



UNIVERSITI PUTRA MALAYSIA

***EFFECTIVENESS OF OCCUPATIONAL SAFETY AND HEALTH
MANAGEMENT SYSTEM ON KNOWLEDGE, ATTITUDE, AND
PRACTICES OF OCCUPATIONAL SAFETY AMONG LABORATORY
STAFF IN MAKKAH HOSPITALS, SAUDI ARABIA***

ALMUTAIRI, NAYEF SHABBAB F

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By

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**Thesis Submitted to the School of Graduate Studies, Universiti Putra
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Doctor of Philosophy**

September 2020

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

EFFECTIVENESS OF OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM ON KNOWLEDGE, ATTITUDE, AND PRACTICES OF OCCUPATIONAL SAFETY AMONG LABORATORY STAFF IN MAKKAH HOSPITALS, SAUDI ARABIA

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September 2020

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Health-related issues of laboratory staff have become a major concern for hospital managers. Occupational injuries and illnesses among medical laboratory technicians would usually result from the exposure to several occupational hazards. The lack of safety measures will increase the health risks of the laboratory staff as well as increasing the operational costs and turnaround time, besides from having an impact on their loyalty and satisfaction. There are different factors that contribute to the prevalence of occupational hazards in medical laboratories, among them is the lack of education and knowledge among staff. Therefore, adequate awareness, knowledge, training, and compliance with OSHMS are important issues in laboratory setting worldwide, especially in developing countries.

The general objective of this study is to determine the effectiveness of Occupational Safety and Health Management System (OSHMS) on occupational safety and health system of laboratory staff in Makkah hospitals, Saudi Arabia.

This research was conducted using a mixed method which includes both qualitative and quantitative methods. Two approaches were used in the qualitative assessment which are HIRARC and OSHMS in evaluating the risk level and control measures in occupational hazards, as well as the compliance to OSHMS. The quantitative assessment involved the use of quasi-experimental repeated measure with the controlled group, which was conducted in Makkah city hospitals. A questionnaire was developed and validated through a panel of experts while a pilot study was performed to measure the knowledge, practices, and respondents' attitude towards occupational safety and incidents.

The study was conducted in Makkah with three hospitals selected for the case study. From the three hospitals, two hospitals with a 477-bed capacity each were combined to represent the control group while one hospital with a 373-bed capacity represented the intervention group. The sample size was calculated using power analysis. 70 respondents were randomly selected from the intervention group population while 70 respondents from the control group population were matched with the respondents from the intervention group. Baseline, post intervention and follow up 1 and 2 (after 3 and 6 months) were conducted to evaluate the effects of intervention on the respondents' safety. Validated educational intervention in the form of lectures were implemented after the collection of the baseline data. The data were analyzed using the SPSS 22 software as well as descriptive statistics such as mean and standard deviation. Frequency analysis was applied for the respondents' demographic variables as well as the qualitative part related to HIRARC and OSHMS in both the control and experimental groups where the data obtained were compared using the Chi square test. For the second phase of this study, the quantitative method was used where the independent t test and the two-way repeated measure MANOVA/MANCOVA were applied.

The results showed that among all three hospitals, 19.3% of the risk and control measures related to occupational hazards was at a low risk, 78.2% at a moderate level while the remaining 2.5% was at a high level. The results for incidence indicated that 70.7% of the staff had reported the incidence/ accidents to the authorized personnel while the other 29.3% of the incidence were never reported while the remaining 30.9% of the staff were exposed to at least one occasion of injury in the lab. The results of the repeated measure MANCOVA analysis for both groups across time showed that there are significant differences between the two groups (control and intervention) in terms of knowledge, attitude, and practices of occupational safety among the laboratory workers at 0.05 level of significance. Besides that, the frequency of being exposed to injury in the intervention group was reduced from 30.2% to 12.9% which is statistically significant.

Educational intervention lectures have been found to be effective in reducing incidence rate and enhancing the safety of laboratory staff. The intervention was also effective in enhancing the respondents' knowledge, attitude and practices which finally affect their safety. Thus, the provision of a regular pattern of feasible educational meetings/classes for the staff and the determination of their level of knowledge, practices and attitude at various times is very important, which can be achieved through the use of the validated questionnaire provided in this work, as an easy and useful instrument.

Keywords: laboratory staff, occupational safety, Makkah hospitals, OSHMS.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEBERKESANAN SISTEM PENGURUSAN KESELAMATAN DAN KESIHATAN PEKERJAAN TERHADAP PENGETAHUAN, SIKAP, DAN AMALAN KESELAMATAN PEKERJAAN DALAM KALANGAN KAKITANGAN MAKMAL HOSPITAL MEKAH, ARAB SAUDI

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su berkaitan kesihatan kakitangan makmal telah menjadi perhatian utama pengurus hospital. . Kecederaan dan penyakit berkaitan pekerjaan dalam kalangan juruteknik makmal perubatan biasanya disebabkan oleh pendedahan terhadap beberapa bahaya pekerjaan. Kurangnya langkah keselamatan akan meningkatkan risiko kesihatan kakitangan makmal dan juga kos operasi serta tempoh pemulihan, selain memberi kesan terhadap kesetiaan dan kepuasan hati mereka. Terdapat pelbagai faktor yang menyumbang kepada bahaya pekerjaan di makmal perubatan, antaranya ialah kurangnya pendidikan dan pengetahuan dalam kalangan kakitangan. Oleh itu, kesedaran, pengetahuan dan latihan yang mencukupi serta pematuhan terhadap OSHMS adalah isu penting dalam persekitaran makmal di seluruh dunia, terutamanya di negara-negara membangun.

