

Research on the Safety Management of Medical Oxygen Chamber

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Abstract—*The safe use of medical oxygen chambers is extremely important. This paper introduces the matters needing attention in the use of medical oxygen chamber, puts forward the safety factors in the use of medical high pressure oxygen chamber, and describes the scientific management method for the safe use of medical oxygen chamber.*

Keywords—*Medical oxygen chamber, Safety management*

I. INTRODUCTION

China's hyperbaric oxygen medicine started in the 1950s, however, the development of hyperbaric oxygen engineering in China is uneven and has not been paid enough attention for a long time. Therefore, there are some problems in the functional development and safe use of hyperbaric oxygen medical equipment to varying degrees. From the late 1980s to the early 1990s, there were too many medical oxygen chambers in China and they were poorly managed. Some problems have arisen, these problems have attracted the attention of the leaders of the State Council. After many times of rectification, the quality of medical oxygen chamber equipment in China has been significantly improved, especially the requirements for safety performance are more stringent, and the occurrence of heavy and extraordinarily serious accidents has been curbed. However, there are still some security risks which need to be paid enough attention.

The management of medical oxygen chamber is a systematic engineering, and the safety management of the user is just one of the links, which is proved to be very important for the safe use of medical oxygen chamber[1]. As the use unit of medical oxygen chamber, we should pay attention to the analysis of safety factors and strengthen daily management.

II. SAFETY FACTORS ANALYSIS OF MEDICAL OXYGEN CHAMBER

A. Equipment factors

The medical oxygen chamber belongs to the category of pressure vessels. It is a special manned pressure vessel. Compared with other pressure vessels, no matter from its structure, and application, or related to its

oxygen supply and exhaust (gas) system, electrical appliances, air conditioning system, instruments, instruments, communication, monitoring system, etc., it has its own particularity [2, 3]. Therefore, the use unit of the medical oxygen chamber must carry out the "medical institution implementation permit" to carry out the oxygen chamber medical business. Before purchasing an oxygen chamber, the user must apply to the local health administrative department and obtain the approval of "Medical Oxygen Chamber Approval" approved by the provincial health administrative department, then purchase a medical oxygen chamber from a unit with an AR5 pressure vessel manufacturing license.

B. Personnel factors

Including medical personnel, medical oxygen cabin management personnel, patients, etc., its unsafe behavior is an important cause of medical oxygen cabin emergencies. Many dangers are accumulating in the process of diagnosis, operation, weak safety awareness and management errors, which ultimately leads to emergencies. After the purchase of the oxygen chamber, the operator of the oxygen chamber must be trained and examined by the institution designated by the ministry of health, and only after obtaining the corresponding qualification certificate can the operator be on duty. The management personnel of the medical oxygen chamber must obtain the qualification certificate after the training and assessment of the institution approved by the special equipment safety supervision agency before they can work.

C. Medical oxygen chamber inspection

From the perspective of years of use, the proportion of accidents in the oxygen chamber is quite high. Therefore, whether it is the annual inspection or the three-year periodic inspection, the use of the unit must be carefully corrected one by one. Key parts such as safety valve and pressure gauge calibration, oxygen analyzer, oxygen concentration exceeding the alarm device reliability, various valve and hand exercise mechanism movement, emergency power supply and emergency lighting system integrity, air filter material performance, wiring of electrical equipment, grounding

of cabins, gas supply system, sealing ring, observation window and glazing of lighting windows shall be carefully examined one by one [4]. In addition, the grounding device of the oxygen chamber is set to protect the safety of the electrical equipment and to protect the operator and the patient from electric shock, and cannot be ignored during the inspection.

III. SCIENTIFIC MANAGEMENT OF SAFE USE OF MEDICAL OXYGEN CHAMBER

The user shall formulate safety management regulations for medical oxygen chambers in accordance with relevant regulations and in light of the actual conditions of the unit, including general management systems and other management systems and duties of operators.

A. *General management system*

General management system includes,

1. The cabin registration system;
2. Equipment inspection system;
3. Technical file management system;
4. Equipment maintenance management system;
5. Periodic inspection system for equipment;
6. Regular inspection and inspection system for equipment;
7. Safety education and training system (including patient safety instructions);
8. Hidden danger rectification and analysis system;
9. Rescue equipment and articles management system;
10. Repair and transformation registration system.

B. *Other management systems*

Attention must be paid to the management of medical oxygen chamber archives, and the technical data, installation, installation inspection, acceptance, registration and other related data provided by the manufacturer should be filed one by one [5]. The exercise records, accident records, inspection records, safety valve and pressure gauge calibration records should be filed in time after the oxygen chamber is put into operation.

C. *Job responsibilities*

The safety operation procedure post responsibility system shall include the following contents.

1. Job responsibilities of the director of the medical oxygen cabin department;
2. The duties of the doctor in the oxygen chamber of the medical oxygen chamber;
3. Responsibilities of hyperbaric oxygen nurses in medical oxygen cabins;
4. Job responsibilities of medical oxygen cabin maintenance management personnel;

5. Job responsibilities of medical oxygen cabin operators;
6. Job responsibilities of other relevant departments and personnel.

The operator of the oxygen chamber shall be strictly inspected before entering the cabin. It is strictly forbidden to bring the fire and inflammable and explosive materials into the cabin. The personnel entering the cabin shall not wear clothing, shoes and hats that can generate static electricity. Objects contaminated with grease are strictly prohibited from being placed in the cabin. The oxygen concentration in the air compartment must be controlled below 25% and must be replaced or stopped when exceeded.

IV. CONCLUSION

With the development of science and technology, medical oxygen chambers will introduce more intelligent technologies [6]. Humans have used the hyperbaric oxygen chamber to treat diseases more and more frequently, especially the hyperbaric oxygen chamber has special effects on diseases such as gas poisoning and anaerobic infection, which makes the hyperbaric oxygen medicine develop rapidly. However, due to various reasons, since 1992, many vicious accidents in the medical oxygen cabins have occurred in China, causing extremely serious adverse effects at home and abroad, which has attracted the attention of leaders at all levels. The state council has formulated and promulgated the "regulations on the safety inspection of special equipment", so as to standardize the safety supervision of medical oxygen chamber in the links of design, manufacture, sales, installation, use, inspection, repair and transformation [7,8].

It should be emphasized that the management of medical oxygen chamber should focus on the combination of emergency response and prevention. We will strengthen the management of major hazardous sources, do a good job in accident prevention, prediction, early warning and forecasting, and prepare ideas, plans, materials and funds, and work for handling accidents, combine daily management work and emergency rescue work, do well the propaganda and education, increase the safety awareness of all staff and emergency rescue skills and always give top priority to ensure the security of the people's life, strengthen the staff and emergency rescue personnel safety protection, minimize disaster accident caused casualties and property losses. Adequate emergency resources should be prepared, job responsibilities at all levels should be implemented, and everyone should be aware of the characteristics, types, causes and degrees of hazards of accidents. In case of emergencies, the right measures should be taken promptly and actively to cope with and save themselves. We should correctly analyze the main accident characteristics of medical oxygen chamber, identify all kinds of hazard sources, find out the critical state of accident caused by emergency, take actions

quickly, cut off the chain of accident development, and restore the critical state of emergency to the normal state, which is the key to prevent the occurrence of emergency accident and lead to disaster.

Strengthening equipment safety management is an important part of maintaining the ecology of the medical industry [9]. It can be seen that the use unit of the medical oxygen chamber can make the oxygen chamber truly benefit the people as long as the safety management of the oxygen chamber is strengthened.

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