



NURSING HOME FIRE

Memphis, TN

March 21, 1988



**FIRE
INVESTIGATIONS**

NATIONAL FIRE PROTECTION ASSOCIATION

1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101 USA

Telephone: 1-617-984-7263

E-mail: investigations@nfpa.org



National Fire Protection Association

International

Executive Offices

1 Batterymarch Park

P.O. Box 9101

Quincy, Massachusetts 02269-9101 USA

Telephone (617) 770-3000

Telex 200250 Fax (617) 770-0700

FIRE INVESTIGATION REPORT

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3 Killed, 18 Injured

Prepared by

Greg Kyte

Life Safety Specialist

ABSTRACT

A multiple-death fire occurred on March 21, 1988 at the Oakville Health Care Center, a nursing home located at 3391 Old Getwell Road in Memphis, Tennessee. The patient involved in the ignition of the fire and two other patients in the room of origin were killed, and 18 others were injured.

The two-story, fire-resistive building in which the incident occurred contained 27 sleeping rooms housing 73 non-ambulatory patients and 1 patient who reportedly was ambulatory. The building had no automatic sprinkler system or automatic fire detection system, except a smoke detector used in conjunction with a pair of corridor smoke doors. The building did have a manually activated fire alarm system which automatically transmitted alarms to the fire department.

The fire originated in a first floor room occupied by three patients. Considerable smoke and toxic gases spread throughout the building; however, the fire was held to the room of origin as a result of staff efforts at extinguishment. All patients, except the three in the room of fire origin, were evacuated.

The significant factors contributing to the multiple deaths in this fire were:

- o The rapid growth and development of a fire that resulted from the ignition of patient room furnishings and contents;
- o The lack of suppression of the fire in the incipient stage by automatic sprinklers;
- o The lack of automatic early detection and warning of the fire that could have resulted in earlier staff actions.

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A non-profit membership organization dedicated to promoting safety from fire, electricity, and related hazards through research, codes and standards, technical advisory services, and public education since 1896.

INTRODUCTION

The National Fire Protection Association (NFPA), with assistance from the Southern Building Code Congress International (SBCCI), investigated the nursing home fire which occurred at the Oakville Health Care Center in Memphis, Tennessee, in order to document and analyze significant factors that resulted in the loss of life.

The NFPA was assisted in data collection and analysis by the SBCCI under an agreement between NFPA and the three model building code organizations to investigate serious fires throughout the United States. In addition to SBCCI, the other cooperating building code groups are Building Officials and Code Administrators International (BOCA) and the International Conference of Building Officials (ICBO). The three model building code groups are supporting NFPA by lending technical staff for on-site field work and a building code analysis.

The NFPA became aware of the fire on the day of its occurrence. Greg Kyte, Life Safety Specialist in the NFPA Engineering Services Division, and Dale C. Perry, Ph.D., Senior Code Analyst at SBCCI, traveled to Memphis to document the facts related to this incident. A two-day on-site study and subsequent analysis of the event were the basis for this report.

This report is another of NFPA's studies of fires having particularly important educational or technical interest. The information presented is based on the best data available immediately after the fire and that obtained during subsequent follow-up. It is not NFPA's intention that this report pass judgment on, or fix liability for, the loss of life resulting from this incident.

The cooperation and assistance of the following people are greatly appreciated: Fire Marshal H. D. Crossnine and Captain O. E. Hart of the Memphis Fire Department; R. T. Hughes, Memphis and Shelby County Building Official; and Dale C. Perry, Ph.D., Senior Code Analyst, SBCCI.

The author would also like to acknowledge Mayer D. Zimmerman of the U.S. Department of Health and Human Services/Health Care Financing Administration for providing technical assistance during the course of this investigation.

BACKGROUND

The Building

The Oakville Health Care Center, located at 3391 Old Getwell Road in Memphis, Tennessee, began serving the community in 1921 as a treatment center for patients diagnosed with tuberculosis. In the 1950s, Oakville became a long-term care hospital that specialized in the treatment of pulmonary disease. In response to the changing needs of the community, Oakville was licensed in 1979 to be a nursing home and was certified to admit both intermediate-care and skilled-care residents.

