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Research on Occupational Health and Safety of Medical Staff Based on ISO 45001

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Abstract: This paper aims to discussion on the application of International Organization for Standardization (ISO) 45001 in hospitals. With the spread of COVID-19 globalization, the occupational health and safety problems of many medical staff have become international commonalities. There are a lot of articles talking about how to protect medical staff, including World Health Organization (WHO), however most of them are focus on the details, which lack of system methodology and standardized model. By analyzing the Occupational Health and Safety (OH&S) risks faced by medical staff during the COVID-19, the importance of International Organization for Standardization (ISO) 45001 application in hospital industry is put forward. Firstly, the paper adopt a theoretical foundation by which or through which hospital can better manage medical staff's occupational health and safety risks and improve their overall performance. Secondly, this paper uses Plan-Do-Check-Act (PDCA) model to hospitals, which provides a framework for hospital to plan what they need to do. Thirdly, from the ISO 45001 perspectives to explore how to solve the current occupational health problems faced by medical staff and adopt relevant programs to protect occupational health and safety of medical staff, thus promoting the healthy and sustainable development of individuals and hospitals. Findings-ISO 45001 can plays an important role in the occupational health and safety of medical staff. It is of great and urgent to instruct hospitals how to scientifically and effectively identify hazards (COVID-19), evaluate their risks and take corresponding prevention and control measures. Therefore it can promote the health and well-being of medical staff. The occupational health and safety management of medical staff in hospitals is also a concrete manifestation of their active fulfillment of social responsibilities. Originality/value: This paper offers an standardized angle to address the risks of occupational health and safety of medical staff during the spread of COVID-19. As for the application of ISO 45001, this paper provides some suggestions based on china's practice and experience, which through the angles of theoretical research methods include high level structure, Plan-Do-Check-Act (PDCA) model and man, machine, material, Method, Environment (4M1E) model.

Keywords: ISO 45001, Occupational Health and Safety, Medical Staff, Social Responsibility, ISO 26000

Introduction

Infectious diseases have been the biggest killer of human life. The Spanish flu outbreak of 1918, which killed between 25 million and 40 million people. Coronavirus Disease 2019 (COVID-19) is caused by SARS-CoV-2, a newly emergent coronavirus, that was first recognized in Wuhan, China, in December 2019. Genetic sequencing of the virus suggests that it is a beta coronavirus closely linked to the SARS virus. By way of definition, a symptomatic COVID-19 case is a person who has developed signs and symptoms suggestive of

COVID-19 (WHO, 2020a). As of May 1, 2020, there have been more than 3.2 million confirmed COVID-19 cases and more than 230,000 deaths worldwide. The world health organization says virus fight is still far from over. As of April 8, 2020, there are 22,073 medical staff in 52 countries were confirmed infected with COVID-19, according to the WHO's daily outbreak report. In fact, the situation is even worse. As of 15 April, 2020, there is 26,672 and 15,000 medical staff in Spain and Italy alone had been infected with COVID-19, this is more than the total number of available global data published by WHO, which means that the true number of COVID-19 infected medical staff worldwide will increase significantly. The International Council of Nurses (ICN) said in a statement that COVID-19 is infected with at least 90,000 medical staff worldwide. Available data collected by the Council show that 6% of confirmed COVID-19 cases are medical staff. The number of COVID-19 cases globally is now more than 3.5 million, which means the number of infected medical staff likely to reach 210,000 (Li, 2020).

It is no surprise that this figure is so high. The medical staff is the main force in the battlefield of COVID-19. Medical staff can be exposed if they are not careful and in short supply of medical supplies or poorly protected. The infection not only causes physical and psychological harm to them, but also may be transmitted to other patients, colleagues, family members and other close contacts. During the pandemic, medical staff in China reported high rates of depression (50%), anxiety (40%) and insomnia (34%) and 47% of medical staff in Canada reported needing psychological support (UN, 2020). Therefore, it is urgent to strengthen the occupational health and safety of medical staff.

