Message from
New York City Fire Commissioner Salvatore Cassano

On December 8th and 9th, the FDNY partnered with Mount Sinai Hospital for the 2nd Annual Hospital Fire Safety Conference. The lessons learned from past incidents, today's current strategies, and the best practices for future ways to prevent tragedies were discussed at this important conference.

Some of the top medical professionals and administrators in the world, and many of our best and brightest Fire Officers, including our Chief of Department Edward Kilduff, discussed the critical importance of fire and life safety in hospitals to not only the patients and staff of those hospitals, but to those who respond there as well.

NBC News Anchor Brian Williams and Michael Useem from Wharton Business School offered their unique perspectives on the challenges hospitals face, and ways to better lead and manage in the future.

The FDNY has responded to several unique emergencies involving hospitals in New York City. Unfortunately, no hospital is immune to fire, natural disasters, and man-made disasters. This is a challenge all first responders and medical facilities face, and together we must strive to make hospitals as safe as possible from fires and other emergencies. We need to plan and prepare for the worst; and train and learn together to be at our best.

The FDNY is please to provide you with the attached information regarding Hospital Fire Safety.

Hospital Fire Safety:

A Hospital Industry and Fire Service Partnership Study for the Development of Best Practices in Response to and Prevention of Hospital Fires

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ABSTRACT

On January 21, 2009 at approximately 1823 hours, the main building of the Mount Sinai Hospital in New York City was impacted by a significant fire. The Fire Department of New York City (FDNY) responded with the fire eventually requiring three alarms to extinguish. Over the course of the following 24 hours, approximately 450 patients were evacuated and relocated to areas of the hospital not impacted by smoke or potential danger. Following the fire, representatives from the Mount Sinai Hospital and the FDNY conducted an informational meeting, to review the incident, and to research other fires and practices in the hospital industry. The meeting initiated a study of hospital fires culminating in a symposium of hospital and fire officials on December 13, 2010. More

than 500 participants representing fire departments and hospitals from over 25 states and the City of London participated to examine best practices in both the USA and the United Kingdom. The following document describes the history of improvements in hospital safety protocols and the author's recommendations to improve hospital and fire service safety and efficiency. Some recommendations require code and standard changes at a local, state, and/or federal level. The complexity of hospitals demands an increased need for fire preventive planning measures. It is recommended that hospital and fire department leadership in all communities create a process to enact these recommendations with a primary objective of preventing injury, death, and the loss of critical hospital services.

INTRODUCTION

The public expects safety at hospitals. Hospitals are prepared for both challenges and disasters resulting in a surge in patient volume. Internal hazards such as fire, hazardous material releases, utility failure, flooding, and structural damage may necessitate the relocation of patients within the hospital or evacuation of the hospital. The short and long term consequences of inadequate hospital emergency preparedness include loss of life, additional injury, financial implications and challenges in providing continued health services. Significant impact is experienced when the incident results in complex renovation or construction.

Historically, hospital fires have caused major loss of life and property. The following incidents produced lessons learned resulting in significant code changes.

- **1929 Cleveland Clinic Hospital in Cleveland, Ohio - 125 Fatalities**.
    - Fire ignited highly-combustible x-ray film causing it to spread quickly throughout the building. When a fire door failed to work properly, the poisonous yellow smoke was carried throughout the building by ventilation shafts and stairways.
      In response to this incident, the National Board of Fire Underwriters created new laws relating to the storage and handling of photographic and x-ray nitrocellulose film.

- **1949 St. Anthony's Hospital in Effingham, Illinois - 74 Fatalities**.
    - As a result, changes were made which included the installation of sprinkler heads at the top of each laundry, trash, and dumbwaiter shaft; the use of smoke barriers to separate floor spaces and all stair enclosures constructed of non-combustible material.

- **1950 Mercy Hospital in Davenport, Illinois - 41 Fatalities**.
    - This fire was started by a patient in the locked psychiatric ward who was later charged with murder. Although sprinkler protection was suggested a year earlier, the system was not installed. Security window bars and door

locks, vent flues that had openings on each story, inadequate enclosure of floor openings and stairs, and an absence of fire doors, all had an impact on the severity of the disaster.

