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## Directions for Improving Fire Safety in Healthcare Facilities

### Abstract

This research work, an assessment of the level of fire safety and an analysis of the fire safety situation in medical institutions were carried out. Documents on fire safety issues, a scheme of fire extinguishing equipment, draft orders for the appointment of persons responsible for fire safety and primary fire extinguishing equipment were developed. The management of the institution is responsible for ensuring fire safety in healthcare facilities. Violations of standard construction norms and rules, technological design norms established in the institutions should not be allowed, and detected violations should be eliminated immediately. Each employee of the institution must know the fire safety rules, strictly observe these rules and the fire prevention regime in the relevant area, and in the event of a fire, take all measures that depend on it to save people and extinguish the fire.

We would like to remind you once again of a number of rules for ensuring fire safety in healthcare facilities:

1) The territory and buildings of the institution must always be kept clean, extra items should not be stored in attics, stairwells, evacuation routes, passages and corridors should not be blocked by beds, cabinets and objects that may impede the movement of people, flammable and combustible liquids should not be stored in basements, warehouses, attics, garages, stairwells, corridors, wards and rooms;

2) The roads, passages, and entrances to the buildings, facilities, and water sources of the institution must be maintained in good condition and must not be blocked by obstructions;

3) The distance between beds in the wards must not be less than 0.8 meters, and the width of the main central passage must not be less than 1.2 meters;

4) Seriously ill patients and children must be placed on the first floor.

**Keywords:** *fire safety, healthcare facilities, inpatient, fire safety system level, analysis, evaluation*

### Introduction

Fire safety in healthcare facilities is of great importance. Because these facilities have a large number of visitors, and at the same time, most patients are unable to save themselves in the event of an emergency. Some clinics are considered highly dangerous places in case of fire, given the presence of inpatient departments and separate wards for newly arrived, often inadequate or sleepy people.

Thousands of people always apply to hospitals, most of whom are treated inpatient, that is, staying in the hospital day and night. If a fire occurs in a healthcare facility, the failure of the hospital can not only cause damage to people and property inside the building, but also cause major problems for the city and its population. When a fire occurs in a healthcare facility, that healthcare

facility cannot accept patients, and then responsibility for their lives is transferred to other facilities (Khannap, 2024, pp. 2-3).

Turn, queues form in these institutions and many people cannot receive full assistance. In this regard, state fire control authorities pay increased attention to healthcare facilities, as well as when carrying out administrative and legal activities. This problem requires special attention, as a number of large fires in healthcare facilities around the world have claimed hundreds of lives.

### Research

The purpose of the research work was to improve fire safety in healthcare facilities. The work will also include the development of documents and requirements for healthcare facilities, an analysis of the fire safety situation in healthcare facilities, and ways to improve fire safety (Marberry, Guenther, & Berry, 2022, pp. 3-8).

### Chart

Major fires at health facilities around the world in 2010-2018

| History    | Location                   | Hospital                                 | Death toll | Additional information  |
|------------|----------------------------|--|------------|---|
| 02.03.2018 | Baku city, Khatai District | National Narcotics Center                | 26 men     | Because of the inability of firefighters to enter the object, problems arose, and strong winds worsened the situation.      |
| 26.01.2018 | Republic of Korea          | Hospital in the name of King Sedjan      | 46 men     | The number of people affected is 146. It has taken up to 2 hours to extinguish the fire                                     |
| 17.10.2016 | Opissa State of India      | Hospital                                 | 24 men     | Number of victims 100   |
| 10.08.2016 | From the garden, Iraq      | Hospital maternity unit in Yarmuk's name | 13 men     | All those who died were newborns.   |
| 24.12.2015 | Jizan, Saudi Arabia        | Intensive therapy unit                   | 25 men     | 107 people were injured. Many of them are poisoned by the fumes, some of them were dead when they jumped out of the window. |
| 13.12.2015 | Voronezh, Russia           | Psychiatric-neurological dispensary      | 23 men     | Number of victims 23 and one FHN partner  |
| 27.04.2014 | Kosixinski, Altay region   | Private rehabilitation center            | 8 men      | The number of people affected is 6. The fire covered an area of 200 square feet   |
| 11.10.2013 | Fukuoka, Japan             | Orthopedic hospital                      | 10 men     | The number of people affected is 8. The fire had been put out in 1.5 hours.   |
| 26.04.2013 | Moscow province, Russia    | Psychological-neurological hospital      | 38 men     | Only three people have been rescued.  |
| 23.10.2012 | Taynan, Tayvan             | Geriatric Hospital                       | 12 men     | The number of people affected is 70. Patient who tried to commit suicide  |