Objektif umum kajian ini adalah untuk menentukan keberkesanan Sistem Pengurusan Keselamatan dan Kesihatan Pekerjaan (OSHMS) ke atas Sistem Keselamatan dan Kesihatan Pekerjaan kakitangan makmal hospital di Mekah, Arab Saudi.

Kajian ini dilakukan menggunakan kaedah gabungan yang merangkumi kaedah kualitatif dan kuantitatif. Dua pendekatan digunakan dalam penilaian kualitatif iaitu HIRARC dan OSHMS dalam menilai tahap risiko dan langkah kawalan terhadap bahaya pekerjaan serta pematuhan terhadap OSHMS. Penilaian kuantitatif pula melibatkan kaedah berulang separa eksperimen terhadap kumpulan kawalan, yang dilakukan di hospital di bandaraya Mekah. Soal selidik dibangunkan dan disahkan

oleh panel pakar manakala kajian rintis dibuat bagi mengukur pengetahuan, amalan dan sikap responden terhadap keselamatan dan insiden pekerjaan.

Kajian ini dilakukan di Mekah dengan tiga hospital dipilih sebagai kajian kes. Daripada tiga buah hospital, dua hospital dengan kapasiti 477 katil masing-masing digabungkan untuk mewakili kumpulan kawalan manakala sebuah hospital dengan kapasiti 373 katil mewakili kumpulan intervensi. Saiz sampel dikira menggunakan analisis kuasa (Power Analysis). 70 responden dipilih secara rawak dari populasi kumpulan intervensi sementara 70 responden dari populasi kumpulan kawalan dipadankan dengan responden dari kumpulan intervensi. Pengumpulan data asas, pasca intervensi dan tindakan susulan 1 dan 2 (selepas 3 dan 6 bulan) dibuat bagi menilai kesan intervensi terhadap keselamatan responden. Intervensi pendidikan dalam bentuk kuliah yang telah disahkan dilaksanakan setelah data dasar dikumpul. Data dianalisis menggunakan SPSS 22 dan statistik deskriptif seperti min dan sisihan piawai. Analisis kekerapan digunakan untuk pembolehubah demografi responden dan juga bahagian kualitatif berkaitan HIRARC dan OSHMS dalam kumpulan kawalan dan eksperimen di mana data yang diperolehi dibandingkan dengan menggunakan Ujian Chi Square. Bagi fasa kedua kajian ini, kaedah kuantitatif digunakan di mana ujian t bebas dan pengukuran berulang dua arah MANOVA/MANCOVA telah digunakan.

Keputusan menunjukkan bahawa di antara ketiga-tiga hospital, 19.3% daripada risiko dan langkah kawalan berkaitan bahaya pekerjaan adalah berisiko rendah, 78.2% pada tahap sederhana manakala 2.5% selebihnya berisiko tinggi. Keputusan bagi insiden menunjukkan bahawa 70.7% kakitangan melaporkan insiden/kemalangan kepada pihak yang diberi kuasa, 29.3% daripada insiden tidak pernah dilaporkan manakala 30.9% daripada kakitangan telah terdedah kepada sekurang-kurangnya sekali kecederaan di makmal. Keputusan analisis berulang MANCOVA bagi kedua-dua kumpulan menunjukkan bahawa terdapat perbezaan yang ketara antara kedua-dua kumpulan (kawalan dan intervensi) bagi pengetahuan, sikap dan amalan keselamatan pekerjaan di kalangan pekerja makmal pada tahap kepentingan 0.05. Selain itu, kekerapan pendedahan kepada kecederaan dalam kumpulan intervensi dapat dikurangkan daripada 30.2% kepada 12.9% yang signifikan secara statistik.

Kuliah intervensi pendidikan berkesan dalam mengurangkan kadar insiden dan meningkatkan keselamatan kakitangan makmal. Intervensi ini juga berkesan bagi meningkatkan pengetahuan, sikap dan amalan responden yang akhirnya mempengaruhi keselamatan mereka. Oleh itu, penyediaan mesyuarat pendidikan/kelas yang bercorak biasa bagi kakitangan dan penentuan tahap pengetahuan, amalan dan sikap pada pelbagai masa adalah sangat penting, yang boleh dicapai melalui penggunaan soal selidik yang disahkan seperti yang tersedia dalam kajian ini, sebagai instrumen yang mudah dan berguna.

Kata kunci: kakitangan makmal, keselamatan pekerjaan, hospital Mekah, OSHMS.