- **1961 Hartford Hospital in Hartford, Connecticut - 16 Fatalitie**s.

    - NFPA Life Safety Code was modified in 1963 as a result of this tragedy. Code changes addressed proper construction, adequate exits, careful housekeeping and trained staff. The code change mandated that draperies, cubicle curtains, and decorative curtains had to be treated with a fire retardant coating. Additionally, automatic sprinklers were required based on the year of construction and which materials were used. The main sprinkler system control valve also needed to be supervised. The code also stated that smoke barriers were required to be one-hour fire resistance rated and smoke doors were allowed to be held open by fusible links.

Between 2004 and 2006, there was a nationwide average of 6,400 fires in medical facilities per year. Documented facilities included hospitals, clinics, infirmaries, and others that provide care to the sick and injured. Healthcare facilities open 24 hours account for 89 percent of fires.
The stated fires resulted in five civilian fire deaths, 175 injuries, and approximately $34 million in annual property loss.

The FDNY responds to a significant number of fire-related incidents at hospitals in New York City. Between 2003 and 2010, the FDNY responded to over 2,800 fire-related incidents at hospitals. NYC has experienced serious hospital fires in recent years highlighting significant challenges to both hospitals and the Fire Department. As a result, The FDNY, acknowledging the potential for large amounts of damage and loss of life, partnered with the Mount Sinai Hospital to research and evaluate fire and life safety in hospitals.

A joint fire/hospital committee dedicated to quality improvement in hospital fire safety was developed after the Mount Sinai Hospital Fire on January 19, 2009. The FDNY tasked their leadership program (FOMI - FDNY Officer's Management Institute) to develop recommendations for responses to fires and emergencies in NYC hospitals. The development of a comprehensive report progressed to the concept of a national symposium. One concern for the committee was to determine if the developed processes and tactics were applicable to hospitals outside New York City.

The committee researched the effort and conclusions that United Kingdom agencies completed which were focused on quality improvement in hospital fire safety. They contacted the London National Health Service and the London Fire Brigade and invited representatives to participate as presenters at the symposium focusing on five recent hospital fires. The best practices developed by the City of London were incorporated in the planning for the December 13, 2010 conference.

A conference was promoted via the internet by both the FDNY, through the FDNY Foundation, and The Mount Sinai Hospital, through the Greater New York Hospital Association. The FDNY and The Mount Sinai Hospital co-sponsored the conference which was held at Mount Sinai. Within two weeks of opening registration, the meeting was filled to capacity and had a large waiting list. Eventually over 500 participants and presenters would attend the conference. Registrants represented hospitals and fire services from over 25 states.

Conference evaluations and data as well as growing interest from attendees to join the committee emphasized the need to publish the committee's findings. The "white paper" is being published with the intent that it may help motivate change in hospitals and in the fire industry. There are plans to hold another conference and expand it to two days so that significant topics surrounding hospital fire safety (i.e. evacuation, evacuation devices, patient tracking, inter-agency incident coordination, etc.) can be reviewed in detail. Issues such as standards and codes can also be examined to identify the best and most economical ways to affect change in the hospital industry. Additionally, identified specific types of hospital fires will be included (i.e. surgical fires, MRI's, pediatric/NICU, ICU).

The strong majority of participants evaluated the meeting as a major success. Their recommendations for a follow up conference, planning meetings to explore code changes, and the publishing of a paper on the experience are being reviewed by the FDNY, FDNY Foundation and The Mount Sinai Hospital.

The conference focused on the following subjects:

Fire Department Challenges

Life Safety

Both the Fire Department and the hospital are tasked with a priority objective of accounting for all persons. The accountability process includes the patient population, employees, students, interns and visitors within the hospital. Complexity is increased if the hospital does not have a tracking system.

Many patients are not ambulatory, resulting in a time consuming task for hospital personnel. The movement of patients requires significant resources. Six rescuers may be required to move a single patient. Completing the movement of patients may require a heavy commitment by first responders and hospital personnel. Search, rescue and evacuation operations may require simultaneous actions by all assigned.