Oakville Health Care Center has grown over time to be a 314-bed, long-term skilled care facility. The center is a licensed nonprofit agency under the direction of Shelby County Government and is financed by public funding.

The complex is comprised of five major buildings that are interconnected, yet separated by a minimum of two-hour fire-resistance rated construction. The buildings were constructed at different times as expansion of the center became necessary. The types of construction vary from building to building as does the level of fire protection.

Three of the five buildings are protected throughout by automatic sprinkler systems, and the entire complex has a fire alarm system with manual pull stations.

The building of fire origin, the Goodman Building, is located on the far western end of the complex and abuts the Magoffin Building on its east side. The Goodman Building was constructed in the 1930s and is comprised of two stories and a partial basement. Each of the two stories has an area of approximately 9,000 sq ft., giving the building a total area of approximately 18,000 sq ft.

The majority of Goodman Building was built of fire-resistive construction that closely resembled Type I (332), as described in NFPA 220, Standard on Types of Building Construction (Type II construction, as defined by the Standard Building Code). The exception to this was a two-story addition built at a later date and used as a patient/visitor lounge. The lounge addition is unprotected, noncombustible construction that resembles Type II (000), as described in NFPA 220, (Type IV unprotected construction, as defined by the Standard Building Code).

The Goodman Building is basically a rectangular shape with outside dimensions of approximately 181 ft by 73 ft and has interior exit stairs located at the east and west ends of the building. (See Figure 1.) Each exit stairway serves both the first and second floors and terminates directly to the outside. Other exits from Goodman include horizontal exits on both floors at the east end, where the building connects to the Magoffin Building, and one additional exit on the first floor, located south of the nurses' station.

A 7 ft 6 in. wide corridor runs east and west down the center of each floor with patient rooms located on each side. A nurses' station is located at the midpoint of each corridor, and immediately to the north is a patient/visitor lounge. Also in the vicinity is an elevator which serves both floors.

At the time of the fire, the first floor was comprised of 13 sleeping rooms housing 36 patients, and the second floor had 14 sleeping rooms housing 38 patients. Just west of the nurses' stations on each floor was a smoke barrier which divided Goodman into two separate smoke zones. A pair of opposite swinging, corridor smoke doors, each 45 in. in width with meeting edge protection, was located in the smoke barrier. The doors were intended to be automatic-closing upon detection of smoke and were connected to the

building fire alarm system. On each floor a ceiling-mounted smoke detector was located in the center of the corridor, approximately 3 1/2 ft west of the pair of corridor smoke doors. The purpose of these detectors was to allow the pair of doors to close in the presence of smoke and sound the building fire alarm.

The building was not equipped with an automatic sprinkler system, nor were there smoke detectors elsewhere in the corridor or in patient rooms. A manual fire alarm system was provided and pull stations were located at the entrance to each exit, at each nurses' station, and at the entrance to each patient/visitor lounge. Manual activation of the system automatically transmitted an alarm to the fire department and sounded the building fire alarm.

Emergency Plan

The Oakville Health Care Center had an established fire plan, and each employee reportedly had been instructed as to his or her departmental responsibilities.

The fire plan was based on a four-step procedure:

1. Rescue of occupants;
2. Confinement of the fire;
3. Notification of staff and fire department;
4. Fire control or extinguishment efforts.

The center had a fire brigade comprised of employees whose responsibility was to serve as an emergency fire fighting unit until arrival of the fire department. In addition, the center reportedly conducted a minimum of 12 fire drills each year.

Public Protection

Memphis, Tennessee is a city of 660,000 people located in the extreme southwestern corner of the state along the Mississippi River. The Memphis

Fire Department employs a force of 1,436 to protect a 290 square mile area. The fire department operates 51 engine companies, 22 truck companies, 15 emergency medical units, and 2 squads out of 49 fire stations. In addition to fire operations, the department concentrates on fire prevention and investigations, hazardous materials, emergency medical services, fire training, and fire administration.

