Chapter

Introductory Chapter: Safety and Health for Workers - Theory and Applications

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1. Introduction

According to 2017 estimates of accidents and work-related diseases and deaths report released by the International Labor Organization (ILO), each year 2.78 million workers die from occupational accidents of which 2.4 million are disease related, approximately 86.3% of the total estimated deaths. The work-related mortality accounted for 5% of the global total deaths (based on the Global Burden of Disease Study 2015) and fatal accidents accounted for the remaining 13.7% [1]. Likewise, for 2017, BLS reported 282,750 MSD cases resulting in days away from work in the private sector, a continued decrease from the previous year (285,950) [2]. Work-related musculoskeletal disorders (WMSDs) accounted for 31.2% of all injuries and illnesses involving days away from work and remain the largest source of injury and illness cases [2]. Therefore, work-related issues have led to the explosion of research on safety and health for workers in the ergonomics and human factors, medical, psychological, engineering, science, nursing, and environmental literature for over two decades. The health and safety hazards address both acute and chronic hazards workers are exposed to at workplaces daily. These days health hazards at workplaces attract more attention because of the potential harm associated with the employee's exposure and the monetary cost attributed to a single cause. Thus, everyone wants a safe and healthy workplace for proper operation and productivity of the employees. Therefore, health and safety at work is aimed at creating conditions, capabilities, and habits that enable the worker and the organization to operate efficiently and in a way that avoids events that could cause them harm [3].

To reduce the rate of accidents reported every year at work, the United State (US) enacted a law to oversee the safety and health of workers at various workplaces in 1970, known as Occupational Safety and Health Act (OSHA). The act was enacted purposely to ensure that employers provide safe working environment for all employees. The importance of human safety and good health cannot be overemphasized or overestimated. Before the existence of OSHA, the National Environmental Protection Policy Act of 1969 became the basis of the environmental protection in the US. This chapter provides the overview of the book on safety and health for workers from research and practical application perspectives.

Everyone is exposed to at least one hazard daily and constantly interacts with different hazards on daily basis. The hazards concern with safety and health hazards, include biological, botanical, mechanical, chemical, physical, etc. Human beings cannot escape inhalation, egestion, injection, and absorption processes, even if they refuse to engage in daily work activities. Thus, it is imperative to study in depth the processes and the methods to control and manage the everyday hazards

humans are constantly exposed to. Furthermore, to complicate issues, human typically operates under different constraints including inability to survive without interaction with one another, environments, materials, and equipment on daily basis to function as human. Given these constraints, human beings are forced to maintain good health while performing their daily tasks by using good judgment during decision-making. Exposure to hazardous materials is inevitable but human errors, time of exposure, concentration, and the dose of the hazardous materials determine the effect on safety and health of the workers. To reduce the likelihood of making errors, human beings must first understand the theory behind each operating process of any activity before engaging in it. Therefore, identification and recognition of hazards relating to the theory and the applications of the principles of handling the hazards are the significant ways for protecting human safety and health at work.

In a cafeteria in the northwest region of United State (US), a teenager rushed out from a restroom and everyone seated immediately perceived unpleasant odor. At once, everyone choruses what is this? The sister of the teenager boy asked her brother "did you wash your hands? The boy responded oh NO, I forgot." Immediately, debate on why and how started in the room that inspired other customers to join the discussion.

Likewise, Wickens et al. [4] document a situation in the Midwestern factory in US on an assembly-line worker. In the scenario, the assembly-line worker had to reach to an awkward location and position a heavy component for assembly. Toward the end of a shift, after grabbing the component, he felt a twinge of pain in his lower back. A trip to the doctor revealed that the worker had suffered a ruptured disc, and he missed several days of work. He filed a lawsuit against the company requiring physical action that endangered the lower back.

A young lady who graduated with GPA of 4.0 from one of the ivy league Universities in US, pick up a supervisory role position in a multi-million construction company and having worked for 5 years in this position, she realized that her health has been deteriorated. She visited the doctor and discovered she suffered from cardiovascular damage, gastrointestinal problems that has led as ulcers and irritable bowel syndrome, and decreased fertility. She requested for damage compensation from the company.

