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"Implementation of Fire Safety Using Quality Protocols in Port Said Private Hospital"

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ABSTRACT

Background: The most important necessity in any hospital is that it does not cause any harm to the patient. In order to achieve this, hospital management needs to envision a specific set of standards and regulate them to function and they must not deviate from the safety standards envisioned by the administrative bodies. Starting from building of the hospitals to their operating system, many procedures must be followed to avoid risks specifically fire. Hospitals contain a variety of substances that can contribute to fire events.

Aim of the study: Implementation a complete firefighting and alarm system for the hospital to make a safe with no fire hospital.

Methodology: To identify the need for this project, the following methods are going to be done:

First: five stages of 6 sigma approach: Define: study and understand how to protect hospital against fier by using the Egyptian code. Measure: develop process map, conduct time study. Analyze: the collected data and statistical analysis Improve: identify potential causes of delay. Control: recommendation and improvement using managerial process of analysis.

Second: SWOT, TWOS, ETOP.

Third: Fish-bone diagram.

Conclusion: It can be concluded that hospital management has a prime responsibility toward safety of patients by implementing control measures to fire accidents. Impact of fire could be reduced with proper and ideal safety management in hospital building. Every single employee of a hospital shall follow her/his responsibility during fire emergencies and try to save as many potential victims as possible without waiting for instructions.

Key words: fire system, hospital management, quality, Egyptian code, protocols.

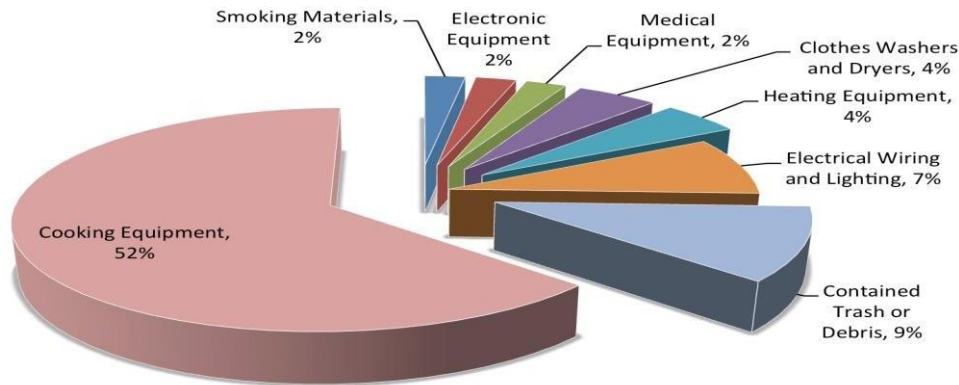
INTRODUCTION

The most important necessity in any hospital is that it does not cause any harm to the patient. In order to achieve this, hospital management needs to envision a specific set of standards and regulate them to function and they must not deviate from the safety standards envisioned by the administrative bodies. Starting from building of the hospitals to their operating system, many procedures must be followed to avoid risks specifically fire. Hospitals contain a variety of substances that can

contribute to fire events. Also, people inside the hospital have different physical and mental characteristics that have different reactions to them. Looking at the general population inside the hospital, it constitutes continuous treatment for patients under supervision. While some patients can rationalize a situation; there are some patients who cannot (1). Evacuation during fire accidents becomes difficult for these patients. In the past, it has been witnessed that hospitals are susceptible to fire hazards and are proven to have tedious evacuations with high fatalities. Effective safety management system requires implementation of meticulously planned logistics and readiness in case of an emergency Boyd (2). The Past accidents in hospitals are poorly reflected in the implementation of appropriate safety protocols and an inadequate emergency response. Safety must be a value in the organization's mind.

