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## Systematic measurement of occupational hazards among healthcare workers

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### Abstract

The healthcare workers are experiencing several types of hazards associating with the factors that they are not taking proper protective measures while handling with patients, working in different shift timings, experiencing work related stress due to over timing, working in less hygienic environment and in lower ventilation and lighting. Occupational hazards prevailing n a hospital are really high due to highly menace environment. There are many types of hazards. The most common are biological hazards which deal with microorganisms, chemical hazards dealing with hazardous chemicals, physical hazards including injures, ergonomic hazards comprising of work environment set up and psychosocial hazards consisting of factors affecting mental wellbeing of the health care professionals.

**Keywords:** Occupational hazard, biological hazard, chemical hazard, physical hazard, ergonomic hazard and psychosocial hazard

### Introduction

Occupational health refers to the impending risk to health and safety for those who work outside. Hazard is something that can cause destruction if it is not forbidden. It will cause disease openly by a person's occupation. Occupational hazard is distinct as the prospective risk to the healthiness of the person mounting due to an unhealthy environment. The occupational hazard is experienced only in the workplace. The hazards can be classified into five they are biological hazard, chemical hazard, physical hazard, ergonomic hazard and psychosocial hazard. Biological hazards are virus or microorganisms that pose a threat to the human being. It can also able to produce or transmit the diseases like hepatitis, asthma, HIV etc. Chemical hazards are caused by exposure to chemicals. In healthcare, the chemicals are used widely in the composition of cleaning agents, sterilizing agents, laboratory agents and some other toxic materials that were used as an protective agents. This causes nausea, indigestion etc. Physical hazard is also known as environment hazard due to excess of heat, vibration and noise. Exposure to x-ray is also an example for it. The Ergonomic hazard is about to reduce the discomfort and risk of injury due to work. While handling with needles they may puncture their skins. Therefore, they have to use the necessary protective measures while handling sharp materials. Psychosocial hazard is the work related stress level that an individual encounter. For examples: the difficulties in the shift timings and the harassments taking place in the workplace.

### Review of Literature

Owie and Apanga (2016) [8] stated that the tuberculosis, musculoskeletal problems, blood bone diseases, allergy due to latex, violence, tuberculosis as well as work-related stress are the general occupational hazards prevailing among healthcare workers. The study involved Medline, PsycINFO and embase. The training has to be provided to the healthcare employees regarding infection control practices.

Clegg (2001) [2] developed a research in order to find out the occupational stress in nurses. The researcher examines issues related to stress management; he also highlighted the organizational culture in order to find the level of satisfaction among the staffs.

Nsubuga and Jaakkola (2005) [7] argued that in spite of needle stick injuries, the nurses are getting infected by HIV/AIDS and other blood borne diseases in order to find out the

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Percentage of cross infection. This study has been done by the researchers among nurses as well as midwives.

Ndejjo *et al.* (2015) <sup>[6]</sup> made the study with the respondents with working in 8 major health facilities in kampala. The effect is higher than 50.0% of respondents describe with the intention that they understand the occupational hazard, 39.5% experience biological hazard, 31.5% experience non-biological hazard. This is because of not wearing proper protective measure, job related pressure, working overtime.

Triolo (1989) <sup>[9]</sup> affirmed that physical in addition to environmental hazards may be frequently observed in hospitals. It consists of slimy floor, deprived electricals, poor lighting, noise and inadequate ventilation. They are experiencing back pain due to working twice than the national average. Most workplace exposure is due to the presence of agent at very low doses.

Tunji-Olayeni *et al.* (2018) <sup>[10]</sup> did an analysis with the structured questionnaire and it is collected from 35 crafts man from one of the construction site in sub Saharan Africa. The following are some of the common health hazards faced by the craftsman that are as follows, cardiovascular, respiratory and musculoskeletal system.

Michaud and Wiczer (2018) <sup>[4]</sup> gave indication that the occupational hazard affects disability risk. Commencing genera equilibrium model, it is established for the reason that social insurance model affects the welfare all the way through the classic, sharing of risk in addition to a innovative channel of occupational replacement. It is found that both can increase welfare. It also gains an additional welfare from insurance.

Nguyen (2018) analyzed the impacts of occupational hazards and additional exposure to chemical, biomedical, as well as physical hazard among healthcare workers. It is found that the workers are getting exposed by disparate types of occupational hazards at the similar time it is escalating the peril of undesirable health outcome.

Batt (2016) demonstrated the occurrence of chemical hazards seen in food results in unplanned enclosure of certain ingredients in the manufacturing of food. The supplementary source put back for sanitizing and cleaning agents obtained from in-plant operations. The physical hazards are usually defined by their size and origins. It is really challenge for detecting the physical and chemical hazards in real time.