Hazardous Materials

Hazardous Materials are common in hospitals. The decontamination of patients, staff, visitors and firefighters may be required. Hazardous Materials may include:

- Biological – bacterial, viral, fungal, parasitic – HIV, staphylococcus aurous infection, hepatitis B and C, tuberculosis
- Chemical – medications, solutions, gases – ethylene oxide, formaldehyde, anesthetic gases, mercury, medical gases, methanol
- Physical hazards – radiation, lasers, magnetic resonance imaging (MRI), electricity, sharps, extreme temperatures, extensive and complex physical plant (steam boilers, generators, etc.), hyperbaric chamber
- Radioactive isotopes
- Clinical labs where specimens, blood, tissue, and body parts are analyzed and dissected. Bodily fluids may contain any number of microorganisms, including those responsible for causing hepatitis, AIDS, tuberculosis or other infectious diseases. All patient specimens must be considered contaminated.
- Chemical storage areas should be considered hazardous. Pharmacy areas may contain large amounts of alcohol.

Communications

Communications within hospitals is often a challenge at emergency incidents. Some hospitals have alarm systems that provide two-way communications from the Fire Command Station (FCS) to phones located on each floor and other critical areas of the hospital. Some two-way communications systems allow announcements to a selected floor(s) from the FCS. Radio communication is not always possible from all areas of a hospital including:

- MRI scan rooms- As copper sheathing is used to prevent interference from outside radio frequencies.
- Imaging areas- Including X-Ray, Interventional Radiology and Radiation Oncology, as lead-lined walls are constructed to protect staff interference with radio frequencies.

Auxiliary Radio communications may be present in some hospitals. Radios can be pre-identified for use by initial first responders. Auxiliary portable radios are valuable to initial first responders investigating an alarm or reported condition.

Occupancy Information

Information about the hospital's facilities including floor plans may not be available for the first arriving officer. Architectural drawings are difficult to read during emergency situations. In NYC, a Building Information Card (BIC) is required for high rise office buildings. A BIC will list important information about the building

(stairs, elevators, standpipes, sprinkler system, and HVAC information). Currently a BIC is not required in New York City Hospitals.

Fire Suppression

Extinguishment of the fire will eliminate the majority of problems. If a sprinkler has activated, it may contain the fire to the area of origin. Common unsprinklered areas in hospitals include conference rooms, public assembly spaces, cafeterias, lounges, libraries, lecture halls/classrooms, basements-cellars-sub cellars, heating plants/steam plants, laundries, and laboratories. If an area is not sprinklered, an aggressive attack on the fire is important to minimize the damage caused by the fire. The goal is to locate and confine the fire to the area of origin while using the minimum amount of water to reduce damage to the floor below.

The *International Building Code* (2009) is available for adoption and use by jurisdictions internationally including NYS and NYC. Both the IBC and the NFPA require new hospitals to be protected by supervised automatic sprinklers. In fully sprinklered buildings, the corridor walls are not required to extend above a ceiling. Based on the building code under which the structure was erected, sprinklers may not be mandatory. Depending on the size of a renovation or the date of construction, sprinklers may not be required or limited to specific areas.

Often building codes are updated with new technology that cannot easily be incorporated into existing buildings. The Joint Commission identifies the term existing building as one in which final plans for addition, renovation, or changes in occupancy were approved by the local authority having jurisdiction before March 1, 2003.

According to TJC Statement of Conditions process, buildings constructed before March 1, 2003 must conform to the 2000 edition of the life safety code (NFPA 101-2000) Chapter 19 for existing structures, which do not require hospitals to be sprinklered.