This book is designed to address the theory of safety and health for workers and the practical applications to solving issues associated with hand hygiene, social support, ergonomics-spine deformity, workplace conditions, health equality, etc. at workplaces.

2. What is ergonomics?

Many workers and employers constantly face one or more of the episodes described in the introduction. The episodes illustrate the role of ergonomics and human factors, industrial hygienist and safety specialist in workplace design. The umbrella for human safety and health at workplaces is known as the ergonomics and human factors. Various definitions exist for ergonomics and human factors from different sources such as scientific literature, professional organizations, governmental agencies, scholars etc. Ergonomics as defined by scientists is the science and practice of designing jobs and workplaces to match the capabilities and limitations of the human body. In 2018, it was precisely defined as fitting the job, workplaces, products to users' capability to enhance safety and good health of the users [5]. CETENA (The Italian Ship Research Company) defined ergonomics as the study of human performance and its application to the design of technological

systems [6]. The author further stated that the goal of ergonomic is to enhance productivity, safety, convenience, and quality of life. It is a fact that ergonomics is derived from the Greek words ergo (work) and norms (law), which denotes the science of work. Therefore, the principles of ergonomics are not limited to traditional occupational environment as stated in Pamela McCauley-Bush textbook [7].

3. Hand hygiene

Hand hygiene is the act of cleaning hands for removing soil, dirt, and microorganisms. Proper hand hygiene had saved thousands of humans from death, chronic diseases, and incurable sickness. In the mid of eighteen century, Dr. Ignazz Philip Semmelwies proposed hand washing to reduce child mortality in the nation, before the discovery of microbial in the late eighteen century. At the time Dr. Semmlwies proposed the method, baby mortality was at 15–20%, and after implementing the proposed procedure, mortality rate reduced significantly to 0.85% in the hospitals where he worked while in other hospitals it remained at 10–15% of mortality rate [8]. Hand hygiene has been taken as the practice mostly needed for the medical practitioners. However, it should be considered necessary and important for everyone, as no one is exempted from sickness or diseases. Absolutely, people have forgotten that cleanliness is next to godliness as the saying goes. Therefore, complete hand hygiene is what is required in our workplaces today, even as many diseases spring up every day. Not long ago, Ebola disease took over the entire world, SARS also, and now it is Corona virus; so, who can tell what the disease will be tomorrow. Nearly, all the new outbreaks are traced to poor hygiene. Nevertheless, the importance of hand hygiene in the workplaces cannot be underemphasized therefore, the earlier the intervention, the better to preventing the spreading of any disease outbreak. In 2017, the findings of the study conducted by Prasad et al. [9] concluded that most patients and nurses interviewed reported hand hygiene as an important aspect of everyday life in preventing infection in the hospital setting. Many researchers have also suggested that hand hygiene is one of the main strategies to preventing infections that affect hundreds of millions of individuals worldwide and are constantly leading to chronic diseases, illnesses, and prolonged hospital stays, which sometime added burden to patients' financial stand and later cause instability within families [10–12]. There are many chemicals, substances, and materials human beings interact with on a regular basis at workplaces and homes, which have high potential of contaminating hands. Sometimes, people forget that their hands are dirty and pick food straight into their mouth without washing their hands, while many scratch their eyes 100 times daily and are found constantly touching their nose and seeping fingers in their mouth. Thus, educating people on the importance of hand hygiene is a crucial aspect of life to preventing unplanned sickness, diseases, and transfer of similar dangerous germs.

