Research article (Award paper)

Prospects and retrospects of occupational hazards amongst healthcare workers

Carol Sharma BGH[1], Sugata Das (Kumar)[2], Subrata Ghosh[3]

[1]Bokaro General Hospital, SAIL, Bokaro Steel Plant, Jharkhand, 827 004, India
[2]Defence Institute of Physiology and Allied Sciences, DRDO, New Delhi, 110 054, India
[3]Post Graduate Department of Physiology, Hooghly Mohsin College, Chinsurah, Hooghly 712101, West Bengal, India

Corresponding author: **Carol Sharma BGH.** Email: sailbghha@gmail.com

ABSTRACT

Introduction and Aim: Several studies showed that exposed health care workers are prone to numerous workplace hazards. Safety measure implementation in high-income countries, mostly neutralize these risks. But in low- and middle-income countries (LMICs), lack of resources and by-passing essential safety measures mostly increase the risk of occupational exposure to these hazards. This study attempts to map and synthesize the available research activities on occupational hazards among health care workers in India (LMIC) and to identify the research gaps and information policy.

Methods: Amongst 190 female health care workers including nursing staff and other caregivers, this humble work attempts to quantify observational and/or experimental studies in various categories of different parameters namely, physical, physiological, biochemical, ergonomic and chronobiological aspects.

Results: Several specific biological hazards including blood-borne pathogenic disease, psychological hazards (workplace violence, burn-out, job dissatisfaction), ergonomic hazards including musculo-skeletal disorders and chemical hazards including biochemical abnormalities (example, exposure to latex and anti-neoplastic drugs) were observed. Several unique cross-talks between parameters of different categories were observed. Implementation of risk reduction strategies was found to be sub-optimal.

Conclusion: Most of the recorded hazards are of biological type (more than 52%). Occupational safety needs to become a priority public health issue for protection of health care workers in India and other LMICs. Much more research activities are needed to understand the magnitude and the cross-talks between different hazards of the concerned profession.

Keywords: Occupational hazards; biological hazards; ergonomic hazards; healthcare workers; cross-talks.

INTRODUCTION

A healthcare worker is someone who offers medical advice and treatment based on formal education and experience. Nurses, doctors, and other professionals in allied health professions are included in this field. The World Health Organization (WHO) estimates that 59 million individuals worldwide work in healthcare institutions.

The National Institute for Occupational Safety and Health acknowledges that the healthcare workforce has particular health and safety problems (NIOSH). The WHO also states that occupational risks are a concern for all healthcare workers, including healthcare professionals. According to the International Labour Organization (ILO), millions of healthcare professionals experience occupational illnesses, accidents, and deaths (1). The dangers or risks connected to unhealthful work settings in the short- and long-term were characterised as occupational hazards by Schulte *et al.*, (2).

Among health workers, burnout and job stress are quite common (3). According to several studies, the possibility of malpractice lawsuits, insufficient staffing levels, lengthy work hours, exposure to contagious illnesses, dangerous chemicals, and long hours all contribute to occupational stress in the healthcare sector. High patient loads and the emotional toll of caring for sick individuals are two additional pressures. Substance addiction, suicide, major depressive disorder, and anxiety are all outcomes of severe stress that affect health workers more frequently than the overall working population. High rates of burnout, absenteeism, diagnostic mistakes, and decreased patient satisfaction are all associated with high levels of stress (4).

The use of respirators can limit exposure to respiratory infectious illnesses including TB (produced by *Mycobacterium tuberculosis*) and influenza; this exposure is a serious occupational danger for those in the medical field (5). Another possible occupational risk is exposure to harmful substances, such as chemotherapy medications. Cancer and other illnesses can be brought on by these

medications (6). Healthcare staff are especially susceptible to catching illnesses like scabies from prolonged patient contact and Injuries from needlesticks or contact with body fluids put medical practitioners at risk for blood-borne illnesses such hepatitis B, hepatitis C, and HIV/AIDS (7, 8).

There are certain health issues and stressors that female healthcare workers may experience at work. Women make up the majority of the official health workforce in many nations, and they are more likely to experience burnout and musculoskeletal injury due to physically demanding job activities including lifting and carrying patients. When exposed to dangerous medications and chemicals at work, female healthcare professionals run the risk of experiencing unfavourable reproductive outcomes such as spontaneous abortion and congenital abnormalities. In rare situations, patients and employees may use gender-based violence against female healthcare professionals (9).