Both existing and new hospitals built for health care occupancy must incorporate strategies for construction and management of:

- General life safety design and building construction
- Means of egress review (travel distance, suite size, egress paths, illumination)
- Protective features (doors, windows, stairs, vertical openings, barriers, finishes)
- Fire Alarm Systems (notification, audible, visual, and monitoring)
- Internal products (decoration, furnishings, heating elements)
- Staff and visitor training

- Implementation of interim life safety measures during constructions and impairment events

New construction must meet with NFPA 101-2000 Chapter 18 and are required to have sprinkler protection throughout the building. According to the NFPA 101-2000 Chapter 19.1.1.4.5, the code does not establish monetary limits or percent values to major versus minor construction. However, the Centers for Medicare and Medicaid in a December 11, 2004 memorandum (Ref: S&C-04-15) did seek to further define a major project as one that modified 4,500 square feet or more than 50% of the smoke compartment. More recent editions of the Life Safety Code reflect this definition of Major renovation. Therefore, a system replacement would have to meet the requirements for new buildings for the entire smoke compartment, not just the area renovated.

Compartmentation

Tragedies in hospitals led to the requirement of smoke barriers in addition to corridor wall construction. Hazardous areas such as boiler rooms, basements or attics, work rooms (carpentry, paint and upholstery shops) and central storerooms were separated or sprinkler protected in order to safeguard and minimize hazards to occupants.

Smoke barrier doors are designed to resist the passage of smoke from spreading throughout the structure. These self-closing doors may be connected to the fire alarm system and automatically close upon an alarm activation. Doors must not be propped open or integrity will be compromised.

Travel distance to an exit is dependent on individual location in the hospital and whether the hospital is protected by an automatic sprinkler system. It can vary for unsprinklered and sprinklered hospitals from 100 feet to 200 feet, respectively. All hospital facilities must be subdivided into separate smoke compartments in order to limit the spread of fire and smoke and move patients without leaving the building or changing floors. Should smoke spread across a smoke barrier, NFPA 101 requires that adequate egress be provided so that patients can be evacuated without having to go back through the fire. Furthermore, code requires a minimum amount of accumulation space on each side of the smoke barrier to accommodate occupants who are relocated.

In existing construction, smoke barriers are only required on inpatient units when there are more than 30 patients. In new construction, smoke barriers are required on all floors containing inpatients as well as stories adjacent to patient occupied stories. Hospitals are prohibited from removing the barriers or neglecting to maintain them even though they are not required in the building. If a building's air handling system is designed for smoke removal, its design should be as described in NFPA 92A and 92B. Smoke dampers are required in non-fully ducted smoke barrier penetrations in both new and existing facilities, as well as those ducted smoke barrier penetrations where sprinkler protection is not provided in each adjacent smoke compartment.

Trash and linen chutes are covered under NFPA 82 and can present significant problems. Trash and soiled linen rooms on each story and the discharge room at the

bottom of the chutes are hazardous areas. New construction requires these rooms to be protected both by one-hour fire resistant-rated enclosures and sprinklers. Existing conditions require only enclosure protection or sprinkler protection. Interior finishes are regulated to control the spread of a fire in the facility.

Magnetic Resonance Imaging (MRI)

MRI's operate 24 hours/7 days per week and are only shut down in an emergency. The magnetic field produced by MRI's can extend up to 20 feet and can cause the firefighters' tools to become dangerous projectiles. Additionally, self-contained breathing apparatus (SCBA) can be pulled into the machine. The interior coils of the MRI magnet are cooled by a liquefied cryogenic gas. This gas is typically liquefied helium or nitrogen. Temperatures of these liquefied gases range from -250 to -350 degrees Fahrenheit. Emergency shutdown of the magnet is known as "quenching the magnet." This involves bleeding off the cryogenic gas from the magnet housing. If this operation is not performed properly, it can create an oxygen deficient atmosphere in the MRI room, and cause the machine to internally overheat and ignite. The helium will be vented to the exterior. The area must be kept clear since a frigid blast will erupt as helium expands 760 times when it is rapidly heated.