Occupational Health and Safety is an Important Issue of ISO 45001 and ISO 26000

Coronaviruses are a large family of viruses that range in severity from colds to severe illnesses, such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The general symptoms of COVID-19 are: Fever, fatigue, dry cough, gradually developed breathing difficulties. (Wang *et al*., 2019; WHO, 2020a) The patients with mild COVID-19 showed only low fever, slight fatigue and no pneumonia. Some patients have mild symptoms, which even no obvious fever, only for headache, palpitation, chest tightness, conjunctivitis, mild limb or lower back muscle pain. Severe symptoms include acute respiratory distress syndrome, septic shock, refractory metabolic acidosis and coagulation dysfunction. Severe cases progress rapidly. Most of the patients have a good prognosis and a few are in critical condition or even die, but the mortality rate is lower than SARS. As an emergency, the legal and regulatory system of COVID-19 in various countries is not yet perfect. Although there are many normative documents and health standards for medical institutions and medical staff in various countries, preparations for such major emergencies as COVID-19 are still insufficient, which is not conducive to the occupational health and safety of medical staff.

International Organization for Standardization (ISO) issued ISO 26000: 2010-Guidance on social responsibility, which Occupational health and safety management is one of the important issues. According ISO 26000, social responsibility means “responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that:

- Contributes to sustainable development, including health and the welfare of society
- Takes into account the expectations of stakeholders
- Is in compliance with applicable law and consistent with international norms of behavior; and
- Is integrated throughout the organization and practiced in its relationships” (ISO, 2010, p3) Occupational health and safety has become one of the important issues affecting social and economic development. Academic research and business practitioners are concerning social responsibility, including human rights and employee safety, are of several decades (Carroll, 1999; Thomas and Kelley, 2016; WHO, 2020a; 2020b; 2020c; Haque and Azmat, 2015) allege that even though employees are important stakeholders， they are ignored in impoverished countries. Health is the basic demand of global citizens. ISO 26000 has elements of labor practices, human rights and fair operating practices, but it is not entirely devoted to occupational health and safety (Thomas and Keith, 2016) believe

“Shared Responsibility Paradigm” as a new approach to understanding human rights issues across global supply chains and the proposed International Organization for Standardization (ISO) 45001 comprehensive framework for management systems addressing occupational health and safety.

Medical staff is responsible for curing diseases and saving lives of patients and their health is a strong guarantee for the health of mankind. ISO 45001 is a recommended standard, but it is a soft law that can be used in a company (Heras-Saizarbitoria *et al*., 2020; Thomas and Kelley, 2016). The establishment and implementation of ISO 45001 in hospitals can identify and decrease potential accidents improve the occupational health and safety management of hospitals, including enhance the physical and mental health of medical staff, improve labor efficiency and have long-term positive effects on the development of hospitals and social image.

In recent years, researchers have begun to pay attention to the occupational health of medical staff, but more confined to daily management (Nowrouzi *et al*., 2015). There are relatively few studies on the occupational health and safety of medical staff in epidemic period. During the outbreak of COVID-19, there are some articles talking about how to protect medical staff, including World Health Organization (WHO), however most of them are focus on the details, which lack of system methodology and standardized model. By analyzing the Occupational Health and Safety (OH&S) risks faced by medical staff during the COVID-19, the importance of International Organization for Standardization (ISO) 45001 application in hospital industry is put forward. Although ISO 45001 is intend to be the most comprehensive and practical international standard to reduce workplace-related illness and safety issues, it is certainly not too specific to cover different kind of situation. As for the application of ISO 45001, this paper provides some suggestions based on china's practice and experience, which through the angles of theoretical research methods include high level structure, Plan-Do-Check-Act (PDCA) model and man, machine, material, Method, Environment (4M1E) model.

Material and Research Method

ISO 45001 occupational health and safety management system is the need of the development of world economic globalization. ISO 45001 aims to enable hospitals to provide health and safety workplaces for medical staff, prevent work-related injuries and health damage and continuously improve their occupational health and safety performance.

Hospitals are responsible for the occupational health and safety of medical staff, including protecting and promoting their physical and mental health. A study of 425 COVID-19 infected patients was also published in the New England Journal of Medicine. There was no medical attention in any of the confirmed cases before 1st January. But between January 1st and 11th the proportion of medical staff among those diagnosed reached 3%. After January 12th, that figure rose to 7% (Li *et al*., 2020). Adopting an OH&S management system aims to enable organizations to provide a safe and healthy workplace, prevent work-related injuries and health damage and continually improves their OH&S performance. The aim and intended outcome is to prevent work-related injuries and health damage to staff and to provide a healthy and safe workplace (ISO, 2018). Figure 1 provides an overview of ISO 45001, which is intended to assist us understanding the structure of this paper. The PDCA model is an iterative process used by organizations to achieve continual improvement and can be applied to a management system and to each of its individual elements (Thomas and Kelley, 2016). Firstly, the paper adopt a theoretical foundation by which or through which hospital can better manage medical staffs occupational health and safety risks and improve their overall performance. Secondly, this paper uses Plan-Do-Check-Act (PDCA) model to hospitals, which provides a framework for hospital to plan what they need to do. Thirdly, from the ISO 45001 perspectives to explore how to solve the current occupational health problems faced by medical staff and adopt relevant programs to protect them, thus promoting the healthy and sustainable development of individuals and hospitals. Figure 1 also reminds that a hospital should consider what factors in developing a safety management system. Top management should show greater involvement in OH&S management:

- Plan (Planning): Identify and evaluate the occupational health and safety risks and opportunities for medical staff, formulate the occupational health and safety goals and the processes necessary to achieve the goals. Allocate necessary resources and maintain an occupational health and safety management system for medical staff
- Do (Support and Operation): Implementation of the planned process
- Check (Performance evaluation): Activities and processes are monitored and measured and results reported in accordance with the medical staff's occupational health and safety policy and objectives
- Act (Improvement): Measures are taken to continuously improve the occupational health and safety performance of medical staff to achieve the desired results

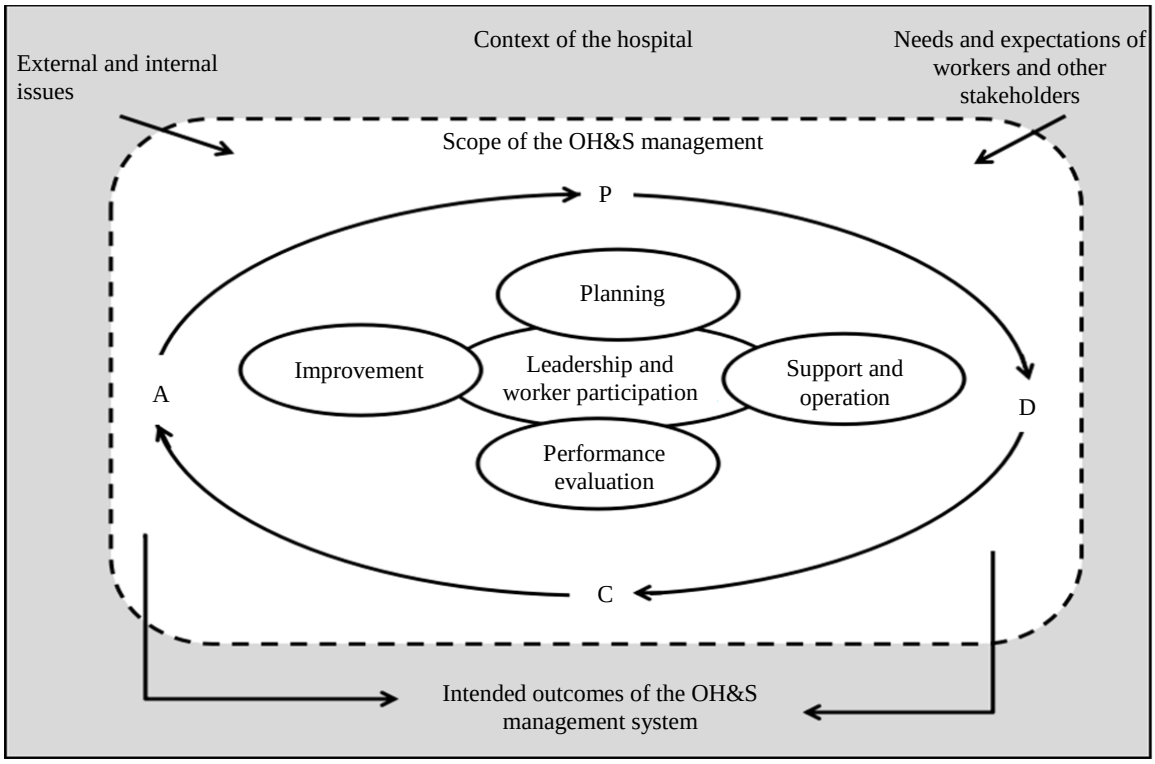

Fig.1: Framework bases on ISO 45001

Working Characteristics of Medical Staff During the Outbreak of COVID-19

As a special professional group, medical staff is shouldering the heavy responsibility of saving lives. In recent years, due to the rapid update and development of knowledge, science and technology, new development and opportunities have been brought to the medical staff, as well as greater challenges and pressures to the medical care. Occupational health and safety of medical staff refers to the medical staff in the treatment, nursing activities in contact with toxic and harmful substances or infectious pathogens, thereby damaging health and life.