|            |                       |                                     |        |  |
|------------|-----------------------|-------------------------------------|--------|--|
|            |                       |                                     |        | caused building fire   |
| 9.12.2011  | Calcutta, Hindictan   | AMRI hospital                       | 90 men | About 160 people were in the fire and smoke zone                         |
| 13.06.2011 | Springs, South Africa | Psychological-neurological hospital | 12 men | Number of victims 27   |
| 16.08.2010 | Bucharest, Romania    | Julest birthplace                   | 13 men | All of the dead were children and newborns, as well as 2 pregnant women. |

## Analysis of regulatory documents and requirements in medical institutions

### General provisions

Due to the high flow of people and the fact that people stay inside the building day and night, healthcare facilities require additional control. In order to determine the correct measures to ensure the fire safety of the facility, it is necessary to determine the constructive fire hazard class, the functional hazard class and the category of the medical facility in terms of fire and explosion hazard. The constructive fire hazard class is established in the regulatory documents "Code of Rules for Ensuring Fire Safety Systems, Fire Resistance of Protected Facilities" (Cheung, 2018, pp. 1-2).

The functional hazard class is determined based on the individual characteristics of the structure and its operation. In addition, the possible reaction of people, their number (including personnel), readiness for a quick response to an emergency situation and the availability of beds should be taken into account. Healthcare facilities operating as dispensaries belong to the first hazard class, which also includes residential buildings that are permanently in operation. Such buildings must include the possibility of independent evacuation of people, as well as the ability to equip them with fire barriers. Bedrooms allocated for sick people should be located separately from other designated areas of the building. Fire safety systems are characterized by the level of fire safety of employees and visitors of a medical institution, as well as material values, taking into account all stages of the life cycle of buildings.

These systems must perform one or more of the following tasks:

- exclusion of fire;
- ensuring fire safety of visitors and employees;
- ensuring fire safety of material reserves.

Medical institutions must have fire safety systems aimed at preventing the occurrence of hazardous factors affecting visitors and employees and their repeated manifestations at the required level (Zamani, Joy, & Abbey, 2023, pp. 3-6).

The required level of ensuring human safety in facilities where the systems are used must be at least 0.9999 of the prevention of exposure to hazardous factors per visitor or employee per year. The permissible level of danger should not exceed 10(-6) of exposure to hazardous factors exceeding the maximum permissible values per person per year.

Hazardous factors that can harm people include:

- heat flux;
- sparks;
- flame;
- high temperature;
- increased concentration of oxidizing agents;
- reduced visibility in smoke conditions.

During a fire, various debris and debris, radioactive and toxic substances, high voltage transfer to conductive parts, explosive factors and the effect of fire extinguishing agents on people also lead to the emergence of dangerous situations.

To ensure the protection of medical workers, visitors and property, it is necessary to provide one or more ways to improve the fire safety system:

- prevention of the spread of fire beyond the source;
- improvement of the design of escape routes;
- improvement of fire detection equipment, as well as warning and evacuation control;
- use of personal protective equipment for individual and collective protection;
- use of highly fire-resistant structures during construction;
- use of highly fire-resistant substances and materials during work;
- use of emergency drainage devices for flammable liquids;
- organization of fire departments;
- use of primary fire extinguishing means in conjunction with automated means.