THE FIRE

Employees of the evening shift began work at 3:00 p.m. on the day of the fire, March 21, 1988. Staffing for the first floor of the Goodman Building included four nursing assistants and one charge nurse.

Promptly at 3:00 p.m., three nursing assistants began their rounds. They visited each patient room, beginning on the east end of the hall and working their way westward. It reportedly took approximately one hour to see all 36 patients on the floor.

By approximately 3:15 p.m., the three nursing assistants had worked their way down to Room 116, the room of fire origin. The room was only a few feet west of the nurses' station. This room housed three male patients, each considered nonambulatory. Patient A was 78 years of age and confined to a wheelchair because his right leg had been amputated above the knee. He was described as normally talkative and aware of his surroundings. Patient B was 95 years of age, totally bedridden, and on oxygen at the time of the fire. He was described as generally nonresponsive most of the time. Patient C was 78 years of age and was able to communicate with staff. He was apparently restrained in his bed at the time of the fire.

The northwest corner of Room 116 was occupied by Patient A and contained numerous personal items including a television, a radio, and a cardboard box with personal effects. (See Figure 2.) Patient B occupied the northeast portion of the room, and Patient C the southeast portion. The nursing assistants reported nothing unusual during their visit to the room. They recall that Patient A was awake, sitting in his wheelchair, and watching television. Patient B was reported to be nonresponsive, as was normally the case. Patient C was awake and spoke to them during their visit. After

completing tasks in Room 116, the nursing assistants visited Rooms 121, 123, 118, and 120, in that order.

While they were in Room 120, the charge nurse and a fourth nursing assistant were in the vicinity of the nurses' station. At approximately 3:40 p.m., the fourth nursing assistant noticed an odor of something burning from her position at the nurses' station. She advised the charge nurse and described the odor as smelling like something electrical was burning. The two stepped into the corridor and observed light smoke at the corridor ceiling level outside of Room 116. Upon closer examination, they determined that smoke was coming from Room 116 and then proceeded to the entrance. They saw Patient A on fire, sitting in his wheelchair. At that time, they were unable to enter Room 116 and attempt rescue due to the amount of heat and smoke in the room. Visibility reportedly was such that Patients B and C could not be seen from the entrance due to the amount of smoke.

The charge nurse called loudly to get the attention of the other three nursing assistants on the floor to inform them of the emergency. They heard her, came out of Room 120, and began closing doors to patient rooms, beginning at the west end of the corridor and working eastward.

The charge nurse proceeded to the nurses' station and telephoned the nursing supervisor to inform her of the emergency. From her office in another building, the nursing supervisor notified the Memphis Fire Department by telephone. As she was reporting the fire, the fire department received the box alarm for the Oakville Health Care Center, indicating that the building fire alarm system had been activated. Records indicate that both forms of notification were received by the fire department at 3:43 p.m.

Following her call to the fire department, the nursing supervisor paged "Dr. Red." These code words indicated to staff that a fire had been reported. At approximately this time, a call was also made to the maintenance

shop informing members of the center's fire brigade of the fire. In all, four employees proceeded to Room 116 and began fire extinguishment efforts. Using numerous portable fire extinguishers, including pressurized water, dry chemical, and carbon dioxide, they fought the fire continuously until fire department arrival at 3:48 p.m. This action was taken without the benefit of personal protective clothing or self contained breathing apparatus and at great risk to those employees.

Staff from other parts of the facility responded quickly to Goodman Building to assist in the evacuation of patients. Patients from the second floor were evacuated horizontally into the Magoffin Building. Patients situated east of the smoke barrier on the first floor were also evacuated horizontally into the Magoffin Building. The 15 patients located west of the smoke barrier on the first floor had to be evacuated down the west stair to the outside of the building. This was accomplished by bodily carrying those occupants to the outside.

"First-in" fire apparatus arrived on the scene at 3:48 p.m., approximately eight minutes after receiving the alarm. This run, which normally takes two minutes, took five minutes, since the engine company was at the far reaches of its district and returning from a previous alarm.

Staff persons met incoming fire fighters and directed them to the exact fire location. Smoke conditions on both the first and second floors of the building were heavy at that time, although the fire was contained to the room of origin.