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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
HBV	Hepatitis B Virus
HCWs	Health-care workers
ILO	International Labor Organization
MOH	Ministry of Health
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
WHO	World Health Organization
PPEs	Personal Protective Equipment's
S&H	Safety and Health
OSH	Occupational Safety and Health
CDSI	Central Department of Statistics & Information
GAS	General Authority for Statistics

CHAPTER 1

INTRODUCTION

1.1 Study Background

On the issue of the safety and health of employees, over the years most employers have shown less than adequate interest in propagating awareness of the need for a proper and conducive environment for employees in the workplace (Lin et al., 2008; Rezaei et al., 2017; Torten et al., 2018). There have been cases of employees not being equipped with reasonable safety and health equipment and, thus exposing them to risks of getting hurt or injured at their workplace in the course of performing their duties (Beekmann et al., 2001; Momani & Mumani, 2017). Therefore, the concept of occupational health in the workplace has increasingly triggered many employers to be concerned about occupational hazards that may negatively affect the health and general well-being of staff. Thus, several developed and developing countries have shown substantial improvement in the health sector (Fasunloro et al., 2004; Tam, 2016).

Health status inevitably plays a significant role in ascertaining the socio-economic progress of a country (Mirowsky, 2017; Sarok, 2012). Improved health results in enhanced efficiency and higher productivity of labour, and this is a precursor of economic development and human welfare and a positive step in the alleviation of poverty (Anuar et al., 2008; Mirowsky, 2017; Øversveen et al., 2017). Some factors have intervened in the health status of the workforce (Makin & Winder, 2008). A “hazard” in the context of the workplace is defined as “ a dangerous phenomenon, substance, human activity or condition that may bring about loss of life, injury or other health impact, property damage, loss of livelihood and services, social and economic disruption, or environmental damage” (Aluko, Adebayo, Adebisi, Ewegbemi, et al., 2016; and Aparecida et al., 2008).

One of the most significant aspects in improving safety and ensuring effective implementation of a proactive OHSMS rests in raising staff safety awareness, knowledge and providing adequate education and training programmes. Once the staff become more knowledgeable and informed regarding safety issues, a safer working condition can be expected (Kozlovska et al., 2013).

Most employees do not really grasp the notion of safety and show little cooperation in complying with the various safety guidelines, and as such, safety measures fail to be effective. If such a situation persists, any safety measure or action required by the government or employer may end up as well-meaning but futile effects since the employees themselves show no commitment to the notion of safety (Sewunet et al., 2014; and Yan et al., 2016). Many employers also do not recognize the occupational health and safety as a process, and this leads to inadequate safety measures. There

will then be a need to supply proper training and education on these measures and rules (Mori & Takebayashi, 2002; Sarok, 2012).

The World Health Organisation defines “health hazards” as “toxic and carcinogenic chemicals and dust, often in combination with noise, heat and other forms of stress” (Goswami & Devi, 2015). Other health hazards include physical and biological agents (Dunstan, Howard, Healy, & Owen, 2012; Prüss-Üstün & Neira, 2016). According to Nordin et al. (2014): “The transmission of disease causative agents to the human body can take place either through skin absorption, by the intake into the digestive tract via the mouth or via inhalation into the lungs.” Bennetts et al. (2016) warn that “The ability to identify these hazards and knowing their implications on the personal lives of all staff in the hospital are crucial. This is to ensure that regular monitoring and review of these measures are important in confirming their effectiveness.”

Blue and Panel (2012); Cadogan et al. (2015); and Salin et al. (2018), all agree that “Without these measures, job performance will be hampered and the employee will suffer the eventual consequence. The attitudes of employees definitely have a significant role in health and safety.”

Hazard Identification, Risk Assessment, and Risk Control (HIRARC) are the most important aspects in OHSMS that have a direct relationship with efforts to prevent and control hazards. Based on the Occupational Health and Safety Assessment Series (OHSAS): 18001 (2007), HIRARC must be carried out throughout the organisation to identify the activities that are potentially hazardous and which can adversely affect occupational safety and health (Widodo & Sartika, 2017).

Sharp injuries are the most frequent reasons causing exposure to blood-borne diseases among healthcare staff (Jaybhaye et al., 2014; Salin et al., 2018). As for psychological factors, hospitals staff face constant constraints in performing their daily tasks (Gero, 2018; Rates, 2013). Increasing work demands and excessive workloads lead to job strain and stress among healthcare staff (Orrung Wallin et al., 2015; Woodhead et al., 2016). The psychological hazards such as heavy workload, extremely demanding work, mental and physical fatigue and burn-out syndrome are norms in the hospital environment that create further stress, depression and mental fatigue among staff (Rates, 2013; Woodhead et al., 2016).

Medical laboratories can be unsafe places (Osungbemiro et al., 2016) because it is where human blood, tissues, urine, and other body substances, often with hazardous microorganisms, are sent to be analysed. Frequently, the equipment and the reagents used in lab tests have been known to have inherent dangers (Misra et al., 2016). Much of the work is challenging, causing stress, accidents, and injuries. To obtain the required information available only from a medical laboratory, those who enter the laboratory must be properly trained and understand the potential risks and hazards,

and be capable of performing their task properly (Frcpc & Noble, 2004; Miller et al., 1986; Oladeinde et al., 2015).