As the largest providers of health care services, the occupational health and safety of medical staff should be taken seriously, especially since the global outbreak of COVID-19 in 2019. Quite a number of medical staff lacks of rest time, sleep and mental health. Poor working conditions caused by stress and fatigue are common health problems of medical staff. They assuming the sacred mission of saving live. Occupational health is a strong guarantee of human health and global cooperation is needed to improve this situation.

A front-line Chinese medical worker who participated in the fight against SARS said that shortly after the first SARS case was discovered in Guang Dong in 2002, a large number of medical staff was infected. Some excellent medical staff even lost their lives. When in the face of incoming SARS infection, hospital and medical staff unable to timely and accurate to obtain etiology and clinical characteristics, of a new infectious disease such as transmission way, the method of prevention and cure. As a result, it is seems helpless and blindness on the protection at the start. This is an important cause of infection among many medical staff in other provinces and cities of China (Ma, 2020).

Medical staff is an overworked group. It has been reported that medical staff died of sudden diseases due to heavy work tasks and mental burden during the outbreak of COVID-19 (Wong *et al*., 2020). Especially during the outbreak of COVID-19, all departments were basically high-risk departments. The characteristics are as follows: The majority of patients are critically ill; poor job foresight; frequent rescue and nursing work; patients' family members are emotional, which easy leads to extreme behavior; the intense pace of work greatly affect the communication with patients and their families; in addition to undertaking heavy medical tasks, medical staff also need to bear various pressures from patients, families and society. They bear the brunt of any outbreak.

Medical staff also faces serious mental hazards. In addition to the stress of work, the COVID-19 is widely transmitted and harmful, which brings great psychological pressure to medical staff. If they are in

such a state of heavy work, high concentration and high nervous tension for a long time, psychological harm is inevitable. It is easy to infect, especially when medical staff deal with the patient's blood, mouth and other tests, which causes great psychological pressure to medical staff. During the pandemic, medical staff in China reported high rates of depression (50%), anxiety (40%) and insomnia (34%) and 47% of medical staff in Canada reported needing psychological support (UN, 2020).

Based on the practice of China, there are some experiences we may need know. On the one hand, the infection of medical staff is related to personal protection. At present, not all medical staff has a background in infectious diseases, so they do not have a strong sense of self-protection. On the other hand, it is also closely related to the factors of working environment. The layout of comprehensive application building is not suitable for the admission and treatment of infectious diseases, especially respiratory infectious diseases. Medical staff and patients share the same channel, there is no clear regional division and poor ventilation in the hospital room is an important factor of infection. In addition, long working hours, excessive fatigue, menstrual period, decreased resistance, cold and previous medical history are all susceptible factors. Young and middle-aged health care workers are at high risk.

Results and Discussion

Planning

The leadership of the hospital should be aware of the danger of occupational exposure, pay more attention to it and protect the occupational health and safety of medical staff. Occupational exposure is the circumstance that medical staff is infected by infective source in the process of nursing work. The hospital is the area where the pathogen is told to be concentrated. The medical staff is in close contact with the patients and directly exposed to the attack range of the infection source. The possibility of the medical staff to be infected with COVID-19 is much higher than the general population. Although medical staffs are better protected than civilians, they work in the most dangerous places and are most at risk of infection (WHO, 2020d). Although while the most effective approach is to avoid contact with pathogens, this is simply but not possible in hospitals, where there are many opportunities for medical staff to be exposed to the source of infection including diagnosis, treatment, care and laboratory testing. During the current epidemic of COVID-19, medical staff in many countries and regions were severely impacted and paid a heavy price, which seriously affected the medical order. Clinical observation data of 138 patients hospitalized in Central South Hospital of Wuhan University showed that of 138 COVID-19 confirmed cases, 40 were medical staff, accounting for 29% of all cases. Among the infected health care staff, there are 77.5%, were in general wards, with the remainder coming from the emergency department (17.5%) and the Intensive Care Unit (5%) (Wang *et al*., 2020).

Firstly, the management of hospital should formulate the overall work plan and contingency plan, including identify the main responsibility body, establish working group, improve the work process, carry out emergency training and drills, etc. Medical staff is exposed to hazards that put them at risk of infection. Hazards include pathogen exposure, long working hours, psychological distress, fatigue, occupational burnout, stigma and physical and psychological violence (WHO, 2020b). They also should identify and evaluate the risk of occupational health and safety management. By learning the relevant knowledge of COVID-19, the leadership made an initial evaluation on the current situation, identify the risk factors that affecting medical staff, so as to determine the occupational health and safety management goals and indicators. They should formulate management solution and decompose the targets, indicators and management plan to each unit of system elements.