Edwards (2014) discussed about the foreign matter includes plant material, insects, glass, plastic and metals. All these foreign matters are the biggest complaint received by different authorities. The foreign matter does not impose any real hazard but it can be a reason for a physical danger because of its size. Shape otherwise consistency may cause physical and also chemical harm. Identifying foreign matter is the key ingredient which helps in employing the control measures to thwart the repetition.

Casson (2018) investigated about the vulnerability of biotechnological processes. It involves together chemical and biohazard in presence of microorganisms. In this study methodology has been developed in order to find out the biotechnological process, it aimed at conventional hazard and biohazard at industry. It is tested with the anaerobic

absorption of the animal compost for bio gas production. This is a wide process for producing renewable sources from energy.

Asselt *et al.* (2018) <sup>[11]</sup> identified the human health risks, which are identified in parsley, basil, thyme, black pepper, chili powder and nutmeg. The severity identified with 36 compounds is scaled from low, medium, high, and severe it is evaluated on the available monitoring data and RASFF notification with the toxicological and carcinogenicity the severity will be assessed, pesticides chloropyrifos and triazophos and dye posted a peak human health risk meant for spices and herbs.

### Measurements of Occupational Hazards

For determining the occupational hazards prevailing among the healthcare employees, primary data was collected from 50 health care professionals. The data is obtained through questionnaire. To select the healthcare professionals, we used random sampling method.

Biological hazard causes menace to the living organisms. The microorganisms, viruses or toxins can have an effect on human health. The nurses those who were wearing PPE and gloves got affected occupational exposure. Biological hazard have been measured using awareness, workplace neatness & hygiene, protective measure while handling infectious materials, handling & disposing of sharps and vaccinations provided for health. In this section, mean analysis is performed in order to identify the most influencing factor among the various above mentioned variables that have an impact on the biological hazard. This is shown in table 1.

**Table 1:** Analysis of Mean for Biological Hazards

S. No	Factors influencing Biological Hazards	Mean	Rank
1	Awareness about Biological Hazard	1.1800	5
2	Work place neatness and hygiene	2.3000	1
3	Using necessary measures for protection	1.3000	4
4	Careful handling & disposing of sharps	1.3800	3
5	Vaccinations provided by the firm	2.1000	2

From table 1, it is clear that the work place neatness and hygiene plays a vital role among all the factors influencing biological hazards.

Chemical hazards are usually caused by exposure to chemicals. It leads to acute as well as long term health problems. Based on the chemical, the hazard will differ. Long-term exposure to chemicals such as lead, tobacco smoke, engine exhausts and silica dust causes high blood pressure, stroke and may even cause heart disease. The chemicals are in the form of germicides, sterilants and pharmaceuticals. Chemical hazards have been determined by usage of disinfectants after handling with chemical agents, safety measure while handling medical gases, experience of indigestion & breathing difficulty and training for usage of chemical substances. In this section, mean analysis is executed for finding out the most significant factor among the various above mentioned variables that have an effect on the chemical hazard. This is shown in table 2

**Table 2:** Analysis of Mean for Chemical Hazards

S. No	Factors influencing Chemical Hazards	Mean	Rank
1	Essential usage of disinfectants and sterilizers	1.5600	5
2	Safety measures while using medical gases	1.8600	4
3	Indigestion due to chemical substances	2.8200	1
4	Breathing difficulty while handling chemical substances	2.2400	2
5	Proper training for handling chemical substances	1.9200	3

From table 2, it is clear that the indigestion experienced due to the usage of chemical substances have a dominant role among all factors influencing chemical hazards.

Physical hazards are physical conditions that may pose risk of injury to the musculoskeletal system, i.e. ligaments or muscles present at the lower back, nerves /tendons seen at the site of hands/wrists, or bones that is surrounding the knees. These forms of hazard may also comprise things such as extreme or awkward postures, hand/arm or whole body vibration, poorly designed tools, equipment, or workstations, poor lighting and repetitive motion. These occur in both

occupational as well as non-occupational settings. It may include public spaces and facilities, offices, home, school, building sites and workshops. Physical hazards are measured by using injuries from sharp materials, sickness due to cross infection from work place, noisy work place, comfortable working environment and proper lighting as well as ventilation. In this section, mean analysis is performed in order to identify the most influencing factor among the various above mentioned variables that have an impact on the physical hazard. This is shown in table 3.

**Table 3:** Analysis of Mean for Physical Hazards

S. No	Factors influencing Physical Hazards	Mean	Rank
1	Injuries from sharp materials	1.6800	4
2	Falling sick due to cross infection from work place	1.6400	5
3	Noisy work place	2.3200	2
4	Comfortable working environment	2.7400	1
5	Proper lighting as well as ventilation	1.8200	3

From table 3, it is clear that comfortable working environment is the major factor required to reduce the physical hazards prevailing in the work place.