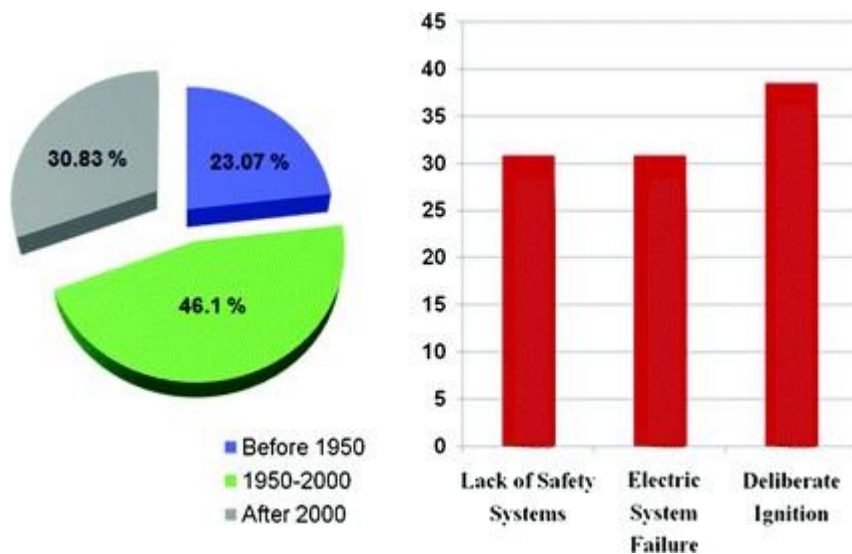
Epidemiology

- There were numerous serious historical fire accidents in the hospitals . These accidents can be caused by different ways .The eight leading causes of hospital fires in the United States of America are shown in the chart below (these figures are based on data from the National Fire Protection Association).(3)



-In these fire accidents, numerous people were killed and injured and valuable property was damaged. The past accidents happened in hospitals reflect poorly on the implementation of proper safety protocols and inadequacy of emergency response. There have been major incidents in hospitals reported in the past, including the fire accident that occurred in AMRI, a hospital located in Kolkata, which killed almost 90 people in the year 2012.⁽⁴⁾ It is one of the recent accidents happened in hospitals in India. In the morning of May 15th, 1929 Cleveland hospital in USA encountered a massive fire accident followed by poisonous gas release from burning nitrocellulose X-ray film ignited by a nearby light bulb ⁽⁵⁾. Around 125 people died in this disaster since there was no proper evacuation strategy and lack of fire protection systems. ⁽⁶⁾

- A detailed study on fire incidents of 13 hospital buildings were used, All the incident cases were constructed on some norms to be designated. For example, one of the norms included higher rate of injuries and casualties. As a result, number of people were killed and injured during fire incidents happened. Also, the hospitals while handling fire accidents have to meet the faults and glitches. In Fig. 1, the blue area denotes three fire accidents before 1950; the red area denotes six fire accidents which occurred between 1950 and 2000; and the green area denotes four accidents chosen after 2000.⁽⁷⁾



Aim of work

Implementation a complete firefighting and alarm system for the hospital to make a safe un fire hospital.

Importance of the project and its value

Safe hospital and environment

Obtaining the Egyptian accreditation and supervision authority

Renewal of hospital license

Obtaining the JCI accreditation

Increase profitability and patient's confidence

Vision: We aspire to be a pioneer in providing excellent health services at the regional level.

Mission: The hospital is committed to providing an integrated health service oh high quality within the reach of every one taking into account the ethics of profession and the health of society and environment using recent technology with continuous medical education .

Methodology

To identify the need for this project, the following methods are going to be done:

First: five stages of 6 sigma approach:

- Define: study and understand the how to protect hospital against fire by using the Egyptian code
- Measure: develop process map, conduct time study which required three months of study.
- Analyze: the collected data and statistical analysis
- Improve: identify potential causes of delay,
- Control: recommendation and improvement using managerial process of analysis, planning and feedback by developed tactics by meeting, advices, notes, continually gathering information. (8)

Second: SWOT , TWOS , ETOP

SWOT analysis for the project table (2)

	Favorable	Unfavorable
	Strengths	Weaknesses
Internal factors	<p>1)The design of the building gives us a chance for development.</p> <p>3)Location of the hospital in the heart of governorate with easy transportation to the hospital.</p> <p>4)Presence of emergency department, ICU, CCU, cardiac laboratory, cardiac outpatient clinic, operative theater a lot of inpatient beds.</p> <p>5)The history and background of hospital gives confidence to people and facilitate our marketing.</p> <p>8)Extremely strong team with excellent emergency skills.</p> <p>10) Infection control, quality control and patient safety are applied.</p> <p>11) Procedures, polices and medical protocol</p>	<p>1)Lack of communication.</p> <p>2)A high number of staff members are registries or travelers.</p> <p>4)Financial losses.</p> <p>5)Staff competencies lake of physician.</p> <p>7)Poor advertising and marketing.</p> <p>8)The medical services in intensive care unit, emergency unit not completed by catheter unit.</p> <p>9)Increase transferring or discharging coronary heart patient to other hospitals to complete treatment by catheter.</p>