Secondly, they should reserve protective equipment and disinfection materials, standardize disinfection, isolation and protection work and work closely with all departments to ensure that everything are in place. The disinfection room during the outbreak of COVID-19 should divided into different areas, such as contaminated areas, sterile areas, clean areas and other areas and make sure the division is reasonable. Ensure that there are sufficient sterilizers, plasticize and sterile storage cabinets in the disinfection room. Open the window everyday ventilated; maintain air current and regular to the work area with disinfectant wiping. Change the disinfectant of the instrument every day and carry out inspection at any time, maintain the effective concentration of the disinfectant.

Thirdly, they should actively promote the network registration and medical appointment function. During the epidemic period, the risk factors are not only environmental, but also human being, for example, too many people came to see the doctor and the environment for treatment was noisy, which would bring difficulties in management. In addition, patients and their families may appear aggressive behavior, the reasons may be a variety of, such as the treatment did not achieve satisfactory results, patients have too much high expectations; patients do not follow the doctor's advice and affecting the effect; patients or family members think that the cost is too high, which may bring adverse consequences, such as they may abuse, beating, threats, intimidation, hijacking medical staff. The smashing, damage and disruption of the medical environment will affect other personnel to seek medical treatment.

Hospitals prepare and are ready to surge clinical care capacity (staff, structure, supplies and systems) in order to be able to provide appropriate care of all COVID-19 patients and maintain essential health services. They should establish a plan for what to do in situations of resource scarcity to cover the allocation. Such a plan should establish a clear overall aim. Part of planning for scarcity is ensuring that a fair system of decision-making for allocation is in place. Ethical considerations that affect all persons affected by COVID-19. Every person is equally valuable. Respect human right (WHO, 2020a).

Support and Operation

During the epidemic period, the hospital's management manual, procedure documents, operation instructions and other normative documents provide the post responsibilities and operation procedures that medical staff needs to follow. Special attention should be paid to the specification of the management record form. The management record form is the traceable evidence of all the activities in the process of occupational health and safety management, especially the records of the medical waste management process and the monitoring of the environmental and OH&S performance. COVID-19 is highly contagious, so medical personnel must be clear about the nature and tasks of work, strictly implement the initial diagnosis system and rescue rules, procedures and technical specifications, master the theory and technology of emergency medicine, disinfection system and so on. (Liang *et al*., 2020) The hospital must establish a scientific and reasonable process, which includes the emergency treatment, diagnosis, acceptance, examination, treatment, rescue, consultation and treatment transfer of suspected patients.

Above that, the hospital also should:

- Set up a body temperature test point, the personnel entering the medical institutions for body temperature measurement
- Reduce non-urgent and non-necessary medical activities and assist diagnosis and treatment via the Internet (Xuan *et al*., 2020)
- Make sure when medical staff enter in hospital wear masks. The use of masks is part of a comprehensive package of the prevention and control measures that can limit the spread of COVID-19 (WHO, 2020f)
- Make sure diagnosis and treatment environment well ventilated
- Use environmental and engineering controls. WHO (2020c) make sure all areas keep clean and tidy, strengthen the management of medical waste, timely removal of garbage and carry out routine cleaning and disinfection of objects surface and ground
- Strengthen the key departments (fever outpatient, emergency, isolation ward, etc.,) environment of clean disinfection
- Set up triage points, which are equipped with disinfection and isolation conditions and necessary protective equipment and perform preview and triage
- Make sick area well ventilated and the air flow flows from the clean area to the polluted area. Implement empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of COVID-19 (WHO, 2020c)
- The medical institution with the conditions shall establish the air negative pressure ward or use the circulating air disinfection machine for air disinfection
- Implementing administrative controls (WHO, 2020c) manage the patients well, minimize the crowding and keep a distance of more than 1 meter from others in the queue, so as to reduce the risk of hospital infection; **(**NHCC, 2020)
- Arrange special persons to carry out the disinfection at any time. The medical institutions shall choose the legal and effective disinfection products, adopt the correct disinfection methods and make good personal protection
- Strengthen the security, security personnel on duty 24 h a day, uninterrupted patrol. To stop in time about cause trouble behavior and protect the life and property safety of medical staff
- **A**pply standard precautions for all patients. WHO (2020c) carry out publicity and education to the patients; tell them what to pay attention to, especially for the poor
- Timely treatment, follow - up and intervention of medical staff with occupational health and safety problems. To each case of occupational health and safety problems occurred retrospective analysis, consolidate the relevant knowledge, at the same time, repeated analysis and improve the standard operating procedures, make it-rationalize, scientific, to effectively reduce the incidence of occupational health and safety accidents
- AS for the medical staff, they also have the obligation and duty to protect themselves. The medical staff should
- Wear gloves, take rubber gloves, do not throw away the disposable supplies immediately after the use of special garbage box. The garbage will be collected by the cleaning personnel and sent to the infection center of the hospital for treatment to prevent the occurrence of hospital infection