1.2 Problem Statement

Occupational injuries and illnesses among medical laboratory staff usually result from exposure to a number of occupational hazards, such as the frequent handling of infectious materials – blood and other body fluids from patients including pus, urine, stool, sputum, secretion, or saliva – and also a lack of working experience as well as failure in complying with standard procedures (Girard et al., 2014; Valent, 2015; Valent et al., 2016). However, the extent of their susceptibility to such risks may vary based on the level of the knowledge and education among both staff members and managers in addressing the aforesaid risks (Bekele et al., 2015), that requires standard and established guidelines.

Due to their multi-task activities and the absence of clear labour regulations, particularly in developing countries, staff in those countries face a higher rate of hazards without proper welfare. Specifically, the employer should inform staff about the health hazards that may arise in the event of a new chemical or physical process happening following the performance of their tasks (Min et al., 2019).

Based on the Bureau of Labour Statistics (2015) report, U.S. private hospitals indicated 238,200 work-related injuries and illnesses in 2014, which represented a rate of 6.2 work-related injuries and illnesses for every 100 full-time members of staff. The International Labour Organisation (ILO) has already worried that non-standard employment, such as daily workers, or any workers who are working in a place that pays no attention to OSHMS regulations, could threaten worker health and even their lives (ILO, 2016).

There are different factors responsible for the existence of occupational hazards in medical laboratories that are related to the lack of education and knowledge among staff, such as overcrowding, heavy workload, incorrectly-installed and poorly-maintained equipment as well as poorly -designed laboratories (Charles et al., 2009; Dutkiewicz et al., 2011; and Klein et al., 2009), and which can turn out to be the possible major reasons for injuries among staff. Besides, it has been found that laboratory procedures may generate low particle-sized aerosols, which are probably inhaled by exposed laboratory staff, and lead to respiratory problems such as asthma and the like (Obiebi et al., 2017) . Carelessness and unsophisticated (safety-wise) techniques in the handling of infectious materials, cause injuries by contaminated needles as well as exposure to toxic aerosol are the main causes of laboratory-acquired infections (Luksamijarulkul et al., 2010). These, in turn, are related to significant shortcomings in three areas, namely, knowledge, compliance with OSHMS, and training of medical laboratory staff.

Besides, the persistent and related ergonomics issues having to deal with infected patients, many of whom may be emotionally unstable, physically violent who require urgent care, and aggravated by long working hours (including double work shifts that often last till late at night), inadequate safety measures, and the overwhelming number of tasks are some of the common factors influencing both the physiological and psychological health of medical laboratory staff (Klein et al., 2009; Rampal et al., 2010; Sabitu et al., 2009). These factors also lead to many health-related issues, such as eye strain, neck, back and shoulder pain, migraine, stomach ulcers, hair loss, digestive disorders, insomnia, lethargy, hepatitis B and appendicitis, among others among other issues (Alex, 2011; Ford & Tetrick, 2011; Shariat et al., 2018).

Inadequate awareness, knowledge, training, and compliance with OSHMS are important issues in laboratory settings worldwide, particularly in developing countries where standard operating procedures (SOPs) are non-existing (Kjellstrom et al., 2009; Organisation, 2009). In Makkah, Saudi Arabia, relevant researches on occupational health hazards and associated factors that influence compliance with OSHMS have yet to be found, especially in healthcare sector. In addition, based on the theory in restriction, Saudi Arabia does not have a functional OSHMS that can help reduce the risk of occupational hazards in some hospitals in general and in medical laboratories in particular. The current OSHMS guidelines are not practical with employers following the traditional concepts. It should be noted that most of the previous researches in this field have been related to western or developed countries.

In light of this, the infection control policy adopted by hospitals in Saudi Arabia is only based on traditional control guidelines defined by the Ministry of Health (MOH) many years ago and it is not compliant with the OHS system. In addition, there is no specific course or education for employers /employees which is deemed necessary in enhancing knowledge in health and safety measures in the work place.

This is a worrying scenario and as such, hazards more often than not have resulted in unpleasant work environments that cause frequent absenteeism at work and a high rate of medical/sick leave. The situation may be due to physical pain/injuries suffered by the staff, which over time would have a negative impact on the overall productivity and subsequently lead to financial inefficiency (Amin et al., 2014; de la Fuente et al., 2014; Gubernot et al., 2015). According to the Makkah Health Affairs during the last week of December, 2017, Makkah hospitals provided medical services to 43,174 patients. In excess of a million laboratory tests were performed on pilgrims at Makkah hospitals during Ramadan (MHA, 2017).). In addition to that, the General Authority for statistics in Saudi Arabia reported that more than 32 million laboratory tests were conducted at Makkah hospitals from 2017-2018 (GaStat, 2018).

An electrical malfunction that caused a fire in the Maternity ward of Jazan Hospital (Bajow et al., 2016), was categorized as “an accidental health and safety hazard” in a Saudi Arabian hospital. While there were concerted efforts by the Government of Kingdom of Saudi Arabia (KSA) aimed at providing a safe working environment in all hospitals in the country, the OSH risk assessment has recognised certain serious and prevailing gaps that are hardly noticeable within the health sector (Alghnam et al., 2014). In this context, the attention given to the large population of staff in hospitals and laboratories, the lack of job hazard analysis and inadequate OSH training in Makkah that require assessment of the laboratory staff, and the standard of health-related operating procedures in health facilities, are some of the significant gaps that need to be bridged in the kingdom’s hospitals.

