KNOWLEDGE, ATTITUDE AND PRACTICE ON OCCUPATIONAL SAFETY AND HEALTH AMONG MEDICAL LABORATORY PERSONNEL IN HOSPITAL RAJA PERMAISURI BAINUN IPOH - IMPACT OF INTERVENTION

By

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ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE ON OCCUPATIONAL SAFETY AND HEALTH AMONG MEDICAL LABORATORY PERSONNEL IN HOSPITAL RAJA PERMAISURI BAINUN IPOH - IMPACT OF INTERVENTION

Suresh Narayanan

The diverse nature of a medical laboratory personnel's work increases the risk of exposure to myriad of occupational hazards throughout the career. However, there were not many extended and focus-driven research done to evaluate the post-measurement of knowledge, attitude and practice (KAP) of Occupational Safety and Health (OSH) among medical laboratory personnel after the mitigation actions expedited. The objectives of this study are to investigate the KAP level of OSH among medical laboratory personnel, plan and execute intervention campaign based on the results of KAP and evaluate the impact of campaign before and after intervention. A cross sectional survey was conducted to measure the KAP on OSH among medical laboratory personnel (N=110) from the Pathology Department of Hospital Raja Permaisuri Bainun, Ipoh. Based on the results, Health and Safety Campaign was planned and conducted for three consecutive days as an intervention program. The impact of the campaign was assessed using the same set of questionnaire. The KAP before and after intervention was compared to evaluate the impact of intervention. Detailed analysis of the gathered data was carried out using SPSS

paired-t test. Mean score of 0-0.49 was valued as poor KAP, 0.5-0.74 satisfactory KAP and 0.75-1.00 valued as good KAP. Knowledge on OSH was good with mean score before intervention 0.79 (SD = 0.19) and after intervention 0.85 (SD=0.12), t = -5.29 and $p<0.05$. However, knowledge on biohazard, oxidizing hazard symbol and OSH legislation were the areas which signified a need for improvement. Attitude towards OSH found to be good and remain unchanged with mean score before intervention 0.79 (SD=0.15) to 0.7852 (SD=0.14), t= 0.42 and $p>0.05$ after intervention. Practice of OSH showed a satisfactory result where mean score before intervention 0.70 (SD=0.24) increased to 0.72 (SD=0.20) after intervention although no statistical significance was noted whereby the t= -1.564 and $p>0.05$. Continuous education and training are important to fill in the gaps between knowledge, attitude and practice of OSH to promote and ensure a healthy and safe working ethos and environment among the employees thus increasing the productivity of the workforce.

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In the name of GOD, the Most Gracious, the Most Merciful. Praise to Him the Almighty that in His will and given strength, author managed to complete the Final Year Project in partial fulfillment of the requirement for the Bachelor of Science (Hons) in Biomedical Science at Universiti Tunku Abdul Rahman (UTAR).

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DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations that have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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Suresh Narayanan

APPROVAL SHEET

This project report entitled "**Knowledge, Attitude and Practice on Occupational Safety and Health among medical laboratory personnel in Hospital Raja Permaisuri Bainun, Ipoh – Impact of Intervention**" was prepared by Suresh Narayanan and submitted as partial fulfillment of the requirements for the degree of Bachelor of Science (Hons) in Biomedical Science at Universiti Tunku Abdul Rahman (UTAR).

Approved by,

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Mrs. Anto Cordelia Tanislaus Antony Dhanapal Date: 12th April 2013

Supervisor

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Date: 12th April 2013

PERMISSION SHEET

It is hereby certified that SURESH NARAYANAN (ID NO: 10ADB00038) has completed this final year project entitled "**Knowledge, Attitude and Practice on Occupational Safety and Health among medical laboratory personnel in Hospital Raja Permaisuri Bainun, Ipoh - Impact of Intervention**" supervised by Mrs. Anto Cordelia Tanislaus Antony Dhanapal from the Department of Chemical Science, Faculty of Science

I hereby give permission to my supervisors to write and prepare manuscripts of these research findings for publishing in any form, if I do not prepare it within six (6) months from this date, provided that my name is included as one of the authors for this article. The arrangement of the name depends on my supervisor.