First due fire companies responded to the south side of the building and entered the building through the doors located south of the nurses' station. Smoke had banked down in the corridor to less than one foot above the floor. Initial size-up by the fire officer indicated a room and contents fire in Room 116. It was not possible to remove any of the room occupants prior to

knockdown of the fire. Fire fighters advanced a 200-ft preconnect, 1 3/4-in. in diameter, to make the initial assault on the fire. After only a few minutes of operation, the fire was reported "knocked down" at 3:54 p.m., six minutes after arrival. At 3:58 p.m. a second alarm was requested to provide additional manpower, and at 4:01 p.m. a coroner was requested on the scene.

Patient C was the first occupant to be removed from the room. He was found in his bed restrained and in a fetal position, badly burned but still alive. Patient B was the second occupant to be removed. He was also still alive but badly burned, and oxygen was still flowing from the unit located behind his bed.

Patient A perished in the fire and was found lying face down on the bed, and had received severe burns. Reports indicate that a butane lighter was found beneath the victim near his right hand. Further examination indicated that the victim received third-degree burns to his front lower body and stomach area, which appeared to have occurred before Patient A fell face down on his bed.

In all, eight residents had to be transported to emergency facilities, and 28 others were relocated to another nursing home. Eleven employees were transported to a hospital and treated for smoke inhalation. Patient B died en route to the hospital, and Patient C died 11 days after the fire.

SUMMARY TIME LINE

<u>Time</u>	<u>Time lapsed from first indication of fire</u>	<u>Activity</u>
* 3:15 p.m.	- -	Last time staff had visited Room 116 prior to the fire.
* 3:40 p.m.	:00	Noticeable odor of something burning.
* 3:41 p.m.	:01	Discovery of fire in Room 116.
* 3:42 p.m.	:02	Nursing supervisor notified of fire by charge nurse. "Dr. Red" paged to Goodman Building.
3:43 p.m.	:03	Fire department notified by telephone. Box alarm received. *Building fire alarm activated.
* 3:44 p.m.	:04	Maintenance staff begin fire suppression effort. Evacuation of Goodman Building begins.
3:48 p.m.	:08	First fire apparatus arrives on scene.
3:54 p.m.	:14	Fire reported to be "knocked down."
3:58 p.m.	:18	Second alarm requested.
4:01 p.m.	:21	Coroner requested on scene.

*Indicates approximate time based on available data and the best judgment of the investigator.

ANALYSIS

Investigators from the Memphis Fire Department determined that the fire was caused by the careless use of smoking materials by Patient A of Room 116. It is believed that he fell asleep while sitting in his wheelchair and watching TV, and a lit cigarette came in contact with his clothes and ignited them.

Eyewitnesses saw the patient on fire and sitting in his wheelchair. Given that his right leg was amputated above the knee, which limited his mobility, it is thought that sometime during the fire the patient attempted to move and ended up on his bed, where fire fighters found him. Severe burns on his stomach would not normally have occurred if the victim had been lying face down on the bed throughout the incident. These burns tend to corroborate eyewitness statements about the initial location of the victim in his wheelchair.

The fire eventually involved most of the combustibles in the northeast portion of the room, including Patient A's garments, bedding, cubicle and window curtains, TV and radio, waste container, bed table, nightstand, wheelchair vinyl seat and back, and a cardboard box containing personal effects.

Tremendous amounts of smoke, heat, and toxic gases developed during this fire, creating untenable conditions for occupants of Room 116. Heat had built up sufficiently by the time of fire discovery and made entry by staff impossible. Because of this, Patients B and C could not be evacuated until after fire department arrival.

The fire was discovered at about 3:41 p.m. by the charge nurse and a nursing assistant. They described initially noticing an odor of something burning and then a light haze of smoke at ceiling level in the corridor near Room 116.

Due to the heat and smoke in the room of fire origin at the time of discovery, they were unable to rescue any of the occupants. Other nursing assistants on the floor were notified and they immediately began closing patient room doors. As part of the center's fire plan, the reason for this procedure was to reduce exposure to patients beyond the room of origin.