All buildings of medical institutions should have their own evacuation route planning solutions or collective protection should be applied. For the safe evacuation of people from medical institutions, the following must be provided:

- emergency evacuation
- exits that meet all State standards, dimensions and rules;
- unhindered movement along the entire perimeter of emergency exits;
- informing and managing people.

The fire detection, warning and evacuation management system should ensure automatic detection of fire in buildings in a time frame necessary for the activation of warning systems for the safe evacuation of medical personnel and visitors (Belyakov, 2018).

The fire protection system of the building ensures the protection of personnel and visitors in a safe area during evacuation and when exposed to dangerous fire factors.

The system provides one or more protection methods:

- the use of certain solutions to prevent smoke in case of fire;
- the use of special anti-smoke ventilation.

In all buildings of medical institutions, the main building structures should be used, which belong to the fire hazard classes corresponding to the fire resistance limits and the required degree of fire resistance of the buildings. The class and fire resistance of building structures are ensured by:

- constructive solutions;
- appropriate building materials;
- fire protection devices.

Limiting the spread of fire should be achieved by:

- fire barriers;
- fire protection sections and compartments;
- emergency shutdown structures of facilities;
- using means to prevent the spread of liquids in case of fire;
- fire extinguishing devices;
- fire extinguishing devices.

The presence of primary fire extinguishing means is mandatory for all buildings of a medical institution. The nomenclature, quantity and location of these means are determined in accordance with regulatory documents and state standards.

Provision of automatic fire extinguishing systems is carried out in cases where it is impossible to extinguish a fire using primary means, as well as in cases where the working personnel is not on duty in the building all day. Automatic fire extinguishing systems should ensure (Mikhailov, 2012, p. 144):

- extinguishing a fire before the occurrence of critical dangerous factors;
- extinguishing a fire before the fire resistance limit of the structure is reached;
- extinguishing a fire before maximum damage is caused to the property of the enterprise.

Buildings of healthcare institutions must have a fire-fighting water supply.

For example:

- natural and artificial reservoirs;

- internal water supply;
- external water supply.

Of particular importance for healthcare institutions is the functioning of evacuation routes and exits leading to a safe zone for people. During their construction, it is necessary to take into account the requirements of regulatory documents on fire safety, comply with all design decisions and pay special attention to lighting, dimensions, quantity and space-planning solutions, and the installation of fire safety signs on evacuation routes before the facility is put into operation (Taylor, Fielding, Reilly, & Kwasnica, 2024, pp. 2-5).

An equally important factor is the elimination of a possible fire by preventing the formation of a flammable environment or the formation of ignition sources in flammable liquids. To ensure that a flammable environment does not form, it is necessary to use one or more methods:

- use of non-combustible materials;
  - limit the mass and volume of flammable substances;
  - place flammable substances in a safe place;
  - exclude the presence of a flammable environment near ignition sources;
  - control of the content of the oxidizing agent in a safe concentration environment;
  - control of the ambient temperature;
  - control of the ambient pressure;
  - automation of medical processes in the field of technologies for working with flammable substances;
  - placement of fire-hazardous equipment in an isolated zone.
- In order to properly exclude a source of ignition from a flammable environment, one or more rules must be followed:

- determine the class of fire and explosion hazardous areas and use electrical equipment strictly corresponding to this class;
- use of quick-acting means of disconnecting the power supply source;
- use of medical equipment that minimizes or completely eliminates static electricity;
- buildings and equipment must be lightning-proof;
- control of the temperature of materials and substances located near flammable environments;
- limit the energy of the spark charge for devices used near flammable environments;
- reduce the likelihood of spontaneous combustion of circulating substances.