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AIDS	Acquired Immuno Deficiency Syndrome
CDC	Center for Disease Control and Prevention
CJC	Creutzfeld- Jacob Disease
DOSH	Department of Safety and Health, Malaysia
DSM	Department of Standard Malaysia
GHS	Globally Harmonized System
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIRARC	Hazard Identification, Risk Assessment and Risk Control
HRPB	Hospital Raja Permaisuri Bainun, Ipoh
HSC	Health and Safety Committee
HSMS	Health and Safety Management System
JKN	Jabatan Kesihatan Negeri
KAP	Knowledge, Attitude and Practice
KPAS	Unit Keselamatan Pekerjaan dan Alam Sekitar
LMC	Labor Management Council
MITI	Ministry of International Trade and Industry
MLT	Medical Laboratory Technologist
MOH	Ministry of Health, Malaysia
MSAI	Mean Score Before Intervention
MSBI	Mean Score After Intervention
MSD	Musculoskeletal Disorder

MSDS	Material Safety Data Sheet
NATA	National Association of Testing Authorities, Australia
NMRR	national Medical Research Registry
NODOPOD	Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease Regulation 2004
NSSIs	Needle Stick and Sharp Injuries
OIIR	Occupational Injury and Illness Rate
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration, USA
OSHAC	Occupational Safety and Health Awareness Campaign
PPE	Personal Protective Equipment
SIPE	School Insurance Programs for Employer
SOCSO	Social Security Organization
UNAIDS	United Nations Program on HIV/AIDS
UNICED	Conference on Environment and Development
UTAR	Universiti Tunku Abdul Rahman
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background Study

The field of medicine has evolved from an art to modern science with perpetual advanced technological developments for nearly two centuries. Although it brings myriad of challenges, newer clinical investigation are now readily accessible for treating physicians and surgeons. Hence, there is an augmenting need for qualified and trained medical laboratory personnel to perform these tests in various medical laboratories.

Medical laboratories in Malaysia house various levels of staffs ranging from consultant clinical pathologist, scientific officers, Medical laboratory Technologist (MLT), laboratory assistants and other administrative staffs forming one of the largest subgroups in the human workforce. As the nature of their work is diverse, these staffs are often exposed to various occupational hazards and risks associated with the material they employ and the methods they deploy in the course of their work. These hazards are commonly biological, chemical, physical, mechanical, and electrical, psychological and fire in nature (Jegathesan, Chin and Lim, 1988).

Staff in medical laboratories are continuously exposed to variety of infectious agents most common being *Mycobacterium tuberculosis, Salmonella typhi, Brucella spp*, and serum hepatitis virus (Singh, 2009). On the other hand, the physical and chemical hazards include toxic chemicals, needle stick injuries,

lacerations skin diseases and possibly cancer associated with chronic radiological wave exposure. As an example, Exposure to formaldehyde was found to be one of the common chemical hazards in medical laboratory, especially in histopathology laboratory. Formaldehyde is a well-known carcinogen, which can cause nasopharyngeal carcinoma and leukemia (Tang, et al., 2009). However, there are no significant occurrences recorded among medical laboratory personnel thus far.

Another common incident reported by health care professionals is needle stick injuries. Even though the incident rate among laboratory personnel is low, serious effective and efficient preventive health and safety surveillance assimilated with stringent codes of laboratory practice should be in place in order to curb the spread of Risk group IV (high individual and community risk) infections such HIV, Hepatitis B and Hepatitis C. Studies have shown that 100,000 needle stick injuries are being reported in United Kingdom and 500,000 in Germany annually (Rampal, Zakariah, Sook and Zain, 2010). In addition, in recent years ergonomic hazards were found to be one of the major threats to pathologists and cytotechnologists. George (2010) states that prolonged microscopic work without break and poor physical posture during screening is highly associated with musculoskeletal diseases among pathologists and cytotechnologist

Concisely, worldwide, 340 million occupational accident cases and 160 million occupational related diseases are reported annually (International Labour Organization, 2011). Statistical study carried out by Social Security

Organization (SOCSO) shows that occupational accidents at workplaces in Malaysia have increased by 4 per cent from 57,639 cases in 2008 to 59,897 cases in 2009 (Rampal, Zakariah, Sook and Zain, 2010). Further narrow research by Anuar, Zahedi, Kadir and Mokhtar (2008a) has found that occupational accident cases in Hospital Kuala Lumpur, Hospital Universiti Kebangsaan Malaysia and Pusat Perubatan Universiti Malaya in Klang Valley showed an increasing pattern from the year 2001 to 2005. Therefore, the growth of health care services and facilities should emphasize the need for internationally agreed standards of safe working practices and most importantly in creating safety awareness among health care professional to follow strict work conduct and ethos.