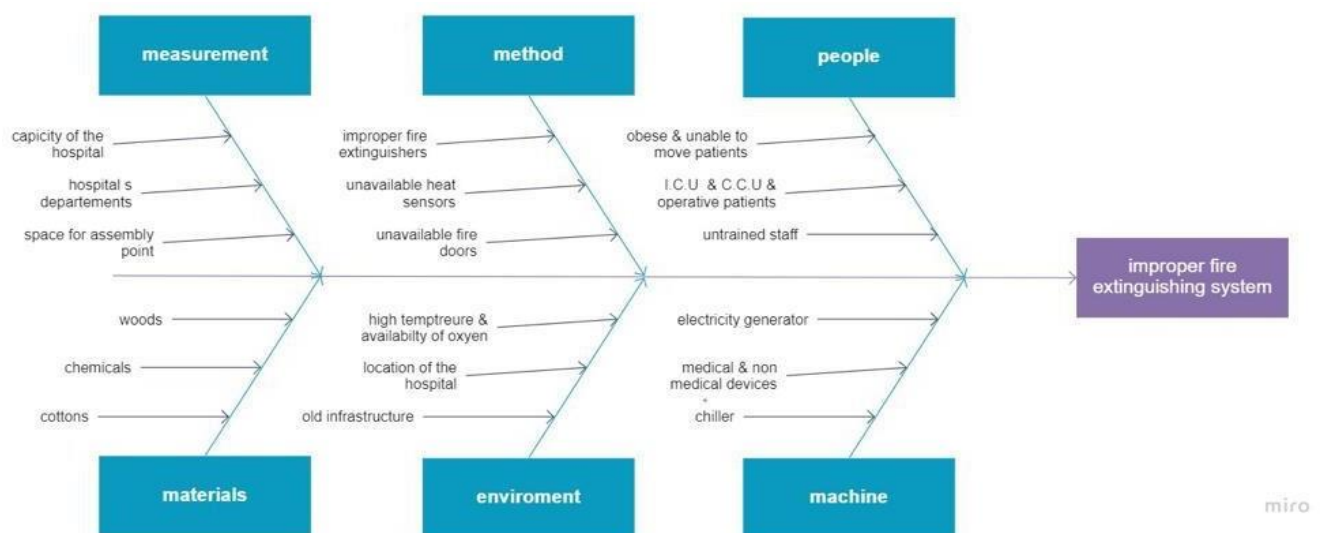
	<p>are usually updated according to the medical society and the evidence-based medicine.</p> <p>12) Cutting edge equipment with high level of technology in all our department.</p> <p>13) Variety of specialized outpatient clinics.</p> <p>14) Presence of computer system program that links all our departments.</p> <p>16) having a contract with many companies.</p> <p>17) The first private hospital to obtain accreditation in the governate.</p> <p>18) Breathe in financial support through the charity.</p>	<p>11) lack of a clear incentive and bonus mechanism.</p>
	Opportunities	Threats
External factors	<p>2) Enable to focus on development.</p> <p>3) Good media relation Better care delivery</p> <p>4) High number of patients demand our healthcare</p> <p>5) Presence of contracts with many medical insurance</p> <p>6) an accreditation Provides financial support (charity)</p> <p>7) Presence of multiple sources of contracts</p> <p>8) Increase the prevalence of cardiac risk factor and cardiac patients in this area.</p>	<p>1) Competitor</p> <p>2) Regulatory standpoint Contracts with other hospital and clinics is not efficient.</p> <p>3) Need more contracts with a lot of medical insurance.</p> <p>4) Political and economic instability.</p> <p>5) Entering comprehensive health insurance system.</p> <p>6) Wideness of marketing media which need professional team.</p> <p>8) Increase water, electricity and phone costs</p> <p>9) increase the level of salaries of stuff</p>

The strategy to turn the threats and weakness to strength and opportunities (TWOS)

- 1- Implement a fire fighting and alarm system
- 2- Increase the contract with other medical centers and clinics to use our medical services.
- 3- Increase the customers services and decrease the wait time.
- 4- Complete health care service and decreasing patient complains.
- 5- Speed in performance and accuracy of results.
- 6- Consultant and medical staff nursing, assistant medical service providers, housekeeper's security need more training.
- 7- Variety of medical school from different university

- 8-Support the marketing unit by professional staff.
- 9-Hospital introduce all health care services 24 hours a day, 7 days a week
- 10-Proper communication with client's patients' governors
- 11-Look for Clients and patients safety and demands.
- 12- Attract excellent staff by increase their salaries. (9)

Third: fish-bone diagram: (10)



Brainstorming: 3 setting.

First: with the team .

Second: With a consultant team from civil protection authority

Third: With consulting office for feasibility study.

Developing and raising the efficiency of the firefighting and the alarm systems.