Medical Gases

Nitrogen, oxygen, and other medical gases are piped throughout hospitals from exterior bulk storage tanks and regulated by NFPA 99. The piping is required to be labeled and color coded, as are remote emergency shutoff valves. They must be labeled to indicate the area they supply. Oxygen supply could intensify combustion and fuel the fire. Nitrous oxide is a compressed liquid and an asphyxiation risk. Ethylene Oxide is used to sterilize medical equipment and supplies and is flammable and highly reactive. Shutoff valves must be strategically installed so that their closing produces the least disruption to patient care while allowing the facility to isolate portions of a system as needed. They must also be labeled with information on the buildings, such as floors, zones, areas, or rooms they control. NFPA color code for compressed gasses (Factory Mutual Systems, 1984):

- Oxygen (gas or liquefied) –color coded - GREEN
- Nitrous Oxide (anesthetic & analgesic) - BLUE
- Carbon Dioxide (surgical applications) - GREY
- Air (can be purified) – YELLOW

Heating Venting and Air Conditioning (HVAC)

On detection of smoke in the supply or return air duct by the smoke detector, the supply and return air systems should shut down and the smoke and/or fire dampers should close to prevent smoke from permeating other floors. Most HVAC systems in NYC hospitals serve multiple floors and do not have purge capability to relieve pent up heat and smoke.

NFPA 90A states that every four years, fusible links (where applicable) shall be removed. All fire and smoke dampers shall be operated to verify that they fully close and moving parts shall be lubricated as necessary every six years (NFPA 80, 105).

Since all new hospitals are required to be protected by automatic sprinklers, the NFPA Committee on Health Care Occupancies eliminated the requirement for smoke dampers in fully ducted systems.

Current Hospital Accreditation and Safety Standards

The Joint Commission (TJC) is the predominant accreditation and standard setting agency in the healthcare field. Hospitals must meet the TJC Environment of Care standards to become accredited by the Joint Commission, which is required to receive CMS Medicare and Medicaid funding. The TJC sets Environment of Care standards related to fire drills, emergency preparedness, hospital security, and medical equipment. Approximately 88 percent of the nation's hospitals, including all of the New York City 911 receiving hospitals, are currently TJC accredited (The Joint Commission, 2010).

Building and Fire Alarm System and Supervision

The International Building Code (IBC) and NFPA require all hospitals in the United States to have a combination of systems to detect fires, alert occupants, and aid in fire control and extinguishment. Appropriate illumination, emergency lighting, and exit markings must be provided for the means of egress and an approved manual fire alarm system must be installed. Manual fire alarm boxes are located at the nurses' station or other communal staff location. They must be visible, accessible and meet travel distance requirements. Boxes at exits are exempt if they are located at nurses' stations.

The 1968 New York City Building Code (NYC DOB, 2010c) defines health care facilities as group H occupancies. Hospitals are classified as an H-2 occupancy group. All H occupancies are required to have at minimum a closed circuit electrically supervised fire alarm signal system. The alarm system must consist of a manually operated pull lever type, sending station and audible signaling device arranged so that the operation of any station will automatically sound the signaling devices throughout all portions of the building for a minimum of four rounds of a distinctive code of signals particular to the station at which the signal has been initiated. NFPA 72 states the alarm must sound within ten seconds and reach the central station within ninety seconds. All fire alarm systems shall be activated by a sprinkler water flow and any other fire detection devices installed in the building. Where two or more buildings are served by one fire response team, a combination unit or zone and a general alarm coded closed circuit fire alarm system shall be provided and an approved indicating enunciator installed in each building.

Upon initiation of a station signal, general alarm signaling devices shall sound in engine rooms and sub-grade areas of each building and unit or zoned alarm signaling devices shall sound throughout all areas in only the building wherein the station signal was initiated.

Once the code numbers have been determined, a designated staff member refers to a chart located at a pull station to identify the location of the alarm.

In the 2008 New York City Building Code, hospitals are classified as Group I-2 occupancy group and require at minimum a manual and automatic fire alarm system and an automatic fire detection system to be installed. In addition, an electrically supervised automatic smoke detection system shall be provided in waiting areas that are open to corridors.

Upon operation of any automatic fire detector, sprinkler water-flow device or manual fire alarm box, an emergency voice/alarm communication system shall automatically sound an alarm tone followed by live voice instructions either on a general or selective basis to the following areas: the alarming floor, the floor above, and the floor below in accordance with the New York City Fire Department. Hospitals are exempt from this requirement and the alarm shall sound in a constantly attended area. A general occupant notification shall then be broadcast over the overhead page (NYC DOB, 2010d).