1.2 Problem Statement

In Malaysia, a significant increase in laboratory accidents and mishaps due to the lack of awareness and knowledge in Occupational Safety and Health (OSH) was found to be major contributor for current problem (Anuar, Zahedi, Kadir and Mokhtar, 2008b; Karim and Chee, 2000) . Previous studies mainly focused on specific issues such as needle stick injuries (Alamgir, Cvitkovich, Astrakianakis, Yu and Yassi, 2008), universal precaution (Izegbu, Amole and Ajayi, 2006) and laboratory-acquired infections (Anuar, Zahedi, Kadir and Mokhtar, 2008a) but less emphasized on issues such as awareness, knowledge and practice on OSH as well as hazard management. Furthermore, there is no extended research done on the post-measurement of awareness and knowledge of OSH among medical laboratory personnel after mitigation action was taken.

Besides that, the currently available OSH Act 1994 in Malaysia does not provide specific protection to medical laboratory personnel (Laxman and Soehod, 2007). Thus, awareness and knowledge in OSH is mandatory to prevent accidents and mishaps among medical laboratory personnel.

1.3 Scope of the Study

Awareness, knowledge and practice in OSH are the key elements of this study. The measurement involved all medical laboratory personnel regardless of their educational qualification, expertise, experience, age and ethnicity.

1.4 Objectives

1) To investigate the knowledge, attitude and practice (KAP) level on OSH among different levels of medical laboratory personnel.
2) To inculcate the importance of health and safety among medical laboratory personnel through health campaigns and safety talks.
3) To compare the KAP level on OSH among medical laboratory personnel before and after the intervention.

CHAPTER 2

LITERATURE REVIEW

2.1 Legislation and OSH Act in Malaysia

OSH Act in Malaysia has established various safety guidelines and policies ensuring employee's wellbeing and welfare to be taken care of at all times. The department of Safety and Health (DOSH) which report to Ministry of Human Resources is responsible in enacting and implementing legislation of OSH (Ibrahim, Muhammad Noor, Nasirun and Ahmad, 2012). Seven safety and health regulations under OSHA 1994 Act have been enforced by DOSH thus far. They are:

1. Employers' Safety and Health General Policy Statements (Exception) Regulations, 1995.
2. Control of Industrial Major Accident Hazards Regulations, 1996
3. Classification, Packaging and Labelling of Hazardous Chemicals Regulations, 1997.
4. Safety and Health Committee Regulations, 1996.
5. Safety and Health Officer Regulations, 1997.
6. Use and Standards of Exposure of Chemicals Hazardous to Health Regulations, 2000.
7. Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease Regulations, 2004 (Laxman and Soehod, 2007).

2.1.1 History of OSH Legislation in Malaysia

Prior to 1914, three enactments on OSH have been on the Federal Machinery Enactment 1913 enforced in Malaysia. They were Selangor Boiler Enactment 1892, Perak Boiler Enactment 1903 and Pahang Boiler Enactment 1908. In 1914, these enactments have changed to Federal Machinery Enactment 1913. The enactment's scope was extended from boiler operation to all types of machinery operations and manual handling. However, in 1953, the Federal Machinery Enactment 1913 has changed to Machinery Ordinance, 1953 and later evolved to become the Factories and Machinery Act, 1967 with additional coverage for factories, environment and human workforce. Finally, in 1997, the Malaysian Parliament proposed and implemented Occupational Safety and Health Act 1994, which serves all sectors (Arrifin, Razman, Mohd Jahi, and Zainon, 2008).

2.1.2 Aim of OSH Act 1994 Legislation

The main objectives of this Act as stated in Section 4 are:

Section 4(a). To secure the safety, health and welfare of persons at work against risks to safety or health arising out of the activities of persons at work

Section 4(b).To protect persons at a place of work other than persons at work against risk to safety or health arising out of the activities of persons at work;

Section 4(c). To promote an occupational environment for persons at work which is adapted to their physiological and psychological needs?