Fires are one of the most dangers feared by health care providers, patient, and all hospital workers

It can be extremely frightening patients and hospital staff

In any hospital the possibility of fire can occur due to presence of (oxygen, fuel).

Evaluation Risk:

Severity: Fatal 5

likelihood likely 4

Score : 20

	1 Remote	2 Unlikely	3 Possible	4 Likely	5 Certain
1 Trivial					
2 Minor					
3 Lost					
4 Major					
5 Fatal				20	

Risk analysis:

Lilkehood: likely

Potential sequence: Extreme

Risk: Very high

	Negligible	Minor	Moderate	Major	Extreme
Almost Certain					
Likely					Very high
Possible					
Unlikely					
Rare					

Risk control

**Risk exposure; Major / Expected per control activity :
adequate**

Major/Expected		Monitor control			
Significant/likely					
Moderate/possible					
Minor/unlikely					
Insignificant/Remote					

Excessive Adequate refine need inadequate

Risk Management

Impact /likelihood : must manage and monitor risk

Significant		Must manage and monitor risks	
Moderate			
Minor			
	Low	Medium	High

Second: escape routes

Third the firefighting system

Fourth: the alarm system and the description of alarm system

Fifthly: extinguishing means by various media

Sixth: ventilation

Seventh electrical connections

Eighth: securing all of the generator rooms, transformer rooms, pump rooms, fuel rooms, cabins, electricity distribution cells

Ninth: indicative signs

Tenth: training on control work

General description of the hospital

The address: Port Said and its main façade overlook Saad Zaghloul Street and AlAmin intersection

The owner is a charity

The date issuance of the building permit 1992

Total area 2300meter square

Description of the building : an eight floors building of concrete buildings and components used to provide treatment , surgeries , laboratory , radiology and the works on each floor are as following , administrative offices .

Ground floor 5 rooms for security and reception

,8 rooms service and maintenance

8 rooms X ray , Sonar and CT scan

5 emergency rooms

Mortuary room , stores , waste rooms , lockers

First floor 26 rooms : 11 administrative offices , 1 lecture hall , 2 rooms server and I t 3 rooms laboratory 9 outpatient clinics rooms

Second floor 13 rooms : 2 for one day surgery , 5 operative , 2 laparoscopy , 2 drug and instrument stalk ,2 lockers doctors and nurses

Third floor 21 rooms : renal dialysis 4 rooms , 12 inpatient patients , 2 a break reluctant , 3 administrative offices

Fourth floor 23 rooms: 18 inpatient rooms , 1 a break reluctant , 2 store rooms , 2 administrative offices

Fifth floor critical and intensive care units 24 rooms

Cardiac lab. , intensive care unit , outpatient rooms , store rooms pediatric care unit , critical care unit , catheter unit

Sixth floor 10 rooms: 4 stores rooms , cafeteria , 2 administrative rooms , water treatment plant

Seventh floor kitchen

Escape tracts:

Escape stairs the hospital is equipped with 2 concrete stairs , one of which 130 cm wide and the other 110 cm wide ,more than 210 height suitable for carrying work in buildings and all stairs connected to the ground floor and connected to the exits and drainage outlets of the surrounding streets . All corridors leading to and from the stairs , a width of not less than 2 meters which is appropriate . the number of exit units was calculated according to the work load and the capacity of the exit unit was calculated according to the terms of the code .

Fire zone; the escape route were evaluated according to the Egyptian code, implementation principles and fire requirements

Each floor of the building is considered a fire zone and it has been designed so that the travel distance does not exceed 20 meters, taking into account that the entire building will be covered by the automatic extinguishing system . Each area has 2 exits on the stairs

All corridors are equipped with an alarm system to address and automatic water extinguishing. All escape routes are provided with phosphorescent signs and arrows to indicate exits and directions. All escape routes are equipped with an artificial lighting system and connected to a generator

source

Electric elevators: There are a total 5 elevators in the hospital, one of them is dedicated to firefighters with a load of more than 900kg and connected to the generator as a backup power source that works automatically in the event of a powers outage. All electrical connections to elevators are placed in ducts, and the electrical panel is secured

With an automatic gas extinguishing system Co2 (fire search)

Dead ends : There are only on the last floor (archive rooms , and it will be provided by a fire resistant iron escape path that opens directly to the adjacent surface with open fresh air and from it to the main staircase

General requirements for fire resistance in separators and corridors in escape routes

The fire resistance walls of the corridors connected to outside is not less than one hour. Fire resistance of walls of skylights and elevators 2 hours

Fire resistance of walls generally 1-2 hours. Direction of doors toward outside of corridors not inside, of fire resistant material connected by magnetic unit panic bar .