When implementing fire safety measures, the necessary operations are carried out, including:

- penetration into places where fire hazardous factors spread;
- creation of conditions that will prevent the development of fires and various disasters;
- use of additional means of communication available at the facility, if necessary;
- prohibition or restriction of people's access to fire or other disaster zones;
- protection of places where fire extinguishing or other emergency measures are currently being carried out;
- evacuation of people from the fire scene.

Fire extinguishing is carried out by a fire brigade. The head of the fire brigade manages the entire process in accordance with the principle of unity of command of the personnel of the fire department participating in extinguishing the fire. He is responsible for achieving goals and objectives, ensuring the safe implementation of the event for his team. The duties also include determining the boundaries of the fire extinguishing area, the procedure and features of these actions, and in addition (Anderson & Ezekoye, 2018, pp. 715-747):

- making decisions on the evacuation of people;
- making other decisions limiting the rights of officials and citizens in the specified area.

All instructions given by the fire chief during fire extinguishing are mandatory for all officials and citizens. No one has the right to interfere with the actions of the fire chief or cancel his orders.

#### **Duties of fire safety officers**

Training of all personnel in fire safety measures at the facility is carried out and supervised by the management of the relevant facilities on the basis of special programs. The organization of this

training is carried out by the official responsible for ensuring fire safety in this medical facility. The head of the medical facility must install signs with the numbers of fire departments, evacuation schemes and fire safety signs in visible places. In addition, during all working hours, the head is obliged to monitor the activities of medical personnel and visitors on the premises to ensure compliance with fire safety rules. Each employee must clearly know the fire safety rules established at the facility and follow them. In no case should he allow actions that may lead to a violation of these rules. Also, personnel must undergo briefings and fire-technical minimums, depending on their positions and activities. The management of the fire safety system of a medical facility is the responsibility of the head or director of the medical facility. He must also perform his duties within the framework of the assigned powers. The head of the medical facility may delegate the necessary powers to officials responsible for ensuring fire safety at the relevant facilities.

The management has the right to ensure safety in case of fire:

- organize fire departments in the established manner;
- make proposals to state bodies on improving fire safety;
- eliminate the causes of fires that have occurred in a medical institution;
- obtain complete information about the state of fire safety.

Duties of the management of a medical institution:

- compliance with fire safety requirements;
- develop and implement measures to ensure the fire safety of the institution;
- conduct briefings;
- control over personnel who need fire safety training;
- conclude a collective agreement;
- maintain the entire fire safety system in good condition;
- apply all possible forces and means in the event of a fire at the protected facility, as well as assist firefighters;
- ensure the access of firefighters to the territory during working hours when performing their official duties;
- issue documents on the state of fire safety at the facility at the request of officials;
- provide information about fires that have occurred at the facility;
- involve volunteer firefighters;
- ensuring fire safety measures at especially important facilities.

All managers and persons responsible for fire safety at the facility are liable for various violations in accordance with the current legislation and local regulations. Medical personnel are an integral part of the fire safety system at a medical facility. Employees have their own rights and obligations that must be strictly observed.

Rights of medical workers:

- protection of their health and property in the event of a fire;
- compensation for damage caused after a fire;
- assistance in determining the causes of a fire at the facility in the event of damage to their property or health;
- complete information on fire safety issues;
- assistance in ensuring fire safety at a medical facility.

Duties of medical workers:

- compliance with fire safety regulations at the workplace;
- immediate notification of the fire department upon detection of a fire;
- taking all possible measures to rescue people and patients, extinguish the fire and protect property until the fire brigade arrives;
- to assist the fire brigade in extinguishing a fire in the event of a fire;
- it is mandatory to comply with all rules and instructions of the state fire protection authorities.

In medical institutions with a large number of employees (50 or more), the establishment of a fire-technical commission is mandatory. Its purpose is to involve the enterprise's specialists in ensuring fire safety at the enterprise.