In NYC, under the 1968 NYC Building Code, fire-proof office buildings over 100 feet in height have specific requirements for the interior fire alarm. These buildings are referred to as "Class E" buildings. In a "Class E" type occupancy, a Fire Safety Director (FSD) reports to the Fire Command Station on an alarm activation and advises the Fire Department of the location of the alarm and of the existing condition(s). The FSD provides the status of elevators and which elevators will take firefighters to the stairwell closest to the alarm activation. The FSD advises firefighters if an evacuation has taken place and the status of the evacuation and location of building occupants. The FSD also notifies building occupants of a fire and makes announcements to the building's occupants. The FSD has access to the building personnel who may be of assistance to firefighters.

Hospitals, regardless of height, are currently not mandated to have an FSD as required by NYC Local Law 5 of 1973 or NYC Local Law 16 of 1984 for high-rise commercial buildings and hotels.

Staff Education

The Joint Commission Hospital Accreditation Standards (EC.01.01.01 EP-6), NFPA 101, and IFC 404.2 all require a written Fire Safety Plan. Every hospital must have a fire and evacuation plan for identifying occupants who require assistance because of an imparity, disability or other special need. Staff training and emergency planning are essential in healthcare settings which have a significant number of occupants who are incapable of self-preservation. Complexities at a hospital fire include:

- Shelter in place or evacuation of patients.
- Possessing the necessary equipment and personnel to move patients.
- Safeguarding patients' medical and medication records.
- Tracking of patient's hospital personnel and visitors.
- Notifying patients' emergency contacts.
- Protecting expensive medical and surgical equipment.

Every hospital should have a Fire Safety Officer whose primary job is to recognize hazards, act as a liaison with the Fire Department and arrange for training of hospital personnel. In addition, Fire Departments should designate an Officer as a liaison to work

with area hospitals. The Officer would operate as the Fire Department representative to hospitals and attend hospital association meetings.

Planning and training are key elements in a hospital's preparedness profile. Hospital staff should be comfortable using the acronym RACE whenever the fire alarm goes off in their area:

R = Rescue; assist those in need from the fire to an area of safety

A = Alarm or alert; notify someone, pull an alarm box that sends out a code by sounding the alarm; call the operator

C = Confine the fire; eliminate drafts; close every door on the way out

E = Extinguishment; for the staff that is competent in using a fire extinguisher

There are various types of patients inside the hospital who may require evacuation in a fire or emergency situation. A typical medical center is divided into three occupancy classifications:

1. Business Occupancy – general classification of compartment of building structure where patients are not seen.
2. Ambulatory Care – outpatient treatment occupancy where four or more persons are mostly incapable of self preservation due to age, disability, or security measures (<24 hours).
3. Health Care – medical or other treatment occupancy where four or more persons are mostly incapable of self preservation due to age, disability, or security measures for an overnight stay (>24 hours).

Dependent on the mobility of the patient, the staffing requirements, equipment needs and planning coordination will be critical to a successful evacuation. Training for these evacuations through development of skills and performance during mock incidents are needed for staff to be competent during real events.

All employees in a hospital need fire safety training as part of their orientation. Annual training and drills need to be incorporated with particular focus on the specific areas within the specialized hazards (i.e. nuclear medicine, MRI, ED, pediatrics, geriatrics, psychiatric). International Fire Code 406 specifies requirements for employee training.

Evacuation protocols should be reviewed and updated annually and as major changes and events occur in the hospital. Employees need to be aware of changes that impact evacuation routes. Plans and drills should reinforce evacuation routes and locations to which they could take patients.

Recommended Improvements for Hospitals

- **Uniform Alarm Systems and Panels**
  All hospitals should adhere to the 2008 NYC Building Code. Adherence will facilitate two-way communications from a required Fire Command Center (FCC) to each floor and other essential areas of the hospitals (pump rooms, mechanical

equipment rooms.) and will enable announcements to selected floors. Exact location of the alarm will be indicated on the panel in addition to elevator and HVAC status, which includes remote on/off control and fan purge capability.