Evacuation plan

- 1- A drawing showing doors windows stairs and corridors
- 2- Stairs for evacuation
- 3- The evacuation path is sound, safe, and empty . windows are easy to open
- 4- Determine the collection point at the main door of the hospital and make sure everyone is evacuated
- 5- Telephone number of security , safety , firefighting and civil defense are written
- 6- The evacuation order is issued by the general manager or his representative
- 7- Avoid crowding and escape of even floors from the eastern and individual floors from western staircase
- 8- Evacuation is carried out through the alarm bell
- 9- Evacuation the building and surrounding obstacles as cars. (11)

During evacuation

When you listen to the alarm bell.

Close the sources of gases and electricity – leave the area according to your way do not use the elevator and use stairs

use the guide boards and arrows to reach the gathering point

avoid running and scrambling and report any missing person

Evacuation of ICU, CCU and operative patient according to the plan developed in coordination with the nearest hospital taking into account the method of transportation. (12)

(RACE & PASS)

RACE (Dealing with fire)

)PASS(How to use

extinguisher)(13) General rules

Put a wet sheet in front of the door to prevent the spread of fire.

Water can be used after switching off the power supply.

Stand upwind, away from fire by 3-5 meters, do not fight fire from above the flame, move the nozzle of extinguisher left and right and you must know the nearest extinguisher and alarm glass breaker.

Firefighting networks and systems

Assets of pumps dedicated to extinguishing and fighting fire will be installed with a discharge rate of 750 gallons per minute and a manometer lift with a capacity of 75 hp, consisting of: Main fire pump with discharge rate 750 g / min, 9 bar lifter driven by an electric motor 750 hp

A backup fire pump with a discharge rate of 750 gallon / min, a bar lift driven by a 4 cylinder diesel engine 75hp, and it works automatically when the power is cut off, the first pump fails or the pressure in network drops

A jockey compensatory pump works to save pressure in the network when opening more than one outlet in the network with a capacity of not less than 5% of the capacity of the main pump and to stabilize the pressure at 7 bar when opening more than water outlet. (14)

A backup firefighting water tank of poly ethylene connected in a row with each other with a capacity of 90 cubic meters will be installed on the fire line to feed the fire pump group and connect it to the hospital fire network, it is sufficient to operate the system for a period of not less than 30 minutes and is suitable for the degree of danger in the hospital and is connected to the public water network to compensate continuously and withdraw from the tank

A network of fire pipes will be installed in the building consisting of a smooth steel (Cemels). As scheduled of 40, diameter of 6 inches for main entrance to the hospital and through it, a two risers of a diameter of 4 inches are fed table 40

cemels smooth inside the first to supply 8 fire boxes and it's faucets up to the roof . the second riser supply 7 fire boxes and a sprinkler network , and a control unit will be installed in each floor to control in the event of maintenance or malfunction in one of the floors . Network drainage rates will be taken into account for the diameters of the pipes to the sprinkler network and fire boxes in all corridors and rooms.

All hospital corridors and rooms will be secured by a total water immersion network , which is an automatic water sprinkler opening at 68 degrees Celsius diameter of 1/2 inch certified and the network of each floor is connected with a control unit connected to the buildings main feeder line for each floor . A 4 inch scimms connection, double sided two socket moss model 2.5 inch outlets morris male will be installed near the main door of the hospital to supply the fire network with water.

all water extinguishing system works automatically when a fire occurs and is able to use for more than 30 minutes and gives a pressure of not less than 5 bar at the farthest point. (15)

The alarm network

An automatic alarm network will be set up for the entire site and with all its components of the type entitled, provided with a plate placed at the hospital entrance in the camera room to monitor it throughout the day

Heat detectors that work on smoke will be installed, except for the kitchen and the laboratory. A manual alarm system, complete with (bells – key – breaker) will be installed.

All the components are identical to the second part of the Egyptian code.(16)

Extinguishing means by different media

1-Manual fire extinguishers

The site is provided with 7 manual fire extinguishing devices that work with dry chemical powder of Bavaria quality, each capacity is 6kg.

the site will be provided with 8 handheld carbon dioxide fire extinguishers with a capacity of 6 kg each

They are all distributed and suspended in walls, corridors, front of escape stairs and at a height of hands reach

2- Fire extinguishing devices for total immersion

The main transformer room of the building will be insured by supplying it with gas automatic system Co2 (fire search).