The fire-technical commission is established by order of the head of the enterprise. The activities of engineers in the commission are based on the organization of technological processes, the installation and conduct of work with electrical installations, water supply, communications, industrial automation, automatic fire protection systems and other automated devices and tools. If the enterprise does not have the opportunity to involve its own engineering and technical staff, it has the right to use the help of third-party organizations and hire engineers who will perform work on a contractual basis. The chief safety engineer of the enterprise is the chairman of the fire-technical commission, who is appointed by the secretary of the labor protection service of the institution, the fire safety.

The duties of the fire-technical commission include:

- assisting the management of the enterprise in compliance with all fire safety laws and regulations;
- identifying and eliminating malfunctions in technical processes in production;
- developing measures to improve fire safety in the technical field.

The functions of the fire-technical commission include:

- identifying hazardous factors associated with the possibility of fire or explosion in workplaces;
- analyzing existing technical processes for the possibility of fire or explosion;
- notifying employees on behalf of the employer about identified equipment malfunctions or high-hazard factors of various devices;
- informing employees about ways to prevent fires in various buildings;
- assisting in identifying possible factors of fires that have occurred in the past;
- assisting in checking the compliance of all enterprise buildings, mechanisms and machines with fire safety requirements;
- assisting in developing improvements to improve fire safety and prevent fires at the enterprise;
- during the construction of enterprises, the participation of the fire-technical commission is taken into account in the commissioning of facilities;
- assistance in compiling a list of personnel to pass the fire-technical minimum;
- assistance in compiling a list of employees who need additional training due to increased danger;
- preparation of training programs;
- conducting initial briefings for new personnel;
- conducting initial briefings for other employees, including: students coming for internships, contractor employees performing various works at the enterprise;
- theoretical assistance to managers when reviewing instructions on fire safety measures;
- coordination of various draft documents;
- assistance in testing fire safety knowledge of enterprise employees.

Members of the fire technical commission have certain rights, namely:

- inspect the building at any time and familiarize themselves with fire safety documents;
- check and eliminate detected violations of the fire safety regime;
- prohibit their use if malfunctions are detected in equipment;
- request materials from department heads on the state of fire safety;
- issue an order to department heads to dismiss employees who have not received instructions and have not been trained on fire safety measures at the enterprise.

It is strictly prohibited in healthcare facilities:

- use of flammable liquids, flammable liquids and other hazardous substances in basement floors;
- use of unsuitable areas and buildings for the organization of production areas and workshops;
- placement of kiosks in elevator halls;
- deportation of exit doors provided for in the project;
- obstruction of people's evacuation routes;

- use of flammable and combustible liquids during cleaning;
- do not use lamps to heat frozen pipes;
- use of blind grilles on street windows.

The head of a healthcare facility must ensure compliance with fire safety regulations not only during the working day, but also during events involving a large number of people.

Analyzing the general provisions on fire safety of healthcare facilities, as well as the duties of managers and their subordinates, it can be concluded that such facilities are considered one of the most important and complex facilities for ensuring fire safety (Overholt & Ezekoye, 2015, pp. 335-367).

### **Analysis of technical documentation and fire safety of medical institutions**

Normative regulation – In order to properly ensure fire safety at the facility, it is necessary to comply with fire safety requirements, that is, regulatory documents or special or technical conditions established by the authorized state body. The concept of normative regulation in fire safety refers to the adoption by state bodies of various normative legal acts that contribute to the regulation of public relations related to ensuring fire safety.

There are standards for determining general provisions and fire safety requirements for protected facilities at all stages of the life cycle. Fire safety legislation in the Republic of Azerbaijan is based on three main documents:

- Law “On Fire Safety” (Baku city, June 10, 1997 No. 313-IQ);
- “Technical regulations on fire safety requirements”;
- Fire safety rules in the Republic of Azerbaijan.

In addition to these documents, five more normative legal acts are known in the field of fire safety:

1. Code of Administrative Offenses of the Republic of Azerbaijan (approved by Law No. 96-VQ dated December 29, 2015). It describes all administrative liability of citizens for failure to comply with fire safety rules.