4. Workplace condition

Workplace conditions have been proved to have both positive and negative effects on employees' health status likewise on their productivity. The more the employee is satisfied with workplace conditions the faster the organization success, which makes workplace condition a major concern for organizations today. In 2019, Sorensen et al.'s study revealed that workplace condition significantly affects workers' health as well as their well-being [13]. Additionally, it is a proven fact that safe working conditions influence the habits of workers, which in turn impacts on

efficiency [14]. Accidents at workplaces are mainly attributed to workplace condition or workers' acts. Workplace conditions refers to the working environment and all existing circumstances affecting labor in the workplace, including working time (hours of work, rest periods, and work schedules) to remuneration, legal rights and leaders' responsibilities as well as the physical conditions and mental demands that exist in the workplace. In other words, workplace condition deals with the organization leadership structure and floor layout or equipment setting. International Labor Organization (ILO) has consistently demanded for workers' work-life balance. Therefore, critical attention is required for worker schedule, leadership skills of the authority, and good workplace layout for proper flow to ensure workers' well-being and better productivity. Research findings on job redesign at call centers significantly improved employee well-being, psychological contract fulfillment, and supervisor-rated job performance [15], mental health [16]. Likewise, research has revealed that work systems design may have effects on physical health, mental health, and longevity of life [17]; therefore, continuous attention to health and safety of the employees is important because ill-health and injuries caused by the systems of work or working conditions cause suffering and loss to individuals and their dependents [18]. As simple as workplace condition might sounds, the fear created through improper workplace conditions such as violent, abuse, segmental judgment, gender biases, etc. are factors, which could prevent employee from taking goal-directed action toward safety. Although, the psychologically, flexible people are less emotionally disturbed in such environments as argued in Hayes et al.'s [19] findings. Nevertheless, adequate consideration should be given to workplace condition to ensure workers' well-being and safety at workplace.

5. Worker acts

Employees' act is another important aspect to be considered at workplaces, to reduce or eliminate accidents that might result in illnesses, diseases, injuries, and death at workplaces. Certainly, no environment is free from all hazards, but workers' behavior toward handling the hazards is a crucial aspect of preventing accidents from occurring at workplaces. Undoubtedly, safety and health specialists need to have general knowledge of the impacts of any hazardous materials to the human body and train all employees on ways of preventing such effects, but because of human nature, how many adhere to the totality of this principle? Employees' safety responsibilities were acknowledged in 1999 by Bratton and Gold [20] that employee is to behave in a manner that safeguards his or her own health and safety and that of his/her co-workers. Furthermore, Jonathan and Mbogo documented the findings from the research carried out at The Research Centre Design and Technology of the Saxion University of Applied sciences on "Safety at work," which acknowledged that personal safety, a safe environment, and safe behavior were important components that employers need to ensure their availability within their organizations for proper productivity and safety of the employees. Liao et al. [21] acknowledged in their study that almost all accidents and injuries occurring at workplace are attributed to workers' unsafe acts, which are also a reflection of system deficiency and unsafe work condition. Dodoo and Al-Samarraie [22] concluded in their study that lack of adequate knowledge on safety and health, violation of safety rules, work pressure, stress, and non-use of protective equipment were the unsafe acts perpetrated by the workers sampled. Researcher has also referred unsafe act as a deliberate omission or deviation from the recommended safety standards Mason [23]. The same researcher described an unsafe act as an individual's likelihood of

not following standard safety rules, procedures, instructions, and specified criteria for work imposed by the organization management. Since the contributions of worker's unsafe acts to the workplace accidents is undeniable worldwide, research aimed at reducing this factor should be considered a discipline of great interest for society in general.

6. Properties of materials used or produced

The physical and chemical properties of raw material use and produce are other essential factors that need attention to properly monitor the health and safety of workers at workplaces. To do this, detailed attention must be given to workplace Material Safety Data Sheet (MSDS). The importance of MSDS in handling worker exposure to hazardous materials in every workplace cannot be substituted for another record keeping data sheet for the purpose of workers' health and safety. According to Translink online website, MSDS is a document that contains information on the potential health effects of exposure to chemicals, or other potentially dangerous substances, and on safe working procedure when handling chemical products. It is an essential starting point for the development of a complete health and safety program. MSDS contains hazard evaluations on the use, storage, handling, disposal information, and emergency procedures related to that material. Therefore, it is imperative to consider the use of MSDS in every workplace to ensure better control of hazardous materials effect on the employees.

This book highlights significant factors contributing to workers' poor health and safety at work, which could result in injury, chronic diseases, and death. Both theories and practical applications are discussed in this book for easy understanding of the readers.

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