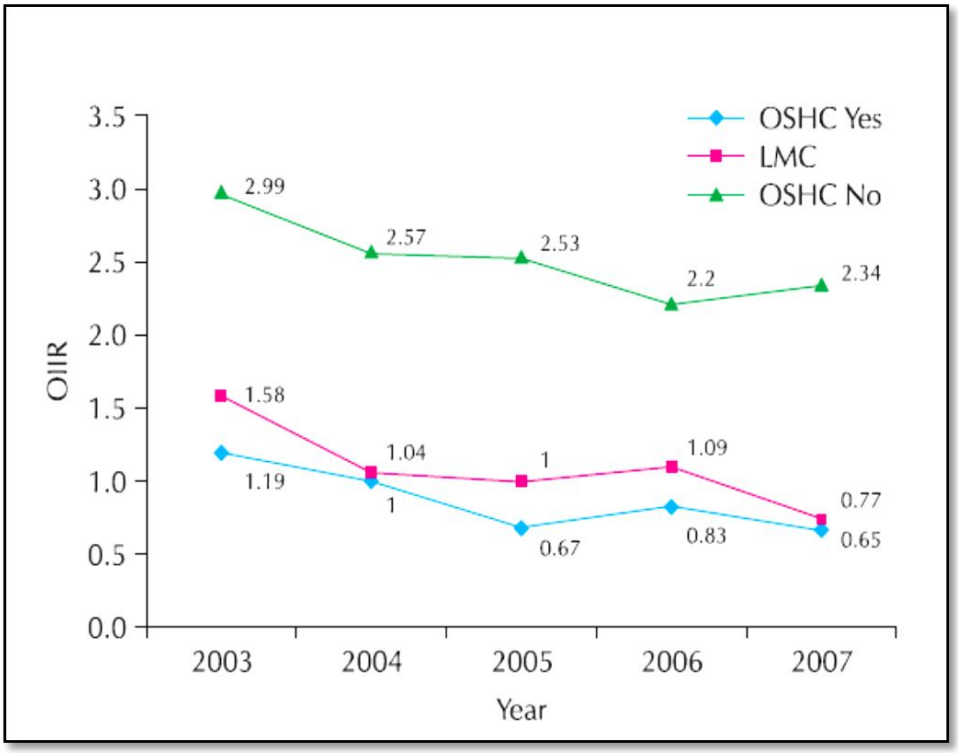
Section 4(d). To provide the means whereby the associated occupational safety and health legislation maybe progressively replaced by a system of regulations and approved industry codes of practices operating in combination with the provisions of the Act designed to maintain or improve the standards of safety and health. (Laxman and Soehod, 2007).

2.2 Health and Safety Committee (HSC) at Workplace

HSC plays pivotal role in managing occupational safety and health activities. Employers are required to collaborate with employees in order to inculcate conducive safety culture within the organization (Cameron, Hare, Duff, and Maloney, 2006). Feedbacks from employees cannot be assessed by the employer without any mediators. Some organizations use workers union as mediator. However, HSC operates effectively and efficiently to gather feedback from employees and continuously increase the knowledge and awareness of Occupational Safety and Health among employees (Wood, 2010). According to OSH Act 1994, an employer or an organization which consists of more than 40 workers is mandated to form HSC following the guidelines of Safety and Health Committee Regulations, 1996 (Laxman and Soehod, 2007). HSC often consists of representatives from employees and management from every unit or department.

According to Kwan, Hm, and Jiyun (2011), workplaces with Labor Management Council (LMC) showed lower accident rate compared with those without one. Moreover, as shown in Figure 2.1, Occupational Injury and Illness

Rate (OIIR) was found to be lesser in organizations with HSC compared to those without one. However, Kristensen (2011) reported that integration between safety organization, safety councils and employee became ineffective unless employees were given opportunity to provide input in the safety council.



OIIR: Occupational injury and illness rate, OSHC: Occupational Safety and Health Committee, LMC: Labor Management Council

Figure 2.1: Comparison between organizations, which has OSHC and LMC with organizations, which do not have OSHC, and LMC (Kwan, Hm and Jiyun, 2007)

2.3 Laboratory -Acquired Infections and Disorders at Medical Laboratory

2.3.1 Tuberculosis

Tuberculosis caused by *Mycobacterium tuberculosis* and the bacterium can be isolated from clinical specimens such as tissue, sputum, stool and other body fluids (Gestal, 1987; Sewel, 1995). Study by Sewel (1995) showed that prevalence of contracting tuberculosis among laboratory personnel is estimated to be 3-9 times higher than in personnel in other vocation. In 2004, 24 cases of tuberculosis were reported in 11 general Hospitals of Malaysia (Tan and Kamarulzaman, 2006). Figure 2.2 below shows pulmonary related occupational diseases, which show an overall increasing trend.