It should be noted that, prevention of these occupational health and safety hazards in developing countries, can be achieved by educating staff before they are assigned to perform any task. Unfortunately, in Saudi Arabia, standard guidelines for this purpose are not available. Thus, conducting a study to address this issue is useful and vital to prevent injuries and the reduce the level of risks and hazards surrounding laboratory staff.

1.3 Research Questions

- i. What is the level of risk and control measures of occupational hazards (chemical, physical, biological, ergonomic) among laboratories staff in 3 selected hospitals in Makkah?
- ii. What is the frequency of occupational incident among laboratories staff in 3 selected hospitals in Makkah?
- iii. What is the level of OSHMS compliance among laboratories staff in 3 selected hospitals in Makkah?
- iv. Does the intervention program have effect on KAP, occupational risk level, occupational incident and OSHMS compliance among laboratories staff in 3 selected hospitals in Makkah?

1.4 Objectives

1.4.1 General Objective

The general objective of this study is to determine the effectiveness of occupational safety and health management system (OSHMS) on occupational safety and health system of laboratory staff in Makkah hospitals, Saudi Arabia.

1.4.2 Specific Objectives

- i. To determine the risk level and control measures of occupational hazards (chemical, physical, biological, ergonomic) among laboratories staff in 3 selected hospitals in Makkah
- ii. To determine the frequency of occupational incident among laboratories staff in 3 selected hospitals in Makkah.
- iii. To determine the level of OSHMS compliance among laboratories staff in 3 selected hospital in Makkah
- iv. To develop an intervention program in order to reduce occupational risk level and incident among laboratories staff in 3 selected hospitals in Makkah.
- v. To determine the effectiveness of intervention program on KAP, occupational risk level, occupational incident and OSHMS compliance among laboratories staff in 3 selected hospital in Makkah.

1.5 Hypotheses

Intervention program has a significant effect on KAP, occupational risk level, occupational incident and OSHMS compliance among laboratories staff in 3 selected hospitals in Makkah.

1.6 Research Justification

As has been mentioned before ,laboratory staff in hospitals are exposed to various occupational infections and medical hazards (Misra et al., 2016; Obiebi et al., 2017). Workplace hazards include chemical, physical, biological and psychological threats (Misra et al., 2016; Rezaei et al., 2017; Salin et al., 2018). Most of these threats are caused by the direct contact between lab technicians and patients or medical tools, which may cause disease transmission through the blood, direct contact or through any other body fluids which originated from the patients. Any forms of contacts with chemicals are dangerous as it may cause incineration and diseases such as cancer and lung diseases (Royle, 2005; Weinstein & Singh, 2009).

The Kingdom of Saudi Arabia is the main religious destination of the global Muslim population. The holy city of Makkah is one of the major cities in the Kingdom and it is the destination of millions of Muslims from all corners of the world who travel throughout the year for pilgrimage purposes. For this reason, hospitals located in Makkah are tasked with the responsibility to provide healthcare services for locals as well as the large number of pilgrims from abroad. Laboratory staff of these hospitals are the focus of health services and they are often exposed to various risks and occupational hazards. As such, it is crucial to determine the level of knowledge on health and safety in their workplace among staff and make efforts to design an easy and feasible package to address the issue.

The infection of laboratory staff has many impacts on their performance and the overall workplace environment. The lab staff may seek medical treatment from a doctor and may need to be on medical leave; and the cost of treatment will be borne by the employer. The high frequency of medical or sick leave results in a shortage of staff and subsequently affects the productivity of the laboratory in general (Tang et al., 2009). This research will determine the occupational hazards, risk level, and control measures in accordance with international standards. The introduction of the cost benefit method known as “hazard identification risk and risk control” (HIRARC), and the intervention introduced in this study, will enable the implementation of the OHSMS in the laboratories with the hope of improving the level of awareness among both employees and employers. This management system will ensure and enhance the safety of the workplace environment, prevent incidents and infection and will save time and money.

By following the standards used in developed countries, and adjusting them to the local needs and standards, this study will help the Saudi Arabian government in developing policy and strategy, based on standard guidelines (OHSAS18001) which will enhance the safety of laboratory staff. An intervention training programme for laboratory staff is a feasible method as it is free from any form of critical side effects. It will enable to increase profitability through the elimination or minimising of threats from those who may be exposed to OHS hazards linked to their work activities. This study also enables organisations to improve and reduce the probability of incidents in the workplace. The positive effects of this study, not only impact employees but also the employers in improving the efficiency of hospitals.

1.7 Conceptual Framework

This section presents the conceptual framework of the study. The conceptual framework consists of the key concepts of the study, the theoretical underpinnings and model (s) adopted by the study. The relationship between the concepts, the theory and model is determined by the objectives of the study and the research design. This study was carried out in two phases.

