

Research Progress on the Occupational Hazards and Protective Measures of Emergency Department Nurses

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Abstract: The emergency department is a department that is crucial for medical institutions. It is mainly responsible for rescuing critically ill patients and dealing with all kinds of public health emergencies. There are significant differences in the working environment and working mode between the nurses in emergency departments and those of other departments. They tend to come into contact with various occupational risk factors, resulting in high incidence of occupational hazards and accidental injuries. Therefore, it is necessary to analyze the common occupational risk factors of nurses in the emergency department and propose protective measures to ensure that these nurses are able to provide nursing services safely and effectively.

Keywords: Emergency department; Nurse; Occupational hazards; Protect

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1. Introduction

The emergency department tends to receive a large number of critically ill patients without clear diagnosis on a daily basis. The nurses in emergency departments can be exposed to a various occupational risk factors during work, such as patients' blood and body fluids, residual poisons, ionizing radiation, and the threat of violence from the patients and their family members. Ensuring the occupational safety of nurses in the emergency department is a key issue that medical institutions at all levels need to pay attention to and solve. This paper summarizes and analyzes the occupational risk factors and protective measures for nurses in the emergency department, hoping to provide reference for relevant personnel.

2. The occupational hazards of nurses in the emergency department

2.1. Biological hazards

The emergency department receives a large number of patients on a daily basis, and the patients' conditions are complex and diverse. In addition, there is high personnel mobility. If sanitary cleaning is insufficient, it may lead to an increase in the content of bacteria in the air and an increased risk of respiratory tract infection among nurses. At the same time, the patients in the emergency department are critically ill patients who need urgent treatment. Hence, the nurses need to operate quickly according to the doctor's advice, including establishing venous access, blood taking, and drug infusion. Improper operations may lead to needlestick injuries. Hepatitis B, AIDS, syphilis, and other diseases can be transmitted through blood. The risk of infection of these diseases significantly increases if the contaminated needles prick the nurses ^[1].

2.2. Chemical hazards

Nurses in the emergency department may be exposed to chemical disinfectants during nursing operations, such as glutaraldehyde- and chlorine-based disinfectants. These substances may irritate the eyes, respiratory mucosa, and skin tissue, leading to asthma and allergic reactions. They are also known to have adverse effects on the gastrointestinal tract and nervous system. Other than that, these nurses are frequently exposed to various drugs, of which some drugs have strong toxic effects. Long-term exposure to these drugs can reduce the body's immunity, induce drug-related adverse reactions, and eventually lead to occupational hazards.

2.3. Physical hazards

Nurses in the emergency department tend to be in contact with surgical blades, injection needles, ampoules, and glass fragments while treating patients. If they are careless, these sharp objects may cause damage to the skin and mucosal tissue. These nurses also need to escort patients for various examinations, in which some examinations can produce ionizing radiation. The accumulation of radiation may cause injury to the blood circulation system, and it is known to have carcinogenic effects. In addition, during the operation of defibrillation, if there are problems, such as electric leakage or short circuit, the risk of burns and electric shock increases. When supporting and handling patients, the handling posture can also cause muscle or spinal injuries.

The daily disinfection process in emergency departments requires three oxygen machines and ultraviolet rays. Ultraviolet rays may cause irritation to the skin and eyes, resulting in edema, erythema, and inflammatory reaction, whereas excessive ozone may lead to pulmonary edema or poisoning ^[2].

2.4. Psychological hazards

Nurses in the emergency department have a different working environment with many stimulating factors, which makes it difficult to communicate with patients. In addition, the working space is narrow and noisy. These nurses need to deal with patients of various emotional states, such as sadness, anxiety, fear, and anger, while carrying out nursing operations. Some patients and their families lack understanding of the work at the emergency department, and with the influence of various factors, such as illnesses, verbal or physical attacks on nurses, nurse-patient disputes commonly occur, thus endangering the mental health of nurses. At the same time, nurses in the emergency department are under the shift system. Long-term shift work may lead to disorders of physiological rhythm, leaving the body in a state of overload stress over a period of time and leading to psychological fatigue, which will increase the risk of occupational hazards.

3. Protective measures against occupational hazards

3.1. Protective measures against biological hazards

In order to effectively prevent biological hazards, the nurses in the emergency department need to have good awareness of protection, understand that patients' blood and pollutants are the source of infection, as well as carry out personal protection in strict accordance with hospital regulations. Patients' excreta, body fluids, blood, and various pollutants need to be treated in a centralized manner in the hospital. Burning, disinfection, soaking, and other methods can be adopted. Areas such as injection trays, the ground, wall, and operation console polluted by patients' blood or body fluids should be cleaned with chlorine-based disinfectants. Air disinfection and ventilation should be carried out in public areas, such as emergency ward and emergency room. Senior nurses should be responsible for triage, and patients with suspected infectious diseases should be immediately transferred to the isolation clinic to prevent cross infection. The nurses in the emergency department should be encouraged to use all kinds of personal protective equipment while carrying out their daily work. Preparing two pairs of gloves in the pocket of their work uniform, they should