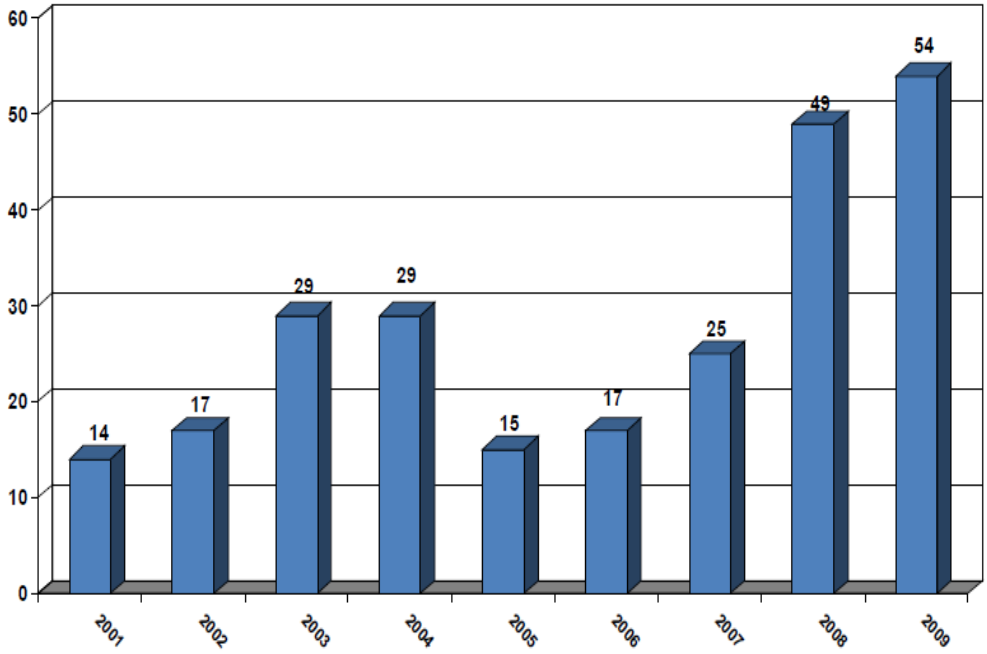


Figure 2.2: Pulmonary related Occupational diseases in Malaysia reported from 2001-2009 (DOSH, 2013a)

Inappropriate and unsafe way of handling pathology specimens generates aerosol, which increases the risk of getting tuberculosis. Harrington (1982) and Gestal (1987) reported that unsafe centrifugation technique increases the risk of self-inoculating tuberculosis. The incidences of tuberculosis among medical laboratory technicians who assisted the pathologists performing autopsies are remarkably higher compared to those who did not (Sugita, Tsutsumi, Suchi, Kasuga, and Ishiko, 2008). However, the occurrence of occupational tuberculosis is difficult to conclude as laboratory acquired infection as it also carries potential outside exposure (Singh, 2009).

Most of the laboratory acquired tuberculosis calamities or manifestation which involves laboratory occurs during Acid Fast Bacilli smearing and staining (Sugita, Tsutsumi, Suchi, Kasuga, and Ishiko, 2008). Thus, these mishaps can be prevented by using proper personal protection equipment (PPE) and the biosafety cabinet class II (as shown in Figure 2.3) to eliminate the aerosols from contaminating specimens, provide an aseptic working environment and serves as a infection control measure (Contained Air Solutions, 2007).

Figure 2.3: Biosafety Cabinet Class II (Contained Air Solutions, 2007)

2.3.2 Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV)

The World Health Organization (WHO) has estimated that approximately 2000 million people have been infected by HBV and that roughly 350 million of these groups are chronically infected (Aspinal, Hawkins, Fraser, Hutchinson, and Goldberg, 2011). The HBV, a double-stranded DNA virus of the hepadnaviridae family causes infection of the liver called Hepatitis B. To date, the Hepatitis virus can be sub-divided into eight genotypes (A-H) and have shown distinct geographical distribution whereby the genotype B and C are prevalent in Asia. Epidemiological studies have indicated that HBV genotype may influence disease progression, with genotypes A and B having better prognosis than C and D (Takkenberg, Weegink, Zaaijer, and Reesink, 2009).

HBV exposure was found to be the highest occupational exposure risk among healthcare workers and laboratory personnel (Gestal 1987; Anuar, Zahedi, Kadir, and Mokhtar, 2009).

The incidence of HCV infections were estimated at less than 0.1% in the UK (Mutimer et al., 1995), 1.8% in USA (McQuillan, Alter, Moyer, Lambert, and Margolis, 1996) and 3% worldwide (Anon, 1999) with higher incidence rate reported in the regions of Africa (Nishioka, 1994). Although the fundamentals of HCV transmission have been established in 20-30% of cases, no mode of transmission can be determined (Coojeevaram, 1999). HBV and HCV infections can lead to severe liver cirrhosis, hepatocellular carcinoma and death. Harrington (1982) recorded that, the outbreak of the HBV is highly associated with haemodialysis units and clinical chemistry laboratories, and self-inoculation was found to be the usual route of infection among laboratory workers.