The danger of violence causing an injury in the workplace is higher for healthcare personnel. Patients and visitors who are inebriated, lost, and aggressive pose a constant threat to healthcare professionals who are trying to treat patients. Violence and assault are frequently not reported in a healthcare context because it is falsely believed to be part of the profession (10). One-on-one treatment is when violent occurrences most frequently occur; being alone with patients increases the danger of attack for healthcare staff. Two thirds of nonfatal workplace violence events in the US involve healthcare professionals.

Due to their work, health care workers are also susceptible to sleep deprivation. Due to the fact that many healthcare professionals work shifts, their work schedule and circadian rhythm are often out of sync. In 2007, it was shown that 32% of healthcare professionals slept for fewer than 6 hours per night. Lack of sleep makes medical practitioners more likely to make errors that might harm a patient (11).

Exposure to a variety of hazardous chemicals present in their employment puts healthcare personnel at risk for harm (12). The continuing COVID-19 epidemic is the most recent and obvious example, which has highlighted the vulnerability of healthcare professionals and shown how crucial it is to ensure their safety (13). High-income nations have implemented safety regulations and standards to safeguard healthcare personnel in response to this risk, and these efforts have mainly been successful in reducing the dangers. However, occupational health and safety is frequently disregarded in many low- and middle-income countries (LMICs) (14). Health risks and poor working conditions have reportedly been linked to issues with recruitment and retention of healthcare professionals in LMICs, aggravating the problem of a lack of healthcare professionals in these nations (15).

Under these circumstances, this study attempts to map and synthesize the available research activities on occupational hazards among health care workers in India (LMIC) and to identify the research gaps and information policy.

MATERIALS AND METHODS

Collection of subjects

This study was carried out in hospitals and nursing homes in different areas of Jharkhand. 250 health care workers including nursing staff and other care-givers were selected randomly for research study. Out of that, 190 subjects were finally selected for experiments. Amongst that 60 healthcare workers were selected based on day time and shift work schedule (Fig. 1 to Fig. 6). All the selected healthcare workers have at least 5 years of experience.

Ethical consideration

This study was performed following the ethical guidelines for biomedical research on human participants as directed by ICMR Govt., of India. All the subjects were explained about the objective and probable impact of the work to volunteer the study.

Research design

Several subjective and objective parameters were measured by standardized procedures.

- Physical parameters: Height, Weight and BMI were measured by anthropometric rod, weighing machine and BMI calculator respectively.
- Physiological parameters: Blood pressure, heart rate was measured sphygmomanometer and stop watch respectively (Fig. 8).
- Biochemical parameters: Stress parameters viz., Epinephrine, Norepinephrine, Cortisol and Total oxidative stress were measured by ELISA Kit (Fig. 7).
- Ergonomic parameters: SPADI, modified Nordic Questionnaire were interviewed on subjects explaining musculoskeletal disorders.
- Chronobiological parameters: Sleep time was measured by an interview method.

Structured cum schedule interview technique was adopted to elicit the information relating to socio-economic condition, health status, activity profile, frequency of duties & rotational duties, total days of performance in a year by the respondents using PLIBEL questionnaire checklist methods.

Statistical analysis

Data was analysed using the Minitab 20 software. Descriptive statistics were computed as mean, standard deviation.

RESULTS

The mean age of study subjects was 35.3±5.62years, height 153.62±5.47cms, weight 59.67±8.87 kgs.

There are several types of hazards faced by healthcare workers including biological, psychological, ergonomic, chemical and physiological. The following pie chart showed that healthcare workers faced more biological hazards than other types of hazards, as 52%. Amongst the biological hazards, healthcare workers are more prone to airborne pathogen (55%) than blood borne and other respiratory viruses hazards during workstation operation.