At the Phase I (pre-intervention phase), as showcased by Figure 1.1 below, HIRARC observations for work activities were employed to determine risk level, occupational hazards, and control measures. As also shown in the figure, there are five elements of control measures considered by this study namely, elimination, substitution, engineering control, administrative, and personal protective equipment (PPE). As for occupational hazards, the study identified four categories of occupational hazards which include chemical hazard, physical hazard, biological hazard, and ergonomic hazard. The second aspect of Phase I used OSHMS checklist mainly OHSAS 18001 which has five (5) major elements in total. These include occupational health and safety policy, planning, implementation and operation, checking, and management review. The third aspect of the preintervention state is occupational incidence. This aspect was carried out through survey questionnaire administered to laboratory staff.

At Phase II (post-intervention phase), indicated in the lower part of Figure 1.1, all the data collected at Phase I were used to determine the effect of OSHMS intervention training which was administered through presentation (lectures and video) The intervention training was used to determine any change in the knowledge, attitude and practices of the laboratory staff under study. The figure 1.1 indicates that by doing so it is expected to enable the improvement in OSHMS compliance, reduce the risk level and incidences, and improve knowledge, attitude, and practices of the laboratory staff under study. By extension, the expected outcome, therefore, is a safe environment, and contribute in the improvement of the lab efficiency, productivity, staff safety and health.



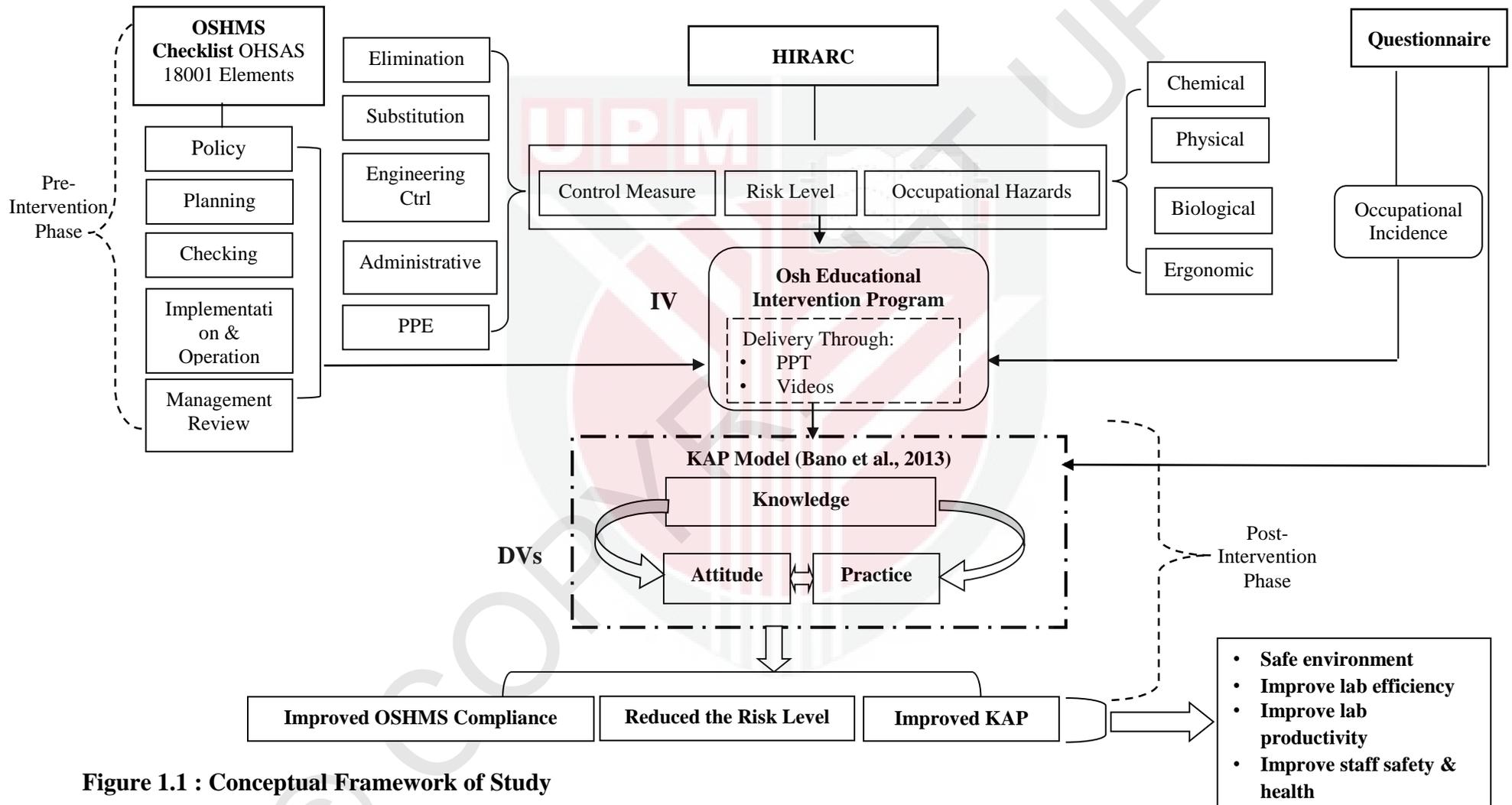


Figure 1.1 : Conceptual Framework of Study

1.8 Definition of Terms

1.8.1 Conceptual Definition

1.8.1.1 Hazard Identification, Risk Assessment and Risk Control (HIRARC)

Hazard A source or a situation with a potential of harm in terms of human injury or ill health, damage to property, damage to the environment or a combination of these (Dosh, 2008).