- Prevent blunt force injury, cut, scratch in the process of diagnosis, treatment, nursing and laboratory testing
- Wash hands carefully and keep fingers away from the faucet as much as possible. When washing hands with disinfectant, apply evenly, especially to the fingertips and creases
- Arrange medical staff's time reasonably for the prevention of psychological factors, strengthen their learning in daily work, continuously strengthen their awareness of self-protection and restrain their emotional impulse with their professional role. Medical staff in China who was treating patients with COVID-19 infection had levels of anxiety, stress and self-efficacy that were dependent on sleep quality and social support (Zhang *et al*., 2020). They can learn psychological adjustment and maintain their good mood and balanced mentality. Actively participate in recreational activities, maintain a full state of work and good physical and mental health

Performance Evaluation

Performance evaluation is an important part of the whole occupational health and safety management system. Its purpose is to evaluate the probability of risk occurrence and the severity of its consequences in order to seek the lowest accident rate, minimum loss and damage. The establishment of the whole system is basically based on the results of hazard identification and risk assessment. On the basis of the results of hazard identification and risk assessment, the mechanism, measures and programs to prevent various hazards or risks are established and improved, so as to maintain the occupational health and safety of medical staff. Man, machine, material, Method and Environment (4M1E) are the abbreviation of the five main factors affecting product quality in the theory of total quality management. This analysis method can also be applied to the occupational health and safety management system of hospitals. Figure 2 analyzes the influencing factors of performance evaluation of occupational health management system in hospitals on the basis of man-machine- material- method -environment model.

Man

Firstly, medical staff lacks knowledge and awareness of protection of COVID-19. At the early time of medical staff in Wuhan fight against COVID-19, infectious department and intensive care not so much, which can't meet the needs. It can only be transferred from other departments such as dental, bone and other departments. Although there is no problem for general health protection, but for the deadly infectious diseases isn't so skilled, they may carried on some training, but are simulated training, not speaking. Carelessness or chronic fatigue can increase the risk of infection. In the early stage of the epidemic, some medical staff has weak awareness of protection and inadequate protection measures. Many people think they are less likely to be infected and take chances. Foundation protection is not in place, operation is not standard. Some medical staff are afraid of trouble, develop the habit of non-standard operation, such as contact with a variety of pollutants do not wear gloves, or gloves broken do not replace in time. Patients do not wear hats, masks, overalls, etc. The lack of the habit of wearing an eye mask, once given to patients with air gun blowing, the patient's secretions are easy to infect the medical staff. These behaviors are associated with a higher risk of infection.

Secondly, the occupational health and safety of the hospital cleaning personnel and security personnel are also very important. These personnel lack relevant professional knowledge, do not receive occupational health and safety training, protection awareness is very poor, the probability of infection is high. They are the focus to strengthen occupational health and safety, because they will affect the operation of the whole hospital.

Thirdly make sure reasonable and safe work and rest system for medical staff. (Xiao and Zhou, 2017; WHO, 2020b) Medical staff infected with COVID-19 should be temporarily transferred from direct treatment or nursing patients and work to avoid cross-infection measures. The hospital should consider with sufficient nursing staff, arrange the working intensity of medical staff in the individual tolerance range and conduct regular COVID-19 test.

Front-line medical care is overloaded, the body is so depleted that it is less resistant to the virus. At present, there is no specific medicine to treat COVID-19 infection, so the hospital can help medical staff to improve body resistance and try not to get themselves virus infection. Therefore, all actions should be medically oriented. For example, all kinds of meetings and publicity are unnecessary, which can be completely saved and do not need to take up the time of saving lives and resting time of medical care.