The nursing supervisor, located in another part of the complex, was notified by telephone at approximately 3:42 p.m. by the charge nurse. The fire department received telephone notification of the fire from the nursing supervisor at 3:43 p.m. While she was reporting the incident, the fire department also received a box alarm from the facility that apparently was turned in when a staff person activated a manual pull station of the fire alarm system. The nursing supervisor then paged "Dr. Red", a request to respond to Goodman Building.

Other health care center staff responded to the "Dr. Red" announcement and began evacuation and fire suppression efforts. The fire brigade fought the fire with portable fire extinguishers until fire department arrival some four minutes later, and used from 10 to 12 extinguishers before they were relieved.

The staff never gained entry into the room due to the amount of heat and smoke, and they were not able to extinguish the fire. However, it is likely that their efforts prevented full involvement of the space and resulted in confining the fire to the room of origin. "First-in" fire apparatus arrived at 3:48 p.m., some 5 minutes after being dispatched. The fire fighters quickly knocked down the fire at 3:54 p.m., some 14 minutes after its discovery.

Smoke infiltrated all portions of Goodman Building, including both floor levels and every smoke zone. Second-floor patients were quickly evacuated horizontally into the Magoffin Building. First-floor patients located east of the smoke barrier for the most part were evacuated horizontally through heavy smoke into the Magoffin Building. The patients housed in first-floor rooms to

the west of the smoke barrier (Rooms 118, 120, 123, and 127) had to be physically carried out of the building down the west stairway. During the evacuation of that area, some rescuers described very heavy smoke in the patient rooms as well as in the corridor. One rescuer stated that when standing at the doorway to Room 120, he could hear patients coughing, but could not see them through the smoke.

A close examination of the first-floor smoke barrier and corridor smoke doors was conducted in an attempt to find an explanation for the smoke infiltration between zones. Numerous penetrations of the smoke barrier were discovered above the finished ceiling between Rooms 116 and 118 and between Rooms 121 and 123. Once smoke moved across the smoke barrier, it filled areas between the finished ceiling and floor deck above and eventually spread into patient areas.

Further, soot deposits in the corridor west of the corridor smoke doors indicated that the doors may have been open much of the time during the incident. Close examination of the doors indicated that they were of the appropriate type with closers, latch, and meeting-edge protection. The doors were intended to be automatic-closing upon activation of a ceiling-mounted smoke detector located 3 ft 8 in. west of them or by activation of the fire alarm system. Witness accounts early in the fire indicate that these doors were open; however, by the time the fire department arrived, witnesses indicated that the doors were closed.

A test of the doors after the incident indicated that they would automatically close upon activation of the fire alarm system. Investigators tested the smoke detector, but it failed to activate and close the doors.

The smoke barrier configuration on the second floor was the same as that on the first floor. The tests were repeated on the second floor with the same results. Both detectors were replaced with new ones and, when activated, the doors closed.

The original detectors were sent to an independent testing laboratory for detailed examination. The laboratory reported that the beacon lamp in both units had burned out. The significance of this is that neither detector was functional and could not hold doors open unless the door holder connection to the relay contacts had been altered. Further examinations indicated that both detectors had been altered so that the doors could be held open even though the detector was not capable of activating them.

Based on this laboratory examination and other information gathered by investigators, it was concluded that the corridor smoke doors located west of Room 116 did not close until 3:43 p.m., when someone activated the building fire alarm system via a manual pull station. Prior to that time, significant amounts of smoke spread to the other smoke zone. Once these doors did close, however, smoke continued to flow across the smoke barrier due principally to the many penetrations above the finished ceiling. Smoke spread from the first to the second floor was due primarily to vertical penetrations between Rooms 116 and 216 (located directly above Room 116.)

SUMMARY

This fire resulted in the deaths of all three patients in the room of origin. Eight patients had to be transported to emergency facilities and 28 others relocated to another nursing home. Eleven employees were taken to a hospital and treated for smoke inhalation.