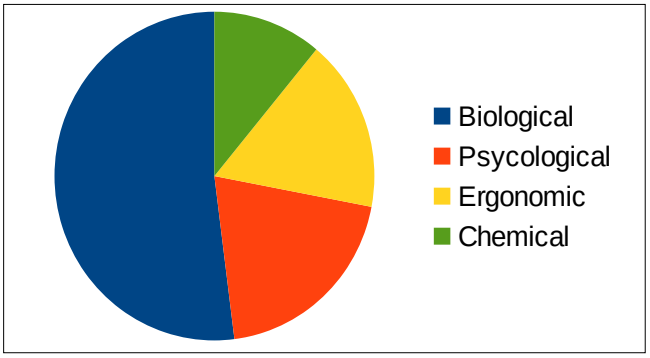

Fig. 1: Types of hazards faced by healthcare workers in work place

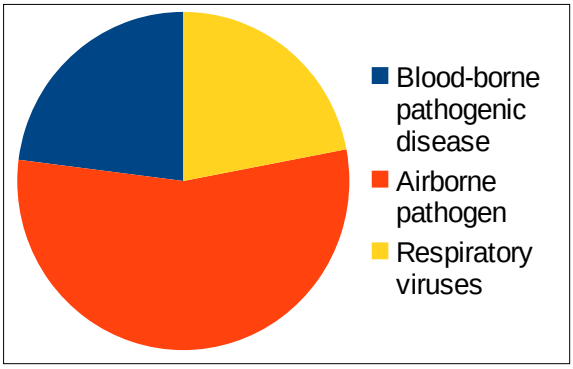

Fig. 2: Different types of biological hazards

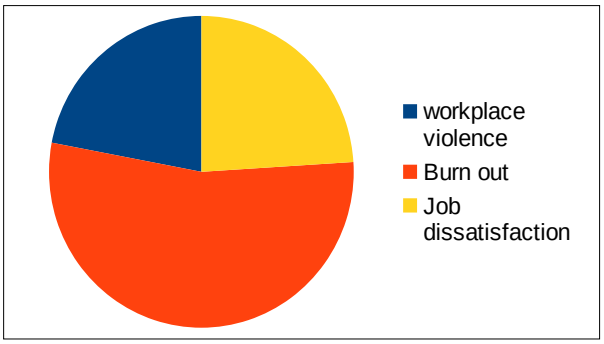

Fig. 3: Different types of psychological hazards

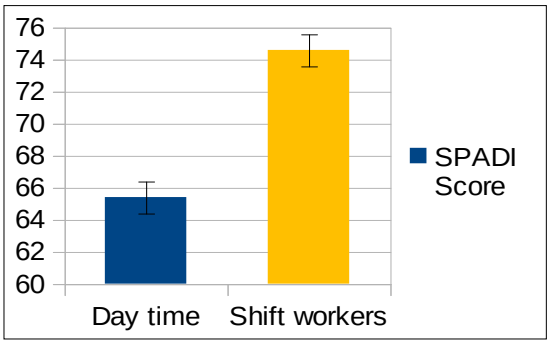

Fig. 4: SPADI score for healthcare workers

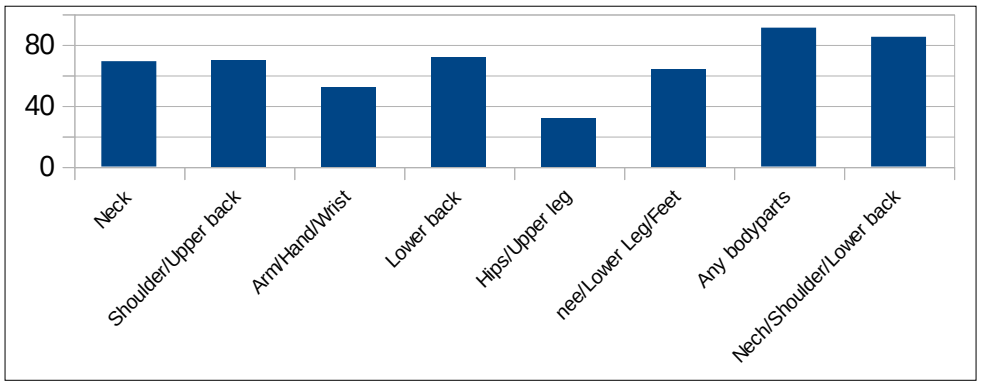

Fig. 5: Modified Nordic questionnaire score

In psychological hazards, healthcare workers faced more burnout (54%) than workplace violence (22%) and job dissatisfaction (24%).

In ergonomic analysis, the healthcare workers who worked in shift duties felt more pain as it was shown in 'Shoulder Pain and Disability Index (SPADI)', the shift workers (74.58) had higher score difference than day time workers (65.4). Evaluation of 'Modified Nordic Questionnaire' showed that shift workers cumulatively felt more pain in the neck, lower part and shoulder of the body.