Patient Tracking Systems

Hospitals should have procedures in place to account for each patient in an emergency. Patient tracking is critical during an evacuation or relocation. Enhanced electronic patient tracking systems ensure that all patients are accounted for in the event of a fire or emergency. Emerging technology can assist hospitals in locating patients, employees, and life safety equipment, resulting in assisting the fire department with status of searches. It is considered a best practice for hospitals to use a technology-enabled tracking system to assist in accurately locating patients and employees immediately. This would be tremendously valuable to the fire department with searches and removals.

- **HVAC Controls**
  HVAC control is necessary to prevent smoke and combustibles in one area of the hospital from affecting the rest of the facility. NFPA currently allows hospitals to check and lubricate smoke and fire dampers every six years (NFPA 80 and 105). This timeframe should be more frequent to ensure they operate properly. It is also recommended that HVAC systems have purge capability permitting pent-up heat and smoke to be removed from the hospital. Also, whether protected by an automatic sprinkler or not, hospitals should have smoke dampers in the ducted systems.

- **Sprinkler Systems**
  Sprinkler systems should be required and retrofitted to be in all hospitals. In NYC, Local Law 26/2004 requires all high-rise office buildings to be fully sprinklered by 2019. It is recommended that all hospitals should also be mandated to maintain a fully automatic sprinkler system, and that it be included in local law.

- **Trained Person Onsite 24/7**
  A Fire Department trained person should be onsite to meet emergency responders and provide necessary assistance and information. Presently, hospitals are not required to have Fire Safety Directors – a person certified through the Fire Department and trained to provide status reports on the location of the emergency, elevators, and evacuations. In NYC, the NYC Fire Code 401.6.2.2 requires high-rise office buildings to have this resource. It is recommended that hospitals have certified and trained personnel on-site to meet emergency responders.

- **Identification Vests**
  It may be difficult to identify key hospital personnel in emergency situations. HICS (Hospital Incident Command System) protocol recommends the use of identification vests in fire or mass casualty incidents. The use of identification vests will assist fire departments and other emergency responders to identify important hospital personnel who can assist in an emergency. It is recommended to have Hospital Incident Command System identification vests available and worn during all small and large scale fires and emergencies.

- **Dedicated Radios**
  The hospital should provide dedicated two-way radios for use in a fire or emergency situation to enable communications with hospital personnel and responders. This should be a temporary measure and the hospital, in consultation with their local Fire Department, should investigate new technologies such as wireless repeater systems or leaky cables in order to improve communications. This communication system should be tested and drilled so that both hospitals and fire services know beforehand the areas in which the radios will function and not function properly (i.e. operating rooms, mechanical spaces, sub basements, etc.).

- **Building Information Cards**
  A uniform Building Information Card (BIC) should be required for all hospitals. This card includes vital information for responders: locations of stairwells and elevators, mechanical equipment rooms, air handlers, fire systems (sprinklers and standpipes), special hazards, and communications. *See appendix.

- **Evacuation Devices**
  In some instances, patient evacuation is necessary. The importance of having the appropriate evacuation devices on hand cannot be overstated. Hospitals should have evacuation devices in order to facilitate evacuation of non-ambulatory patients. Patients should be assessed upon admission and periodically during hospitalization to determine if they are ambulatory, if they can be transported in a wheelchair or if they need to be transported on a flat surface.

Fire Department Hospital Liaison

Strong relationships need to exist between the fire departments and area hospitals. A Fire Department Officer should be assigned as the area hospital liaison. The officer should operate as the fire department representative to hospitals and attend hospital association meetings.

Memorandums of agreement should be developed with neighboring fire, EMS, volunteer emergency response teams, and other healthcare institutions with regularly scheduled planning and review meetings between all parties.

Summary

Although standards and plans presently exist, the following recommendations should be considered to enhance fire and hospital operations:

- Change and standardize building and fire code requirements for uniform hospital alarm systems and HVAC controls.