Risk is described as a combination of the likelihood of an occurrence of a hazardous event with specified period or in specified circumstances and the severity of injury or damage to the health of people, property, environment or any combination of these caused by the event (Ford and Tetrick, 2011).

Control is the elimination or inactivation of a hazard in a manner such that the hazard does not pose a risk to staff who have to enter into an area or work on equipment in the course of scheduled work (Tziaferi et al., 2011).

1.8.2 Definition of Knowledge, Attitude and Practice (KAP)

Knowledge: knowledge is defined as “the acquisition, retention, and use of information or skills” (Wan, Rav-Marathe, & Marathe, 2016).

Attitude: attitude is defined as “the psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour”(Wan et al., 2016)

Practice: is defined as the actions involved in the ways and the manner tasks are carried out (Eagly & Chaiken, 1993, 2007).

1.8.3 Operational Definition

The HIRARC process involves four simple steps:

- a. Properly identify and categorise all the related activities of laboratory staff at Alnoor hospital, Hira hospital and King Faisal hospital.
- b. Identify the hazards in work activities among laboratory staff in three hospitals.
- c. Assess the risks for each hazard based on the likelihood of it happening and its level of severity.

- d. Establish the level of tolerance to the risks and creating the necessary control measures

Hazard: The hazard in this study is the health hazard which can cause illness or harm to laboratory staff in Alnoor hospital, Hira hospital, and King Faisal hospital. This includes biological, chemical, physical, and ergonomic hazard. To measure the hazard, this study used HIRARC form, based on the guidelines from Malaysian Department of Safety and Health. By working in the laboratory there are risks related to machines and other factors listed in HIRARC form. Based on the work activities there are two types of hazards: health hazards and safety hazards.

Risk: the formula to calculate risk is as below:

$$\text{Risk} = \text{Likelihood} \times \text{Severity}$$

Control: To determine which work activities pose high risks to laboratory staff entails the selection of a suitable control measures to the source of the hazard such as: the use of personal protective equipment (PPE).

Knowledge: It is operationally defined by using four (4) constructs adapted from (Aluko, Adebayo, Adebisi, & Ewegbemi, 2016; Shekhar, Patel, Jain, Garg, & Mangukiya, 2015; Zaveri & Karia, 2012). This includes biological knowledge, chemical knowledge, ergonomic knowledge, physical knowledge and personal protective equipment knowledge.

Attitude: It is operationally defined by using three constructs adopted from (Aluko et al., 2016). The three (3) components include: cognition, affect, and behavior.

Cognition: the cognition component of attitude consists of the true and false beliefs about the attitude object (Eagly & Chaiken, 2007).

Affect: this is the emotion attached to every aspect of the attitude object (Eagly & Chaiken, 2007).

Behaviour: this is about the prone nature of one to act in particular ways in relation to the attitude object.

Practice: This is operationally defined by using a number of constructs developed from various sources. This includes general practice hazards and safety issues (Shekhar et al., 2015; Zaveri & Karia, 2012), practice hazards and safety related to chemicals ("European Agency for Safety and Health at Work," 2005), Practice hazards and safety related to physical issues (Aluko et al., 2016), Practice hazards and safety related to biological issues (Goswami et al., 2011), Practice hazards and safety related to personal protective equipment (Goswami et al., 2011; Phukan, 2014), Practice hazards and safety related to ergonomic (OH&S Workplace, 2012; Wauben, Van Veelen, Gossot, & Goossens, 2006).

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Letter arrangement for meeting with all supervisors, safety coordinators, and quality management manager.

TO:

Directore of laboratory in Alnoor Specialist Hospital at makkh. saudi arabia

Permission to carry out research project title: "**Effectiveness of Occupational Safety and Health Management System on Knowledge, Attitude, Practices of Occupational Safety and Risk Level Among Laboratory Workers in Makkah Hospitals, Saudi Arabia**"

As mention above my name is Nayef Almutairi, PhD Research Student in Occupational Health and Safety , Faculty of Medicine and Health Sciences. Universiti Putra Malaysia

The objective of the letter is to apply permission to cary out research in title: "**Effectiveness of Occupational Safety and Health Management System on Knowledge, Attitude, Practices of Occupational Safety and Risk Level Among Laboratory Workers in Makkah Hospitals, Saudi Arabia**" at Alnoor hospital.

The objective of the project is to improve the safety and health among the laboratory staff and lab facilities.

There fore I would like to have a meeting with you and your team including :

- Head of staff of laboratory
- Safety officer in laboratory
- Quality control manager
- list of staff names

please contact with me at(phone 0568699929) or email : nff-999@hotmail.com.