The electrical panels in the elevator rooms will be provided with an automatic gas extinguishing system Co2 (fire search)

3- Wet chemical liquid automatic extinguishing devices

The hood in the kitchen will be equipped by a wet chemical liquid system that works automatically in the event of fire, god forbid.

Provide a certificate of safety, validity, and efficiency of manual fire extinguishers

Ventilation

Central air conditioning ducts will be secured by fire dampers

Seventh electrical connections. All electrical connections and wires conform to the loads according to the Egyptian code. All electrical panels are equipped with automatic circuit breakers – it works to cut off the electric current automatically when any shortage occurs in the electrical circuits

Securing places of private nature

Generator room: with a total immersion system of self extinguishing with carbon dioxide, wall are fire resistant for at least 2 hours, below it sands

The capacity of the generator is 300 k.v it does not require ozone because it is less than 1000 kv

Transformer room: with a total immersion system of self extinguishing with carbon dioxide

Pump room: extinguishing with automatic water extinguishing system and manual devices

Medical gases chamber will be equipped with automatic water extinguishing system

Main electrical distributing panels room: automatic switch off with gas filling system Co2 (fire search) and the sub room with a water immersion system and manual Co2

Elevator rooms with automatic fire fighting system with Co2 (fire search)

Xray And radiotherapy are secured by automatic extinguishing system with water , taking into account that the pipes are of copper and not iron , as well as the sprinklers as a guarantee that they are not affected or affected by the radiation

Catheter unit: secures by the automatic total immersion system FM200

Paper and archive stores secures by automatic total immersion system FM200

Administrative offices, inpatient rooms, cafeteria , pharmacy , and roads are secured by automatic sprinklers

The stores do not exceed 180 cm in height.(17)

Indicative signs

Phosphorous type, luminous, and arrow direction of security evacuation trends

Training

On civil protection work on an annual basis with necessary number (25%) of workers in coordination with the civil protection in port said

Training internally about PASS & RASCE. evacuation drill

Certificates and Documents

Environment consultant report with a safe waste disposal system

Safety reports compliance and validity of alarm and extinguishing system

Raise the level of insurance against fire hazards according to the requirements of the Egyptian code

Maintenance : contracting with a company for maintenance work

Ban of smoking in the building

Risk	Goal	Objective	Activities	Team	Starting date- ending date	KPI	Budget
Possibility of a fire affecting the hospital , patients and hospital staff	Protect and secure the facility from fire	Insurance of the facility from fire risk Protect patient , visitors and workers from fire hazards Training of workers on civil protection work Training of workers on the evacuation plan Maintenance contracts for firefighting equipment's and water tanks	<p><u>fire works</u></p> <p><u>Sprinkles</u> Supply , installation and testing of automatic sprinkles model SP1(upright) amount 250 automatic sprinkles model SP-2(pendant) amount 150 An automatic sprinkles SP-3 side wall amount 150 all NFPA</p> <p><u>Piping system</u> Supply , installation , and testing of seamless steel pipes schedule 40 as stakes and suspended ceilings 25-150 mm in diameter amount 4532</p> <p><u>Fire hose cabinet</u> Number , supply , and installation of a double cupboard . keeping fire supply , made of galvanizes sheet , thickness of 1.8 mm , electrostatic paint and contains a 30 meter 2.5 inch hose , a 2.5 faucet , a 1 inch hose and 1 inch faucet SRI mallaysian . amount 22</p> <p><u>Zone control valves</u> Installation of control group : OS & y valves – flow switch -check valve – tamper switch – pressure guage -Test & drain valve amount 8</p> <p><u>Siamese connection</u> With the numbersupply and installation of a Siamese connection 4 , 2.5 , . 2.5+ inch to connect to the fire tank pump with two approved outlets amount 1</p> <p><u>Automatic extinguishing with carbon dioxide</u> Cylinders 45kg , tubes valves , nozzles , control panel , manual shut off switch and electrical wires 3 in number (electric room , generator , kitchen)</p> <p><u>Automatic extingwishing system with gas Fm 200</u> Cylinders 9 kg ,tubes nozzles</p>	<p>Implementatio n: BG for engineering and trading company Under super vision of assaf consultation engineering trade company Follow up by our civil maintenance department</p> <p>Training program Internal in charge of safety occupational health and quality management External by civil protection and civil defense authority</p>	<p>Project Start 15/1/2021 Finish 15/7/2021</p> <p>Training : Start 1/3/2021 Finished 1/5/2021</p>	<p>Training internal all hospital staff 25% of the number /week External 10 person / week</p> <p>Implem entatio n According to time schedule 25% of the plan / month</p> <p>Business &repaym ent payment Supplying fire pump at 30/1/2021 Chow equipmen ts End at 1/3/2021 Installatio n and commissi oning 20% per month Testing effectiveness 100% at the end of project</p>	<p>The implement ation work is entrusted to BG company Total amount by Egyptian pound = 4222534</p> <p>عقد صيانة دورية مع شركة بالفاري ناقدر ب 05555 (خمسون الف جنيه مصري)</p> <p>الذيم الاجم اليه للمصروفات = 005555 Fire work sprinkles =99950 Piping system 555888 Fire hose cabinet 321400 Zone control valves 126112 Siamese connection 10449 Automa tic extinguish ing with carbon dioxide 75246 Automat ic extingwi shing system with gas Fm 200</p>