In chemical hazards, healthcare workers are more sensitive to latex allergy (23%) than sensitization (10.50%). The stress marker hormones like epinephrine, nor-epinephrine, cortisol and total oxidative stress (TOS) showed significant differences compared to shift and daytime workers. The catecholamines showed significantly higher value in case of daytime workers than shift workers whereas TOS and cortisol were found to be significantly higher for shift workers than day workers.

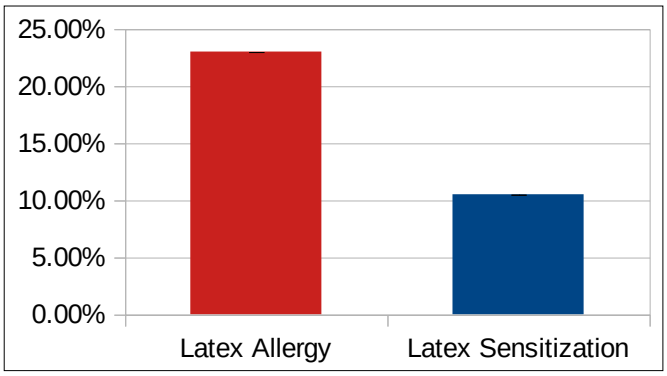

Fig. 6: Chemical hazards faced by healthcare workers

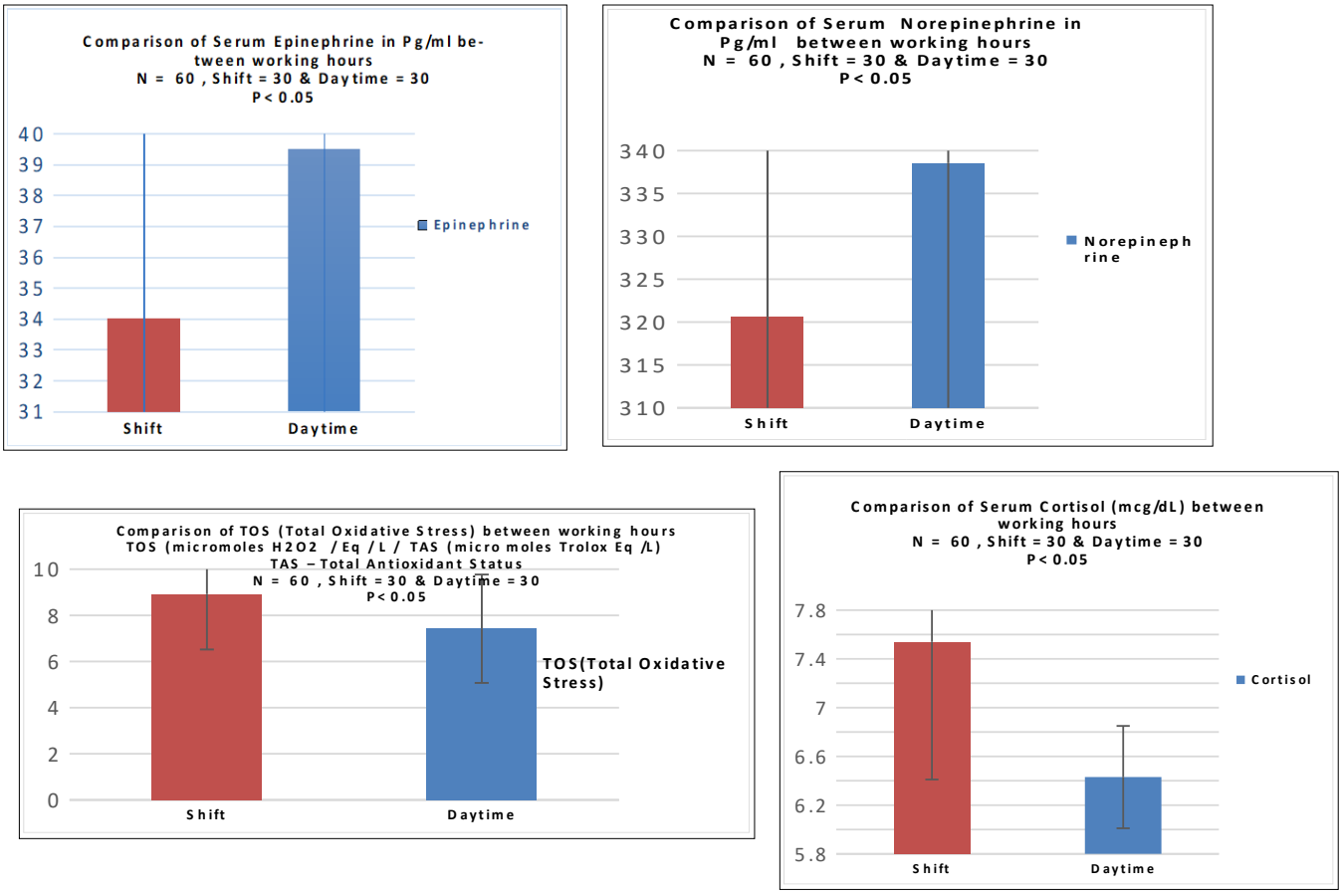

Fig. 7: Comparison of a) Serum epinephrine b) Serum norepinephrine c) Total oxidative stress d) Serum cortisol between working hours

In physiological hazards, evaluation of systolic, diastolic pressure and heart rate; it was found that, shift workers showed higher systolic, diastolic blood pressure and heart rate than day time workers.

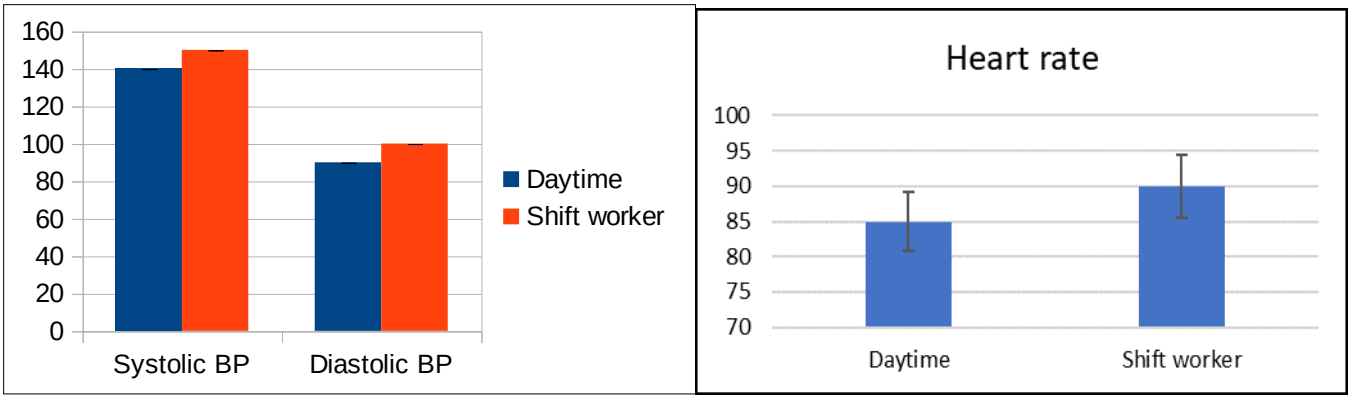

Fig. 8: Physiological hazards faced by healthcare workers BP in mmHg (A) and Heart rate(B) in beats per minutes (units)

DISCUSSION

The purpose of this study was to determine the frequency of occupational health hazards affecting healthcare workers in Jharkhand's hospitals and healthcare institutions. It lists the risk factors for the many types of hazards that have been found, including biological, chemical, ergonomic, psychological, and physiological risks (Fig. 1-3, 6, 8). According to the report, there is a very high risk of work risks for healthcare personnel (16) Healthcare employees' inability to do their jobs efficiently due to illnesses and injuries may have an adverse influence on India's healthcare system as a whole. Physical risks like falls, noise, and mechanical dangers can have long-term physiological impacts like hearing loss, thus it's important to implement different control methods like designing noise control techniques. To protect oneself against physical damage at work, healthcare personnel should have access to high-quality PPE.

