Fire protection systems were supervised. The fire spread to bedding and a patient ventilator, causing an unrestricted flow of oxygen. Staff immediately discovered the fire. They began closing doors and relocating patients to safe areas. Automatic closing corridor doors and corridor walls limited fire and smoke spread. The two patients in the room of origin died, as did a third two rooms away. The door to that room apparently had not been closed. Corridor sprinklers limited fire spread from the room of origin. Hospital Fire Brooklyn, New York

A Virginia 1994 hospital fire ultimately claims six lives.
A December 1994 fire in Virginia claimed six lives, five at the time of the fire and the sixth months later. The fire began when bedding materials ignited. Foam plastic padding in an "air flotation" mattress fueled it further. A nurse heard screaming and found a fire in the bed nearest the door. She called for help and pulled the fire alarm but was unable to rescue the patient. Nor did she close the door. The fire damaged the oxygen regulator, releasing pure oxygen until the zone valve was shut off. Smoke entered undivided concealed spaces above the ceiling and seeped below. Patient rooms did not have smoke detectors. The fire was already severe when

discovered. The automatic connection to the fire department was not working. No sprinklers were in the room or hallway Hospital Fire, Petersburg, VA . The sixth death was documented in Kenneth J. Tremblay's "Catastrophic Fires of 1994," published in the September/October edition of *NFPA Journal.)*

Consistent with federal criteria, the Joint Commission's accreditation process currently requires health care facilities to conform to the provisions of the 1999 edition of NFPA 99 and the 2000 edition of NFPA 101. These provisions reduce the risk of fire and other hazards and help ensure that the property and staff are prepared should an emergency occur.

As the numbers and fire histories indicate, adoption, implementation and enforcement of modern era safety codes and standards through organizations such as The Joint Commission do make a difference. The reduction in both the frequency and severity of fires in the US healthcare system is not an accident. Rather, it is the result of targeted survey and surveillance programs to keep the patients, staff and visitors safe from fire.