- Require smoke dampers in all HVAC systems.

- Maintain a Fire Department educated employee on-site to meet responders during alarm activations or emergencies.

- Have reliable electronic patient tracking mechanisms in place to accurately account for all patients and employees in real-time.

- Require sprinkler systems in all existing hospitals.

- Ensure Hospital Incident Command System identification vests are available and worn during all small and large scale fires and emergencies.

- Maintain a cache of hand-held radios for emergency responder use and foster the use of new technologies to enhance fire department communications to all areas in the hospital.

- Equip some hospital beds with patient evacuation devices for non-ambulatory patients. Certain exceptions (i.e. ICU beds) may apply whereby the device could be stored in the room, floor or nurses station.

- Require a Fire Command Center in all hospital facilities with one and two-way communication capabilities.

- Require Building Information Cards maintained at FCC.

- Work with the local Fire Department to develop a better working, cohesive relationship.

- Publish and maintain accurate guidelines for shelter in place/evacuation protocols.

- Ensure a facility recovery/continuity plan is current and in place.

- Enforce periodic staff fire and evacuation training and evacuation route familiarization.

Appendix

FOMI Hospital Surveys
Sample Hospital Building Information Cards,
London Report-Risk Assessment link
*www.preventionweb.net/files/13954_reviewof**londonhospitalfire**s1.pdf*

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HOSPITAL BUILDING INFORMATION CARD
(For use by Fire Department personnel)

1. BUILDING INFORMATION: BIN#_____
ADDRESS: _____
AKA: _____
Construction Class: _____
O.R.'s (Floors) _____ I.C.U.'s (Floor) _____
Labs (Floor #) _____
Medical Gases (Floor #) _____
Floor Plans (Floor #) _____
Linen Chutes _____
Occupancy Keys (Floor #) _____

2. BUILDING STATISTICS
Stories: _____ Height: _____ Width: _____
TYPE of CONSTRUCTION: _____
Roof Setbacks: _____
Horizontal Connections: _____

3. STAIRWELLS:

Designation	Floors Served	Pressized	Standpipe

Re-entry Floors: _____
Access Stairs Located Between Floors: _____
Roof Access Stairwells: _____
Fire Tower: Y/N If yes, Location: _____

4. ELEVATORS:

Bank Designation	Car Numbers	Floors Served

Pass. _____ Patient _____ Service _____
Low _____ Med _____ High _____

5. VENTILATION:
HVAC Zones: _____
*Mer_____ Floor Serves _____ To _____
Mer _____ Floor Serves _____ To _____
Mer _____ Floor Serves _____ To _____
Smoke Management System
Purge Capability Y / N Automatic/Manual

6. UTILITIES:
All Fuel Oil Tank Locations (Capacity): _____
Natural Gas Service: Y/N _____
Emergency Generators Location _____
Roof Storage: LPG_____ Diesel Fuel_____ Other_____

7. FIRE PROTECTIVE SYSTEMS
Standpipe Location: _____
Sprinkler Isolation Valve Location: _____
FD Connection Locations: _____
Building Fully Sprinklered: Yes / No
Partially Sprinklered: Floors_____ _____ _____ _____ _____ _____
Fire Pump Locations: _____
Standpipe Isolation Valve Locations: _____
Flow Restrictors (PRV) Floor Locations: _____
Non-water Fire Extinguishing Systems:
Locations: _____

8. HAZARDOUS MATERIALS

NAME OF PRODUCT/QUANTITY LOCATION

_____
_____
_____
_____
_____

Special Notes:

9. COMMUNICATIONS
Class "E" Y / N Repeater System Y / N
Public Address Y / N To Engineer Y / N
Radios for FDNY Use Y / N Public Telephone Y / N
_____

10. TEMPORARY CONSIDERATIONS
_____
_____

11. BUILDING FIRE SAFETY INFORMATION:
Fire Safety Director: _____
Work: ( )_____-_____
Emergency ( )_____-_____
Building Engineer: _____
Work: ( )_____-_____
Emergency ( )_____-_____