The majority of the research on biological risks focused on the occupational transmission of bloodborne diseases including Hepatitis B, HIV, and Hepatitis C through sharps' injuries, such as those caused by needlesticks, and splash accidents. Due to the high frequency of these illnesses in the community and the inadequacy of safety measures to mitigate these risks, healthcare professionals from LMICs are more likely to transmit bloodborne infections (17). The use of conventional precautions, Hepatitis B vaccination, and post-exposure prophylaxis (PEP) for HIV and Hepatitis B have all been suggested as risk reduction measures to lessen occupational exposures to bloodborne infections (18). But the healthcare workers are not taking so much precaution to prevent airborne infections as they suffer in more percentages. It recommended to use mask during working in the hospitals and nursing home.

Workplace violence dominated studies on psychological dangers. Worldwide reports indicate that workplace violence is a serious issue in the healthcare industry (19). The most often reported perpetrators of verbal and physical abuse were patients and their families, while the most frequently reported sexual harassment perpetrators were co-workers and patients. A variety of negative effects (psychological, physical, emotional, social, work functioning, quality of care, and financial) can come from being a victim of workplace violence (20).

Definition of burnout includes three components: emotional weariness, depersonalization, and poor personal achievement (21). Because of the significant amounts of emotional and psychological stress that their profession entails, health care employees are recognised to be at an elevated risk of burnout (22). There is evidence that 55% burnout is linked to absenteeism, high staff turnover, low morale, and a decline in care quality. The indicators that were shown to be connected with intention to leave were increased emotional pressures, lower workplace commitment, diminished meaning of work, and decreased job satisfaction. On the other side, job discontent is linked to greater rates of absenteeism and employee turnover. Improving employee job satisfaction, organisational commitment, and desire to stay is largely dependent on creating a positive work environment (23).

A prevalent reason for work-related disability and absenteeism, musculoskeletal problems have significant financial repercussions in the form of workers' compensation and medical costs. According to a Nordic questionnaire, the neck, shoulder, and lower back experience the most discomfort. Working in the same position for extended periods of time, being bent or twisted while working, lifting and transferring patients, handling numerous patients, and performing repetitive tasks were the occupational physical risk factors for musculoskeletal complaints identified in this study as it showed in SPADI score and Nordic questionnaire analysis report (24).

The studies on chemical hazards in this study mainly examined exposure to latex allergy and latex sensitization. It was found that 23% and 10.5% healthcare workers were exposed to latex allergy and its sensitivity. According to several studies, healthcare workers who use hypoallergenic powder-free latex gloves run the risk of acquiring latex sensitization, hence it is recommended that resource-constrained nations must find a practical replacement for latex in the healthcare setting.

Amongst daytime and shift workers, stress can be a factor as physiological hazards. In daytime working hours healthcare workers are found to be more stressed as epinephrine and norepinephrine showed significantly more secretion rate than daytime due to over rush during working time. Sometimes shift work is found to be a stress marker for healthcare workers as it is found to increase level of cortisol and total oxidative stress due to lower healthcare staff assistance during shifting hours and sleep deprivation. These physiological hazards are found to increase heart rate and blood pressure level of shift workers as the probable cause might be sleep deprivation due to shifting hour duties. It is recommended to change duty hours rotationally amongst all healthcare workers to minimize their physiological hazards.

This complete study has shown that healthcare employees in LMICs are exposed to a broad variety of occupational risks and that risk reduction methods and safety measures are not effectively applied, mostly because of equipment and human resource limitations. Prioritizing occupational health and safety is crucial for safeguarding healthcare professionals in these nations. In addition to advocating for the provision of safer workplaces for healthcare workers in these nations, agencies must also address the causes of migration, mortality, and disease among health care professionals in LMICs (25). This is to be expected given that LMICs with high rates of infectious illness in the population have more obvious biological hazard threats. However, employees in the healthcare industry also frequently come into contact with substances that have been related to chronic conditions including asthma and cancer. LMICs must conduct more study in this area.

CONCLUSION

A significant fraction of healthcare professionals in LMICs are exposed to a variety of occupational risks. Due to a lack of resources, safety precautions and risk reduction efforts in these nations are not as effective as they may be. Because occupational risks can lead to illnesses and injuries, negatively affect staff retention, and lower the standard of care delivered, healthcare professionals need to be safeguarded from these risks. Although there has been a significant rise in study on occupational risks among healthcare professionals in these nations over the past ten years, the majority of this work focuses on biological hazards. The remaining categories of occupational dangers require more study.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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