2. Criminal Code of the Republic of Azerbaijan (This Code was approved by the Law of the Republic of Azerbaijan No. 787-IQ dated December 30, 1999). This Code describes all criminal liability of citizens for failure to comply with fire safety rules.

3. Resolution of the Government of the Republic of Azerbaijan "On licensing of activities in the field of fire safety" (Resolution of the Cabinet of Ministers of the Republic of Azerbaijan No. 174 dated November 7, 2002).

This resolution establishes the procedure for licensing fire-fighting work carried out by legal entities and individual entrepreneurs.

4. Order of the Ministry of Civil Defense and Emergency Situations of the Republic of Azerbaijan "On approval of fire safety standards" "On design of fire alarm systems in buildings and structures".

5. Order of the Ministry of Civil Defense and Emergency Situations of the Republic of Azerbaijan "On approval of fire safety standards" List of buildings, structures, buildings and equipment that must be protected by automatic fire extinguishing installations and automatic fire alarm systems".

**Evacuation routes and exits, emergency exits** – The correct functioning of evacuation routes and exits plays an important role in ensuring the safety of a medical institution. For this, all norms and rules must be observed during the construction of the building. All calculations for them are carried out without taking into account the fire extinguishing equipment used.

The evacuation exit must lead people to a safe place, that is, outside the first floor of the building or to safe rooms on the floors above the first floor. When considering basements, evacuation routes must lead directly outside, except for cases established by State Law. All exits must be located in a staggered manner. Their number and width must be determined depending on the building and its possible evacuation when fully loaded, and the maximum permissible distance from the most remote place where people can stay to the emergency exit. If several rooms in a



building have different functional hazards, they must be separated by fire barriers and provided with independent evacuation exits (Huang, Wang, & Liu, 2021, pp. 4-5).

The medical institution belongs to the functional hazard class F1.1, in connection with which the floors of buildings must have at least two evacuation routes on each floor, and if the number of people being evacuated is 15 people, then the width of the evacuation route must not be less than 1.2 meters.

Also, if the area exceeds 300 m<sup>2</sup> or more than 15 people can enter at the same time, then there must be at least two emergency exits on the basement and first floors. In order to correctly place the stairs on each floor of the facility, the following expression should be used to determine the distance:

$$L=1,5* \sqrt{P/n-1}$$

P – perimeter of the room, n – number of evacuation exits.

The width of the evacuation exit should be such that it is possible to freely transport a person with a stretcher from the exit. The doors should open in the direction of exit from the building. They should also not be obstructed.

The corridors of evacuation routes with a length of more than 60 m are required to be separated by fire partitions (Tolo, Patelli, & Beer, 2017, pp. 2733-2756).

If the evacuation exits do not meet the requirements, they should be classified as emergency exits. Emergency exits are not taken into account in emergency situations. Emergency exits themselves are necessary to increase safety in case of fire. Emergency exits should lead people to a safe area, that is, to the exit:

- to an open balcony with a blank wall or a fire escape;
- to a room or compartment protected by minimizing the penetration of fire in case of fire;
- to a fire-resistant roof.

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- to an open balcony with a blank wall or a fire escape;
- to a room or compartment protected by minimizing the penetration of fire in case of fire;
- to a fire-resistant roof.

The lighting of evacuation routes should comply with the requirements for “natural and artificial lighting”. Photoluminescent elements are used for evacuation route signs. When placing them, it should be understood that people detect these signs with their peripheral vision.

The relationship between the size and frequency of installation of signs and indicators is established in accordance with State standards (Rohde, Corcoran, & Chhetri, 2010, pp. 58-69).

Primary fire extinguishing means – Primary fire extinguishing means are used only in the initial stages of a fire, since in the event of a full-fledged fire such extinguishing is dangerous to health and life. Primary fire extinguishing means include:

- fire extinguishers;
- fire hydrants;
- fire equipment;
- blankets that isolate the source of fire.