Ergonomic hazards are those that cause injury to musculoskeletal system. It will happen for the reason that there may be poor maintenance for both the equipments and lack of infrastructure. The ergonomic hazards are measured by taking the good conditions of machinery and equipments,

excessive workplace to perform tasks, heavy materials injury, asthma and dermatitis developed after joining in the job and proper training for handling infectious materials. In this section, mean analysis is performed in order to identify the most influencing factor among the various above mentioned variables that have an impact on the ergonomic hazard. This is shown in table 4.

**Table 4:** Analysis of Mean for Ergonomic Hazards

S. No	Factors influencing Ergonomic Hazards	Mean	Rank
1	Good condition of machinery and equipments	2.6200	3
2	Excessive workforce to perform tasks	2.9200	2
3	Heavy materials injury	2.5600	4
4	Asthma and dermatitis developed after joining in the job	3.7400	1
5	Proper training for handling infectious materials	2.1800	5

From table 4, it is evident that the health care professionals after joining job in the hospitals develop asthma and dermatitis which is the most influential ergonomic hazard.

Psychosocial hazard will affect the psychological well-being of the people. It is due to violence, harassments and occupational stress. So, the firms should support the individuals to provide counseling in order to get rid of the individuals from these kinds of issues. The psychosocial

hazards are estimated by co-workers abusing, illness due to shift timings, mental stress due to work, imbalance of work – life due to excessive work and firms help to overcome these hazards. In this section, mean analysis is performed in order to identify the most influencing factor among the various above mentioned variables that have an impact on the psychosocial hazard. This is shown in table 5.

**Table 5:** Analysis of Mean for Psychosocial Hazards

S. No	Factors influencing Psychosocial Hazards	Mean	Rank
1	Co-workers abusing	3.8800	1
2	Illness due to shift timings	2.9400	2
3	Mental stress due to work	2.7800	3
4	Imbalance of work - life due to excessive work	2.7200	5
5	Firms help to overcome these hazards	2.7600	4

From table 5, it is clear that the health care professionals experience abusing from the co- workers which is the most influential psychosocial hazard.

In general, populace of diverse ages will have disparity in their observation towards the things they perceive. According to the age, the influence of various factors on them will

fluctuate. As a result there would be contradictory thinking among different age groups in common. In this study, ANOVA has been performed to find out the difference between the demographic profile (age) of health care professionals and their perceptions about various occupational hazards.

**Table 6:** Analysis of Variance between Age and different Hazards

S. No	Hazards	F	Sig
1	Biological Hazards	4.176	0.021
2	Chemical Hazards	0.734	0.485
3	Physical Hazards	2.508	0.092
4	Ergonomic Hazards	1.813	0.174
5	Psychosocial Hazards	1.897	0.161

From the table, it is found that the significance value of only biological hazard is below 0.05. Therefore, it is obvious that only the biological hazard face difference in perception with respect to different ages.

This study also determines the relationship among the various factors influencing the occupational hazards. This is interpreted using correlation analysis. Table 7 shows the correlation analysis.

**Table 7:** Determining relationship among various Hazards

Factors	Correlation	BH	CH	PH	EH	PSH
BH	Pearson Correlation	1	.356	-.076	-.226	-.449
	Sig. (2-tailed)		.011	.601	.114	.001
CH	Pearson Correlation	.356	1	.201	-.221	-.465
	Sig. (2-tailed)	.011		.162	.123	.001
PH	Pearson Correlation	-.076	.201	1	.502	-.107
	Sig. (2-tailed)	.601	.162		.000	.461
EH	Pearson Correlation	-.226	-.221	.502	1	.383
	Sig. (2-tailed)	.114	.123	.000		.006
PSH	Pearson Correlation	-.449	-.465	-.107	.383	1
	Sig. (2-tailed)	.001	.001	.461	.006	

From the table 7, it is found that the significant value between biological and chemical hazard & biological and psychosocial hazard is less than 0.05. Therefore, it is obvious that there is a significant relationship among Biological, Chemical and Psychosocial hazard. Also, the significant value between physical and ergonomic hazard & ergonomic hazard is less than 0.05. Thus, there is a significant relationship between physical and ergonomic hazard.

### Conclusion

Occupational illness refers to all health problems in the work environment. The health issues caused or made worsen the work. Occupational illness consequences from exposure within a workplace by means of any type of physical, chemical, ergonomic, psychosocial or biological cause. Thus, the normal physiological stuff is affected and the fitness or the well-being of the worker is prejudiced. Some of the components for effective occupational hazard management are identifying hazards and managing risk, inspection of equipments and work practices, investing about accidents and to provide the safety programs. According to this study it is found that the physical and ergonomic hazard work together while biological, chemical, ergonomic and psychosocial hazards possess a very strong relationship among themselves. So the protective measures to be used properly while handling with infectious materials. The organization should also provide necessary training to make the individuals aware about the occupational hazards.

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