			<p>control panel manual shut off switch and electric wires 3 in number (server , UPS catheter , UPS radiotherapy)</p> <p><u>Fire search</u></p> <p>Supply installation and operation of a fire fighting system fire search with a capacity of 2kg using co2 gas with length of 4 meter number 14</p> <p><u>Fire fighting pumps</u></p> <p><u>Electrical fire pump</u></p> <p><u>Electric driven fire pump system consisting of pump , motor , controller it shall be horizontal split case bronze fitted , double suction centrifugal having design capacity of 750 GPM at a design head of 150 PSIG TDH & 100 H.P when opening at 2900 RPM (UL listed & FM approved) all requirements of NFPA#20</u></p> <p><u>Diesel fire pump</u> a horizontal centrifugal split case diesel driven fire pumping capacity of 750 GPM at a design head of 150 PSIG TDH & 100 H.P when operating at 3000 RPM . it shall be UL listed & FM approved of NFPA#20</p> <p><u>Jockey fire pump</u> design capacity Vertical multi stage of 50Gpm at head of 160 Psig TDH & 5H.P (UL listed)</p> <p><u>fire water tank</u> supply and installation of a polyethylene tank with all its components 15 cubic meters 6 number</p> <p><u>emergency fire doors</u> according to specifications <u>engineering drawings \</u> <u>fire alarm system</u></p>			<p>162352 Fire search 94262 Fire fighting pumps 1522209 Fire water tanks 231900 <u>emergency fire doors</u> 122766 Total fire fighting 3322534</p> <p>Alarm system 900000</p>
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			<p><u>fire alarm outlet</u> a full copper coated 1 *2 mm outlet including iron pipe packing and its accessories</p> <p><u>fire alarm panel</u> 8 loop addressable type 1 Fire smoke detector 360 number Fire heat detector 40 number Fire bell 20 number All of UL/FM Fire manual call point 24 in number monitor modules 13 in number Control modules 13 in number</p>				
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The Legal and Obligatory Study

The legal study

A study by the Legal Affairs Department in cooperation with the Medical and Engineering Authority.

Fundamental of project subject to laws governing Arab Republic of Egypt.

Civil protection accreditation for hospital safety conformity.

Occupational safety and health administration

Also, subjected to the standards and policies of the ministry of health and population. Subject to policies, standards and supervision of Egyptian Atomic Energy Authority. (18)

The political study

Political support for health projects in light of the state's concern for the health of citizens and the providing health service for all 24/7. The political conditions allow the establishment of the project, because political sovereignty currently supports investments and health projects.

The social study:

Study the extent of the community's need for the service and the extent of the service's impact on improving the level of health in Port Said. With this project it can be transferred that the availability of the service is not available, it saves effort, money and time, reducing the complications arising from their lack of sufficient availability on port said community. Providing rehabilitation and health education services for the society.

The catastrophic plan:

Management steps:

predicting and diagnosing the crisis determining its cause

Causes analysis and goal setting

Develop an emergency plan

Regular safety Training on the plan

Identifying alternatives reporting system

Continuous improvement

According to Occupational Safety and Health Administration Environmental Protecting Agency:

Evacuation plan in the event of a natural disaster.

Evacuation plan in the event of a fire - short circuit.

A plan to deal with power cuts.

Chemical spill handling plan.

A plan for dealing with medical and non-medical waste.

Infection control plan.

Security, safety and fire plans:

Security:

The hospital has a contract with a trained security company for patient relatives and staff safety.

The presence of a trained and qualified security department.

Covering the hospital with surveillance cameras.

Safety:

-We have an occupational health, infection control team for safety and risk management, implementing the civil protection codes. following the infection control guidelines by using the personal protective equipment to prevent hazards such as: corona virus, hepatitis B, hepatitis C and AID immune deficiency virus. The protective measures is generally required to protect from chemicals, radiation, dust and projectile as face shields, spectacles, apron, masks (surgical & N95) and goggles.