**Fire extinguishers** – One of the most important conditions for the operation of the facility is the availability of primary fire extinguishing agents. To determine the type and quantity of these agents, the following should be taken into account:

- physicochemical and fire hazardous properties of flammable and combustible substances;
- interaction with extinguishing agents;
- categories of buildings and structures.

The height of the place where the fire extinguishers are located should not exceed 1.5 m. The choice of the type of fire extinguisher depends on the fire category of the room.

The choice of the type of fire extinguishers depends on the fire and fire-explosion hazard category and purpose of the premises (it can be public, as in the case of a dispensary), as well as the class of possible fires that may occur in the building. In this regard, it is necessary to adhere to the Fire Safety Rules of the AR to select fire extinguishers and their quantity for each facility.

The location of fire extinguishers should be such that the fire extinguisher itself is not damaged and is protected from direct rays and heat flows. It should also be clearly visible in case of emergency, for this purpose, location signs should be placed above the fire extinguishers; Fire extinguishers should be placed close to places where there is a possibility of fire. Fire extinguishers weighing no more than 15 kg should be placed at a height of no more than 1.5 m above the floor level. Fire extinguishers weighing more than 15 kg are installed at a height of no more than 1 m above the floor level or on the floor with mandatory fixation.

**1. Fire hydrants** – Fire protection systems and requirements for internal water supply, medical facilities and the presence of people there day and night, the number of fire hydrants on the floor should be one, and the minimum water flow for extinguishing a fire should be up to 2.5 liters per second in one stream.

The height of the location in the facility is not higher than 1m 35cm. Fire water supply inspections should be carried out by the company servicing the crane twice a year. Hose rolling should be carried out at least once a year. A separate pipeline should be laid for fire extinguishing needs in medical institutions. The pressure of the fire extinguisher is considered to be in accordance with the standards when the water column is 15.7 m. Internal fire water supply pipelines are made of 50 mm diameter electrically welded steel and plastic pipes. The minimum water consumption for internal fire extinguishing on all floors is 2.5 l/s per flow. Cranes should be equipped with hoses and shafts in accordance with the requirements. Inspections should be carried out in accordance with the standards.

**2. Fire source isolation covers** – These include fire blankets and fire extinguishing equipment. They are used to isolate the source of combustion from access to oxygen. Such covers are available in laboratories where flammable liquids are present in medical facilities.

**3. External networks** – External networks include fire water supply, located outside the building in an open area and helping to extinguish a fire from the street in emergency situations. External fire water supply in medical dispensaries is provided by two fire hydrants in accordance with the requirements within a radius of 200 meters in the PQ-1 wells on the territory of the institution and PQ-2 wells opposite the facade.

**4. Medical institutions must have anti** – Smoke (filtering) masks (Kurzawski, Cabrera, & Ezekoye, 2020, pp. 445-467).

## Conclusion

The main purpose of this research work is devoted to the study and improvement of fire safety in medical institutions. Here, an analysis of regulatory documents for medical institutions and an analysis of the fire safety situation were carried out. As a result of the analysis of the fire safety situation, it was determined that the following work is mainly necessary to ensure safety:

- Evacuation routes and exits;
- Alarm system and fire extinguishers;
- Primary fire extinguishing equipment;
- Design of building structures;
- Organizational measures to ensure fire safety.

The main solutions implemented in this regard:

- Preparation of working documents (instructions) on fire safety issues. Instructions for staff, instructions for inpatients and instructions for conducting building evacuation drills;
- Development of a fire extinguishing equipment scheme for a protected facility and calculation of the types of fire extinguishing equipment recommended for use;
- Preparation of orders in a new form on the appointment of persons responsible for fire safety and persons responsible for the operation of primary fire extinguishing equipment.

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