Smoke spread to the second floor and to portions of the first floor situated west of the smoke barrier would have been considerably reduced had the corridor smoke doors functioned properly and the numerous penetrations not existed. A lesson in this fire is that once installed, fire protection systems must be adequately maintained to ensure operational readiness in a fire so that integrity of smoke and fire barriers will not be compromised.

Evacuation of patients from Rooms 118, 120, 123, and 127 took much longer to accomplish than in other areas of the Goodman Building. Patients in this area had to be physically carried down the west stairway to the outside of the building. Patients located east of the smoke barrier on the first floor were also subjected to heavy smoke conditions while being removed from their rooms. The difference is that their evacuation was accomplished earlier and much faster due to the horizontal evacuation capability and quick staff actions.

The door to Room 116 reportedly remained open throughout the incident, allowing smoke and toxic gases to fill the corridor system. Attempts by staff to control and extinguish the fire until arrival of the fire department resulted in the open door.

Given the close proximity of the nurses' station to Room 116 and the fact that the room door was open at the time, the question is raised as to how long the fire had been burning before its discovery. It is believed the fire grew very rapidly, given the amount, type, and arrangement of combustibles present in the area occupied by Patient A. It is also believed that only a few minutes lapsed from flaming ignition until its discovery by staff.

The survivability of patients who are intimate with the ignition, such as was Patient A, is unlikely. The NFPA Fire Analysis Division has reviewed the fire death record of health care facilities. Of those victims whose locations relative to the fire were reported, 92 percent in care-of-the-sick facilities¹ and 58 percent in care-of-the-aged facilities² were so near to the point of ignition as to be coded as "intimate with ignition." Nearly all of these deaths occurred in fires that began with clothing, mattresses, or bedding. Typically, these fires were started by smoking materials or materials used to light them, and they were usually accidental.³

The deaths of the other two room occupants could have been averted if the fire was controlled in the incipient stage by automatic means, such as a quick response sprinklers, or if it had been discovered sooner. Another alternative may have been to restrict the combustible furnishings in the room so that a fire would not grow to such proportions in a short period of time and thus jeopardize occupants not intimate with the fire. Fire protection design alternatives that can achieve such desired performance, are available by application of codes and standards such as the NFPA 101 Life Safety Code and the Standard Building Code.

Because of the higher fuel loading and lower staffing levels which nursing homes generally have when compared to hospitals, and the enforcement problem of limiting fuel loads, the presence of quick response sprinklers or in-room smoke detectors may be preferred alternatives. This would give staff the necessary lead time to take action that could avert such multiple deaths.

1 "Facilities that care for the sick" include hospitals, clinics, and the like, but exclude doctors' offices, mental institutions, and institutions for the physically handicapped or for physical rehabilitation.

2 "Facilities that care for the aged" are not limited to facilities with nursing staff but are supposed to provide some treatment or care.

3 "Fatal Fire Risks and Hazards in Health Care Facilities," Fire Journal, Vol. 81, No. 5, September, 1987, pp. 102 - 103.

In a health care facility, some fire protection design alternatives consider that the staff will have time to detect an incipient fire by automatic or visual means; begin emergency procedures such as notifying the fire department, rescuing exposed patients, and closing patient room doors; and extinguish the fire, if necessary. However, changes may occur in the typical fuel loads of patient rooms that could more frequently produce fires that reach full room involvement or flashover in less than five minutes, something the NFPA Fire Protection Handbook says indicates a severe fire hazard in a health care facility.⁴ If this is in fact occurring, the staff may not have sufficient time to complete emergency procedures.^{5,6}

The significant factors contributing to the multiple deaths in this fire were:

- o The rapid growth and development of a fire that resulted from the ignition of patient room furnishings and contents;
- o The lack of suppression of the fire in the incipient stage by automatic sprinklers;
- o The lack of automatic early detection and warning of the fire that could have resulted in earlier staff actions.

⁴ "Health Care Facilities," Fire Protection Handbook, 16th ed. (Quincy, Mass.: NFPA, 1986), pp. 9-19.

⁵ Isner, Michael S., "Two Patients Die in Missouri Medical Center Fire," Fire Journal, Vol. 81, No. 5, September, 1987, p. 96.