be reminded to wear gloves before contacting blood substances. Under special circumstances, they should be encouraged to practice double gloving. If their skin accidentally comes into contact with the patient's body fluid or blood, it should be washed with clean water or soapy water ^[3]. If the patient's blood or body fluid comes into contact with their mucosa (mouth or eyes), they need to rinse the contaminated part with normal saline or clean water. Relevant studies have suggested that aseptic operation and handwashing are important measures to prevent the spread of infectious diseases caused by operation failure. Therefore, nurses should strictly follow the hand hygiene regulations and aseptic operation principles implemented by the hospital. They should strictly wash their hands before and after nursing operations to prevent infection. In order to ensure effective handwashing, medical institutions have proposed the six steps of handwashing: the mutual friction between the palms of both hands, the interlacing of fingers palm-to-palm, the interlacing of fingers over the back of the hands, the mutual friction of the back of the fingers to the palm with fingers interlocking, the friction between the fingertips and the palm, as well as the rotation of the thumb clasped in the palm. The hospital needs to be equipped with arm faucets, pressure bar control liquid soap, and other hand washing equipment. The total time for handwashing should not be less than a minute. At the same time, with the high incidence of respiratory diseases, nurses need regular ventilation to keep the air in the consulting room fresh, disinfect the indoor air with air disinfection equipment, and wear masks to prevent respiratory tract infection. In addition, medical institutions need to vaccinate these nurses to reduce the incidence rate of infectious diseases.

3.2. Protective measures against chemical hazards

In order to effectively prevent chemical hazards, nurses need to regularly open windows for ventilation and promote indoor air flow. All kinds of highly volatile chemical disinfectants need to be sealed and stored to avoid adverse reactions caused by inhalation of such substances. In daily nursing operations, protective measures such as wearing gloves should be strictly implemented to avoid contact with irritants. At the same time, during rescue treatment and administration by nurses in the emergency department, the drugs can enter the respiratory system or contact the skin by means of aerosol. Therefore, these nurses need to wear masks with appropriate tightness to ensure that the skin is close to the mask for effective protection against 1-5 μm airborne particles ^[4]. If there are handling chemotherapy drugs with strong toxicity, they need to wear goggles, protective aprons, and polyethylene gloves. If they accidentally come into contact with such drugs during operation, they need to immediately wash the contaminated part with clean water. In addition, syringes, ampoules, and other items need to be recovered in time. Residual liquid medicine should be properly handled to avoid long-term exposure to air, which will pollute the environment.

3.3. Protection measures against physical hazards

Nurses in the emergency department should have awareness of protecting against sharps injury, strictly follow the standardized operation process while rescuing patients, and emphasize on self-protection to prevent sharps injury. The emergency department should set up special medical waste collection buckets and arrange special personnel to be responsible for recycling. Nurses should be reminded to use one hand to separate the needle and place the separated needle into the barrel in time to prevent needlestick injuries. If a nurse is pricked by a needle, the blood should be squeezed out from the proximal end to the distal end, and the wound should be placed under running water. Then, it should be properly disinfected with iodine, and the surface of the wound should be covered with a sterile film. The management personnel in the emergency department should report any sharps injury to the nosocomial department, properly deal with sharps waste, and monitor the blood of the concerned personnel to prevent the spread of nosocomial infection. At the same time, in order to effectively prevent ionizing radiation, the nurses in the emergency department need to ensure correct self-protection methods. During bedside radiography, the distance

between the nurse and the camera should be controlled at more than 10 meters, and they should wear appropriate protective clothing. While carrying out ultraviolet disinfection, the nurses should avoid looking directly at the ultraviolet rays, stay away from the disinfection site, and open the windows for ventilation after disinfection. All medical equipment and disinfection equipment should be regularly checked and timely repaired or replaced to prevent occupational hazards. In addition, emergency departments should regularly organize training for nurses to teach them the correct handling posture. During nursing operations, nurses should cooperate with each other while handling patients and strengthen personal protection on the basis of ensuring safety, so as to avoid occupational hazards, such as lumbar muscle sprain ^[5].

3.4. Protective measures against psychological hazards

Nurses in the emergency department tend to have heavy daily work tasks, physical and mental fatigue, as well as high psychological pressure. A poor psychological state may lead to a significant increase in the incidence of nursing errors and nurse-patient disputes. Therefore, emergency department managers need to organize training for nurses regularly and explain various operation processes at the emergency department in detail, so as to improve their working ability. At the same time, it is necessary to carry out professional ethics education and nurse-patient communication education for the nursing staffs, so that they can develop active patient-centered service consciousness, learn to think from the perspective of patients, and use different communication methods based on the condition and emotional state of the patients and their family members, so as to reduce the incidence of nurse-patient disputes. In order to reduce the psychological pressure of nurses in the emergency department, various recreational activities can be organized in the hospital to help nurses relax. Nursing managers should actively communicate with their nurses, understand the difficulties they encounter in their work and life, as well as actively assist in solving these problems. In view of the physiological issues faced by nurses as a result of long-term shift work, managers need to arrange their shift work properly and reasonably, so that the nurses will be able to achieve work-life balance, thus improving their physical and mental state. In addition, the hospital needs to strengthen the legal education and training of nurses in the emergency department, guide nurses to use legal weapons to safeguard their own rights and interests, as well as properly handle any nurse-patient disputes. Nursing managers also need to take appropriate measures to deal with various nurse-patient disputes, timely understand the causes of these disputes, protect the interests of nurses, and prevent occupational injuries caused by psychological hazards.

4. Conclusion

It is common to see many patients in the emergency department, and their conditions are usually critical. The daily work tasks of the nurses in the emergency department are heavy, and they have to deal with a tremendous amount of pressure. Many factors, including biological, chemical, physical, and psychological factors, can lead to occupational hazards, which will seriously affect the physical and mental health of these nurses. In order to effectively prevent occupational hazards, the nurses in the emergency department need to ensure self-protection while carrying out their daily work, perform nursing operations in strict accordance with relevant norms, and use appropriate nurse-patient communication methods, so as to realize effective self-protection.

Disclosure statement

The authors declare no conflict of interest.

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