Machine

The instrument should be sterilized in time. In the operation of blunt force and other accidental damage to the skin, will also make the serum or plasma with the virus into the human body, causing the infection of medical staff. Medical staff should avoid indirect contact with the infection. If the skin mucous membrane of a confirmed patient comes into contact with objects such as mobile phones, test tubes and instruments, it can also cause infection.

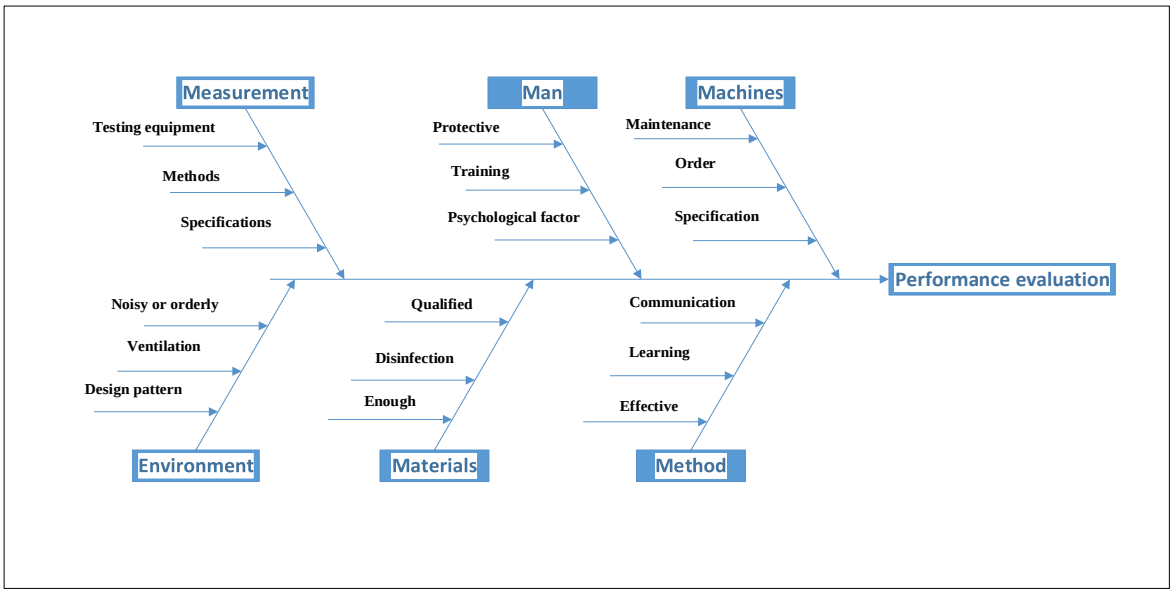

Fig. 2: 4M1E model on performance evaluation of occupational health and safety management system

It is recommended to develop the use of robots in the infectious ward. It is necessary to use high technology such as robot to do in-room service and treatment of infected patients.

Material

Provide adequate and high quality protective products. At present, supplies such as masks, protective suits, goggles and disinfectants are in short supply. This is a rigid gap and the overseas and compatriots of the whole country are trying to solve it in a coordinated way. Some protective masks are easy to infect medical staff due to quality problems. Medical staff are to avoid direct contact with infection, mainly refers to the oral skin mucosa or conjunctiva contact and cause infection. The sterilization equipment is not reasonable, after the use of some equipment in the disinfectant soaking time is not enough, at present, some hospital protective equipment is not unified, protective measures are not in place, equipped with part of the respirator design defects, cannot reach the sealing effect or quantity. Medical staff who provide direct care to COVID-19 patients, their personal protective equipment should include medical mask, gown, gloves and eye protection (goggles or face shield). The cleaners who enter the room of COVID-19 patients, their personal protective equipment should include medical mask, gown, heavy duty gloves, eye protection (if risk of splash from organic material or chemicals) and boots or closed work shoes (WHO, 2020e).

Method

The hospital should regulate the procedure of routine operation and carry out the standard prevention standards.

"In Wuhan's intensive care units, aerosols in the air, as well as various medical procedures, are at great risk of infection. It require level 3 protection. In a general clinic, you can have secondary protection (Ma, 2020). Operation process is an important part to ensure occupational safety. Strictly abide by the safety standards, correct the dangerous behavior of medical staff and minimize the impact of occupational hazards. Medical staff must implement standard prevention, that is, whether the patient is infected with COVID-19 or not, according to the standard of protection of the infected person, the patient's blood, body fluids and contaminated products are regarded as infectious. Contact with these substances, to strictly follow the standard protection principles and take protective measures. Medical staff should avoid indirect contact with the infection. Mainly is the patient's blood secretion, urine and feces and other pollution. When the weather is dry, these viruses will evaporate into the air, which will cause the medical staff to test by hand mouth, hand eyes, hand nose and other contact to cause indirect infection.