2.3.3 HBV Vaccination as Prevention Strategy

Through the National Hepatitis B Immunization Program by Malaysian government in 1989, many healthcare workers were immunized for HBV. However, recent study has shown that significant number of workers have failed to receive complete three doses as shown in Table 2.1. Those workers who received all three scheduled doses were considered to be successfully vaccinated (Hesham, Ilina, Zamberi, Tajunisha, and Ariza, 2005). Post vaccination anti-HBs testing were compulsory to all HCW who are high risk

for blood-contaminated body fluid exposure (Beltrami, Williams, Shapiro and Chamberland, 2000).

Table 2.1: HBV Immunization Status among Healthcare Workers in Two Kuala Lumpur Hospitals (Hesham, Ilina, Zamberi, Tajunisha, and Ariza, 2005)

	HKL hospital staff	HUKM hospital staff	Student nurses	Other students	Total
Number	241	153	60	171	625
Taken vaccine	**177 (73.4)**	**139 (90.8)**	**60 (100)**	**138 (80.7)**	**514 (82.2)**
One dose only	14 (7.9)	5 (3.6)	0 (0)	13 (9.4)	32 (6.2)
2 doses only	17 (9.6)	19 (13.7)	24 (40.0)	16 (11.6)	76 (14.8)
Completed	119 (67.2)	112 (80.6)	31 (51.7)	103 (74.6)	365 (71.0)
Unsure	27 (15.3)	3 (2.2)	5 (8.3)	6 (4.3)	41 (8.0)
Last dose taken					
≤ 5 years	43 (24.3)	81 (58.3)	17 (28.3)	109 (79.0)	250 (48.6)
≥ 6 years	61 (34.5)	10 (7.2)	0 (0.0)	5 (3.6)	76 (14.8)
Unsure	73 (41.2)	48 (34.5)	43 (71.7)	24 (17.4)	188 (36.6)
Never taken vaccine	**64 (26.6)**	**14 (9.2)**	**0 (0.0)**	**33 (19.3)**	**111 (17.8)**
Anti-HBs test done	**67 (27.8)**	**50 (32.7)**	**9 (15.0)**	**12 (7.0)**	**138 (22.1)**
≥ 10 mIU/ml	22 (32.8)	23 (46.0)	3 (33.3)	8 (66.7)	56 (40.6)
< 10 mIU/ml	6 (9.0)	3 (6.0)	0 (0.0)	1 (8.3)	10 (7.2)
Unsure	39 (58.2)	24 (48.0)	6 (66.7)	3 (25.0)	72 (52.2)
Not done	**174 (72.2)**	**103 (67.3)**	**51 (85.0)**	**159 (93.0)**	**487 (77.9)**

* figures in parenthesis denote percentage.

2.3.4 Acquired Immuno Deficiency Syndrome (AIDS)

AIDS was found to be one of the diseases that increased the anxiety among healthcare workers. The latest statistics of the global HIV and AIDS epidemic published by United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO) in November 2011, showed that an estimation of 34 million people worldwide were living with HIV/AIDS in 2010. South and South-East Asian Regions reported third with 4 million people living with HIV/AIDS in the regional statistics after sub-Saharan African, North Africa and Middle East region (Korndoerfe, Vogelsang, Richards and Greywall, 2011).

Most of the laboratory or healthcare setting acquired AIDS cases were transmitted through needle sticks injuries (Gestal 1987; Anuar I. , Zahedi, Kadir, and Mokhtar, 2008; Rampal, Zakariah, Sook, and Zain, 2010). In United States, a total of 32 healthcare workers were infected with occupational acquired HIV infection from 1981-1992. Twenty-five percent of these health care workers were laboratory workers (Singh, 2009). In another study by Beltrami, Williams, Shapiro and Chamberland (2000), 55 HCW in United States reported to Centre for Disease Control and Prevention (CDC) for occupationally acquired HIV infection and out of 55 of them, 47 sustained percutaneous exposures, 5 mucocutaneous exposure and 2 by percutaneous and mucocutaneous exposures mode. Significantly, out of 55 infected people 19 were laboratory technicians.

2.3.5 Occupational Musculoskeletal Disorders

Musculoskeletal disorders (MSD) is an inflammatory and degenerative condition which effects the tendon, ligaments, joints, muscles and peripheral nerve (Punnett and Wegman, 2004). Carpal Tunnel Syndrome, Sciatica, Osteoarthritis, back and neck pain are the examples of MSD. Recent studies have show work duration, hours spent on microscope, fast workspace and poor ergonomic working conditions were highly associated with MSD among histology and cytology laboratory workers who have to do long hours of microscopic work (George, 2010).