- Infection control measures in food handling by wearing gloves and masks.

- Preventing and management of chemical hazards by:

1-Protection of health care and patients from chemical hazards

2- safe storage and handling of chemicals

by: labeling and preparation for safety data sheets for chemical hazards.

Risk per hospital admission of dying from a medical error is > 1 in 1000.

Fire plan:

Fires can be extremely frightening patients and hospital staff.

The possibility of fire can occur due to presence of oxygen, fuel and heat.

We have our specific fire safety plan in the event of a fire emergency.

A plan to evacuate the hospital (total and partial) by doing four drills per year.

Our goal is preventing and managing of the fire, saving life's minimal loss.

Our quality and safety team are professional and is well-trained on managing fire risks through:

1-Training all staff in Hospital on risk management plan

2-Providing enough extinguishers

3- well defined evacuation plan

The first way to control accidents and injuries to prevent them following governing agencies standards. Depending on:

Using fire extinguisher (PASS)

Pull the pin, aim at the base of fire, Squeeze handle, sweep nozzle from side to side standing about 6 – 10 feet away from the fire

When fire emergency occurs (RACE)

Rescue, Alarm Contain by closing windows and doors, Evacuate

So, accidents can be divided up to accident related to physical environmental and equipment and accident related to patient care. which in hospital is fire accident, chemical accident, hospital wastes and environmental

So, achieving quality outcomes is a group process.

Discussion

- According to the studied data, few hospitals with high-tech protection systems were not competent enough in fire safety management. Faults and difficulties identified in these fire accidents are as follows:

1. Absence of mechanized firefighting systems.
2. Non-compliance of law enforcement.
3. Myopic planning.
4. Maintenance and management of firefighting appliances.
5. Incompetency of hospital staff regarding safety issues.
6. Combustible materials used and stored in the building.
7. Poor accident management methodology.
8. Legal and administrative bottlenecks regarding security and safety systems.(19)

- One of the primary considerations in preventing hospital fires is to prohibit the use of combustible structural (e.g., floors, walls, roofs, stairwells, fire escapes) and nonstructural (e.g., doors, windows, ceilings, fixtures, façade, insulation, mechanical and electrical conduits) components in the hospital facility.

- New facilities should be designed using building codes and guidelines for fire

prevention, and the materials used should have adequate fire resistance ratings. (These ratings refer to the duration, usually in hours, that a given material can withstand a fire at a specific maximum temperature before losing its integrity, including its strength and insulation capabilities.) In the case of both structural and nonstructural components, fire resistance ratings/durations can vary from 30 minutes to over 4 hours. (20)

Every hospital building must have at least four emergency exits and a maximum of six (21)

- High rise buildings should be easily reachable by road.(22)
- Equipment operation and maintenance through regular inspection.

Hospital buildings must be inspected in every 6 months, and the inspection process should be filmed.

- As-built drawings or plans for existing facilities are required in order to determine the fire-retardant retrofitting needs of the facility. As-built drawings should also be produced for new facilities for future reference, for example in the case of renovations or refurbishments. These drawings should be submitted to the fire service so that, in the event of an emergency at the medical facility, first responders will have a good knowledge of the layout and location of emergency exits, fire compartments, and so forth, allowing for a more efficient response in saving lives.

- Retrofitting plans for fire prevention (and suppression) should be submitted with an associated price tag for the medical facility's overall operating and maintenance budget. However, the following important questions should be considered: *What is the associated "price tag" of a person's life? What is the cost of not providing protection against fires?*

Conclusion

It's concluded that to address the vulnerability of hospitals to fires, all possible steps should be taken to minimize the hazard of fires in hospitals and to stress the need for evacuation. Hospital Fire Prevention and Evacuation is applicable to existing hospitals that can be retrofitted to improve safety against fires as well as proposed or newly built facilities. The primary aim of a hospital facility is to not evacuate patients unless absolutely necessary. Hence, special attention should be focused on proper prevention and suppression techniques to avoid this worst-case scenario. That being said, evacuation training and preparedness is of paramount importance to avoid and/or minimize loss of life.

Recommendations

It can be recommended that hospital management must have a prime responsibility toward safety of patients by implementing control measures to fire accidents. Impact of fire could be reduced with proper and ideal safety management in hospital building. Every single employee of a hospital shall follow her/his responsibility during fire emergencies and try to save as many potential victims as possible without waiting for instructions.

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