Environment

In the early days of the outbreak, the rapid increase in the number of patients and social panic caused a large number of patients and suspected patients to rush to the hospital for testing and treatment. Most hospitals do not receive any training for providing mental health care (Lima *et al*., 2020). The run far beyond the capacity of the hospital causes chaos on the medical scene, which makes it impossible for medical resources to effectively concentrate on the treatment of severe patients. It seriously affects the efficiency and quality of medical

assistance, what is more serious is that the bank run causes patients, suspected patients and even their of medical staff to learn, to ensure that medical staff enough to understand the clinical manifestations of patients with COVID-19, diagnosis, treatment, first aid nursing knowledge (Shi *et al*., 2020). Training and assessment were conducted on cardiac resuscitation, monitoring and ventilator application of COVID-19. In the absence of sufficient medical staff, the hospital should strengthen the first aid knowledge training of junior medical staff, give play to the guiding role of senior medical staff and comprehensively improve the overall level of medical staff during the period of COVID-19.

To strengthen the training of the communication skills and methods between medical staff and patients. Strengthen the communication with patients, especially COVID-19 conditions is complex, there is no clear solution. When the patient and family to easy to emotional, don't understand, don't cooperate, medical staff should be timely communication with the patient and family, otherwise easy to dispute or aggressive behavior, such as hiding exposure history and escaping from a hospital, they should make all kinds of contradictions in the bud as far as possible.

Medical staff should also pay attention to the protection of their own safety. First, strengthen physical exercise, create a good interpersonal environment. (Buruck *et al*., 2016) During the epidemic, everyone's pressure is relatively large; in this case, more should protect their physical and mental health. Second, when COVID-19 patients in the case of provocation, abuse, threats, medical staff should remain silent, timely contact with security personnel and proprietary personnel to deal with, to avoid positive conflict with patients. Especially the COVID-19 is more infectious, when the attack happens, mobilize the surrounding patients to avoid together and call the police. Keep calm and alert when medical staff is hijacked, wear a mask, take good precautions and take the initiative to communicate, strive for time and space, as far as possible to appease each other. If not fully sure, medical staff should not use words or actions to stimulate patients or family members.

Conclusion

Since the first case of COVID-19 infections was reported in China in December 2019, a large number of reports on COVID-19 have been published successively. It seems that the occupational protection of front-line medical staff against COVID-19 has not been fully paid attention to by the society, which is undoubtedly an important challenge in the outbreak. Medical staff as the guardian of the national health in COVID-19 pandemic, who face of high risk exposure risk and huge psychological pressure, however, they did not flinch. Relying on excellent professional, strong courage and perseverance, they build a solid wall of protection between the virus and people, which make people moved.

Occupational health and safety is one of the most important issues for an organization, because every manager should consider employees as the most valuable resource, which is the social responsibility of every hospital. A lot of organizations are aware of the benefits that occupational health and safety management system norms provides or could provide. Over the past few decades, the types of occupational health and safety risks have changed with technological, social and economic advances and companies should use new methods and tools to control and manage these risks. ISO 45001 focuses on the application of the occupational health and safety management system as an important means to ensure the health of all workers in the workplace, not only related to occupational health and safety management, but also to integrated environmental management, quality management and social responsibility issues. (Darabont *et al*., 2018) Considering this outbreak of COVID-19, we can also drawing lessons from the ISO 45001 occupational health and safety management system norms, constructing the standards and norms of hospital and promoting the scientific, standardized and modern operation of medical staff occupational health and safety system in all kinds of hospitals, It will help to improve the health quality of medical staff, maximize the protection of two-way safety of medical staff and patients and create greater social benefits. Protecting the occupational health and safety of medical staff is also the concrete performance of the hospital to fulfill its social responsibility actively.

COVID-19 as a public health emergency, the number of infections and the rapid spread are unprecedented. This is a serious challenge for any country's health system. Hospitals were unable to make more errors in information needs and prevention of COVID-19 infections. Here, we refer to the management concept of ISO 45001 and suggest that hospitals should adopt protective measures for medical staff. Hopefully, with these new precautions, it will be no more infections among our medical staff.

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Author's Contributions

Weiwei Zhao: Research concept and design and Final approval of article.

Zhou Jiang: Data analysis and interpretation and Final approval of article.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

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