Table 2.2 shows types of musculoskeletal pain observed among cytotechnologists. The importance of proper posture maintenance to eliminate MSD is shown in Figure 2.4.

Table 2.2: Survey of Cytotechnologists for Musculoskeletal Pain (George, 2010).

Survey of Cytotechnologists for Musculoskeletal Pain*

Anatomic Site	Respondents With Symptoms (%)
Any	85
Headache	54
Neck	55-60
Upper back	53
Lower back	57
Elbow	35
Wrist, left/right	37/55
Hands, left/right	38/48

Figure 2.4: The fixed eyepiece angle promotes excessive flexion on neck (A) and upper back (B) (George, 2010).

In Malaysia, occupational related MSDs keeping increasing thus requiring serious attention (as shown in Figure 2.5). The number of occupational related MSDs have increased exponentially in a fourteen year period from 1995 – 2009. In 1995, only five incidences of MSD cases were reported. However, in the year 2009, 161 cases of MSD reported which denotes 32-fold increase (DOSH, 2013b). Therefore it also can be inferred that incidence of MSD is inversely proportional to technological advancement and ergonomic design benefits.

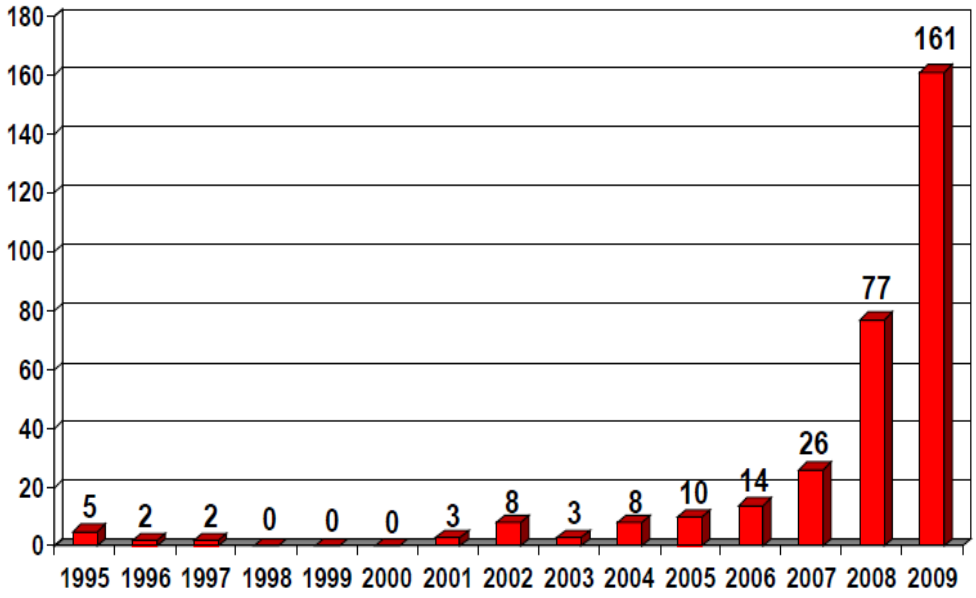


Figure 2.5: Musculoskeletal Disorders reported in Malaysia from 2009 (DOSH, 2013b)

Sharma and Golchha (2011) noted that work related MSD among Indian dentists not only affected the efficiency of the work, but also a major contributor for health related retirement. The study also revealed that 55% of health retirement was associated with occupational MSD.

2.4 Health and Safety Management System (HSMS)

2.4.1 Relationship of Hazard and Risk

Hazards are elements, which could pose a threat to life, health, property and environment. The elements could be from any objects such as machines, chemicals and environment. Risk is about the probability that someone gets harmed by the hazard (WorkSafe, 2013). Hazards and risks perceiveness behavior evolved through physiological and genetical predisposition factors. They are also viewed as socially or culturally constructed (Espiner, 1999). In the study by Makin and Winder (2008), work culture that discourage or overlook the incident reporting can increase the risk of occupational hazard. The relationship between hazard and risk (as shown in Figure 2.6) varies according to workplace factors (WorkSmart, 2012).