For their discussion

Best Regards

Appendix C : Consent Form (UPM)



UPM
UNIVERSITI PUTRA MALAYSIA

**JAWATANKUASA ETIKA UNIVERSITI
UNTUK PENYELIDIKAN MELIBATKAN
MANUSIA (JKEUPM)**

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

**EFFECTIVENESS OF OCCUPATIONAL SAFETY AND HEALTH
MANAGEMENT SYSTEM ON KNOWLEDGE, ATTITUDE, PRACTICES
OF OCCUPATIONAL SAFETY AND RISK LEVEL AMONG
LABORATORY WORKERS IN MAKKAH HOPITALS, SAUDI ARABIA**

2. INTRODUCTION:

We would like to invite you to participate in this study. However, before you decide whether to participate or not it will be very important that you fully understand the concept and brief introduction of the study. Kindly read the following information before finalizing your decision.

Employers have little awareness and anticipation of the health and safety of workplace employees. The employee is not equipped with safety and health equipment, and reasonably he/she will have the risk of injury or injury at work, any time he/she is responsible. As a result, the concept of built-in occupational health is increasingly attracting many employers to ensure that occupational hazards that could adversely affect workers' health. It is for this reason that the researchers are interested in studying the occupational safety and health management system of laboratory staff in the Makkah Hospitals in Saudi Arabia. The study was designed to determine the occupational hazards (chemical, physical, biological, ergonomic, psychosocial) of laboratory workers in three selected hospitals in Makkah and to further assess their relationship to occupational morbidity and risk. This will help to develop an intervention program to reduce the occupational risk level and accident rate of laboratory staff in three selected hospitals in Makkah.

3. WHAT WILL YOU HAVE TO DO?

If you agree to participate in the study, you need to sign the consent form and to fill the questionnaire to the best of your knowledge and with all sincerity. Note that, there won't be any test or taking sample from you. While collecting the data from you using the questionnaire; your Sociodemographic information will be asked followed by the main content of the questionnaire.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

All temporary staff that usually visits during hajj operation, trainer or students all those laboratory workers that are about to retire within the period of this study will be considered exclusive.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will be given an opportunity to ask questions regarding occupational safety and health management system (OSHMS) being you the laboratory workers of which could be very beneficial to you and your colleagues in other hospitals that are not part of this study

(b) TO THE INVESTIGATOR?

The study will contribute to the existing knowledge on control and prevention of occupational hazard through the used of interventional study. The results of this study will further serve as evidence base information for the development of effective policies and guidelines for the control and prevention of occupational hazard amongst the laboratory workers in the hospitals. Data obtained could also provide an avenue for further research in the area.

6. WHAT ARE THE POSSIBLE RISKS?

There is no risk associated with this research study.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

Yes, the information that will be provided in this study will remain strictly confidential and will not be provided or disclosed to any third party. The questionnaires will be coded with a unique identification number to avoid exposing names and other details. In addition, no part of the respondent's details will be published as all the questionnaires will be completely destroyed after the completion of the study.

**8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?
NAYEF AL-MUTAIRI**

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9. CONSENT

I Identity Card No.
address.....
.....hereby
voluntarily agree to take part in the research stated above *(clinical /drug trial/video
recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology,
possible adverse effects and complications (as written in the Respondent's
Information Sheet). I understand that I have the right to withdraw from this research

at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature Signature
(Respondent) (Witness)

Date : Name :

I/C No. :

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date Signature
(Researcher)

BIODATA OF STUDENT

Nayef Shabbab Faraj Al-mutairi, was born in Al medina Al munawara – Saudi Arabia - in 1976. He completed his secondary school from Al-Hakam Ibn Hisham school in almahad area in Al medina Al munawara city of Saudi Arabia. He graduated with a diploma of Nursing from the health institute in Al medina in 2000. The graduated from bachelor's degree in Nursing from the University of Applied Sciences in Jordan 2007. He obtained his Master degree in Public Health course of (occupational health and safety) of the Faculty of Medicine, University of Science & Technology in Jordan 2011.

He started his first job in ministry of health in 2000 as Director of the health center in almahad area . And then in 2014, he moved to work in Umm Al-Qura University as lecture in Makkah – Saudi Arabia. Then he works as deputy dean college of health science at Al-lieth 2014/2015 till joined his PhD program in occupational safety and health at University Putra Malaysia.

LIST OF PUBLICATIONS

- Almutairi, N. S., Tamrin, S. B. B. M., Guan, N. Y., & How, V. Review of Knowledge, Attitude, and Practice Among Laboratory Workers Towards Occupational Safety and Health. *Malaysian Journal of Medicine and Health Sciences*, 16(1): 297-303, Jan 2020. (eISSN 2636-9346).
- Almutairi, N. S., Tamrin, S. B. B. M., Guan, N. Y., How, V. (2019). Determine the Risk Level of Occupational Hazards among Laboratories Staff in Makkah among Laboratories Staff in Makkah. *Opción*, Año 35, Especial No.21 (2019): 11-19 ISSN 1012-1587/ISSN: 2477-9385 .
- Almutairi, N. S., Tamrin, S. B. B. M., Guan, N. Y., How, V., & Danaee, M. (2019). Effectiveness of Intervention Occupational Safety and Health Management System on Improving Safety and Health among the Laboratory Technician/Staff. *International Journal of Advanced Scientific Research & Development (IJASRD)*, 5(12), 18-32.



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NAME OF STUDENT: ALMUTAIRI, NAYEF SHABBAB F

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