⁶ "Fatal Fire Risks and Hazards in Health Care Facilities," Fire Journal, Vol. 81, No. 5, September, 1987, pp. 102 - 103.

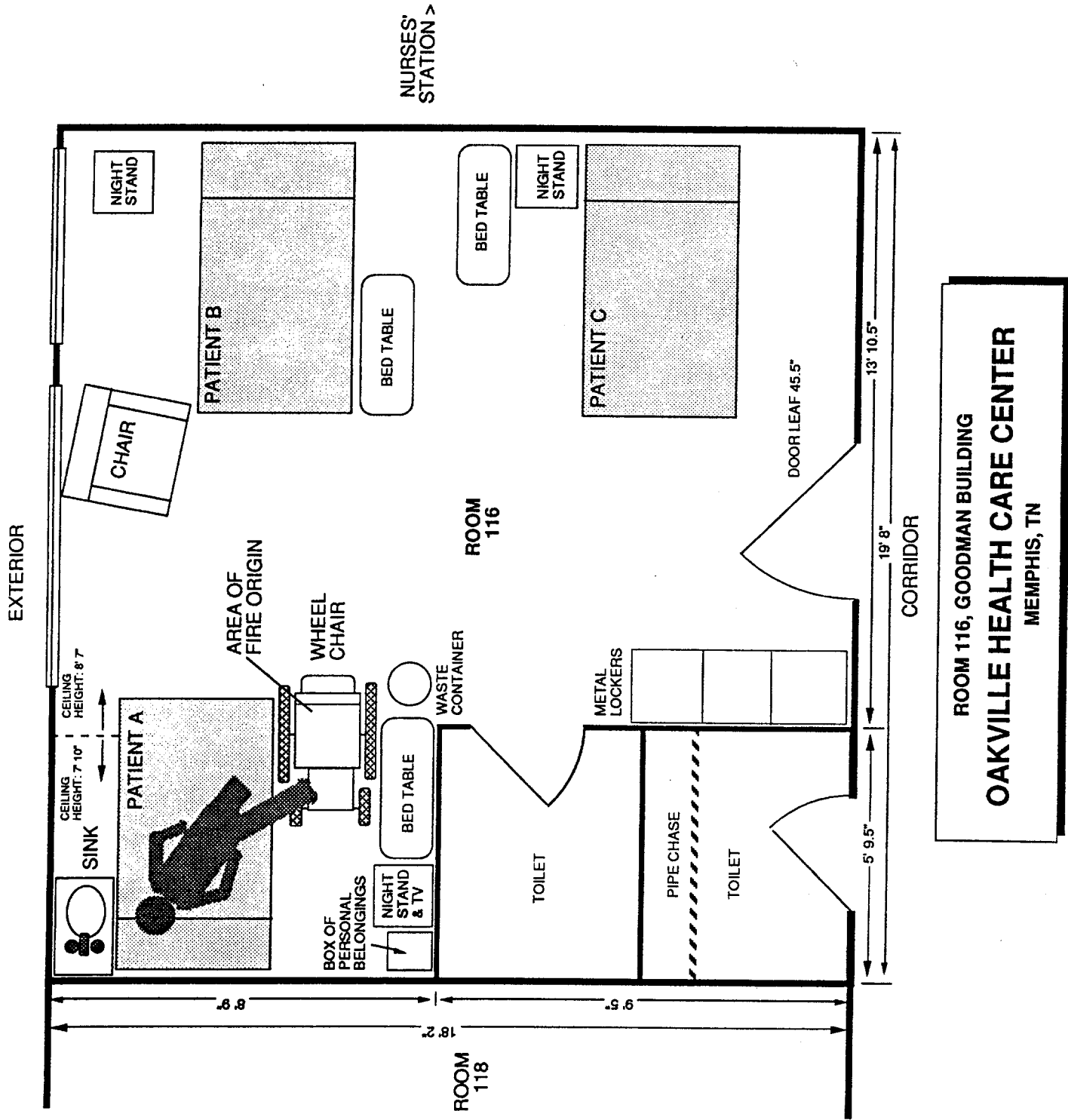


FIGURE 2