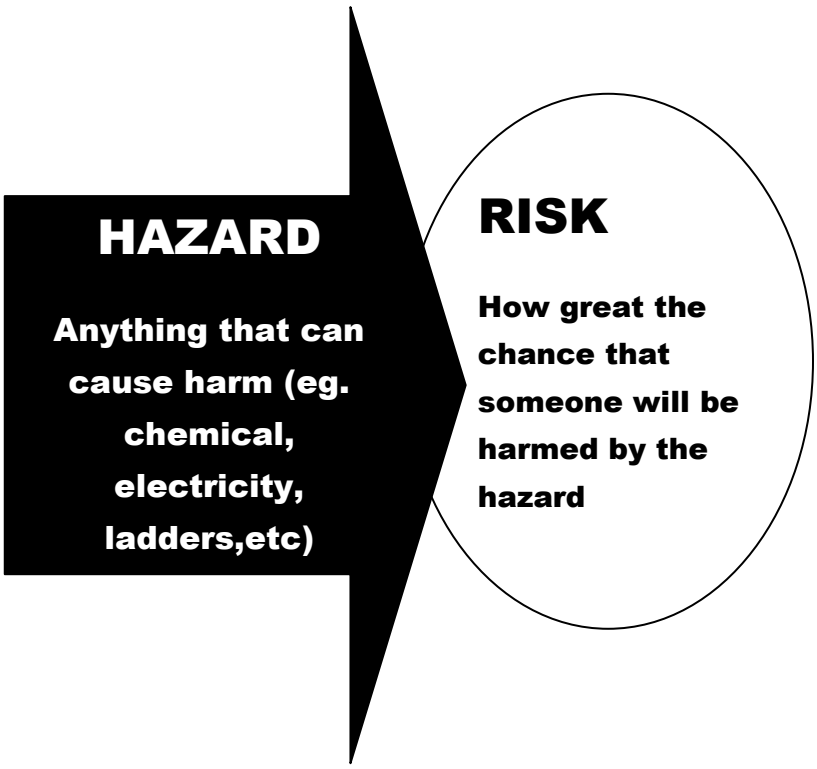


Figure 2.6: Relationships between Hazard and Risk (WorkSmart, 2012)

2.4.2 Hazard and Risk Management

Hazards and risks are difficult to be eliminated, but both elements can be managed and controlled effectively by HSMS as shown in Figure 2.7. Traditional method of controlling the hazard and risk provides five hierarchical options, elimination; substitution; isolation; administrative control and finally PPE (Makin and Winder, 2008). The safe person, safe place and safe system strategies indicate the corners where hazards and risks arise and the smart measures to control them. Safe person strategy represents the interaction of people with objects, chemicals or people that can cause biological, physical and psychological hazards. Safe place strategy refers to working condition or operating environment such as biohazard and physical environment. Finally,

the safe system strategy signifies the safety policy of the organization including incident reporting and hazard management which are important to control the hazards and risks (Makin and Winder 2008).

Risk assessment and the hazard control are only effective and successful when handled in an organizational context. This is the situation where employer-employee commitment and cooperation works as an important health and safety implementation tool (Akpan, 2011; Hughes and Ferrett, 2011).

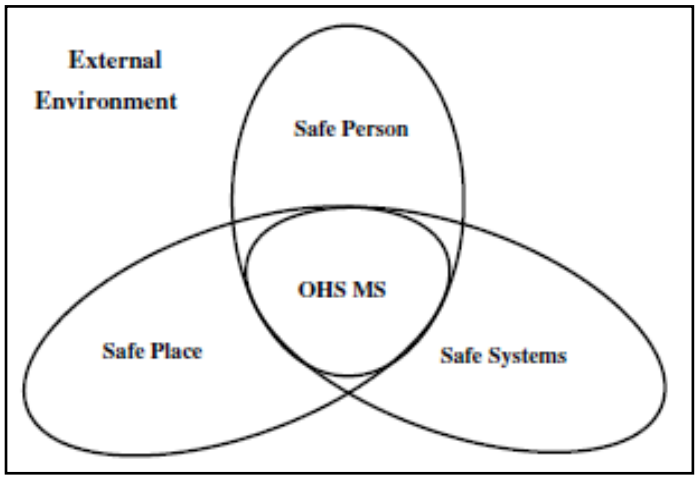


Figure 2.7: Strategies for dealing with complex hazards (Makin and Winder, 2008).

2.5 Knowledge, Attitude and Practice (KAP) of OSH

2.5.1 Statistics of Accidents

As the numbers of medical laboratories in Malaysia are increasing annually with the establishments of modern infrastructures and facilities, many statistical studies were conducted on the accidents and infections to analyze its etiology in a health care setting. The statistical analysis on the incident rate of injury and illness can be used as a benchmark to evaluate the safety performance among medical laboratories in Malaysia (Anuar, Zahedi, Kadir and Mokhtar, 2008a) (Figure 2.8 and Figure 2.9).

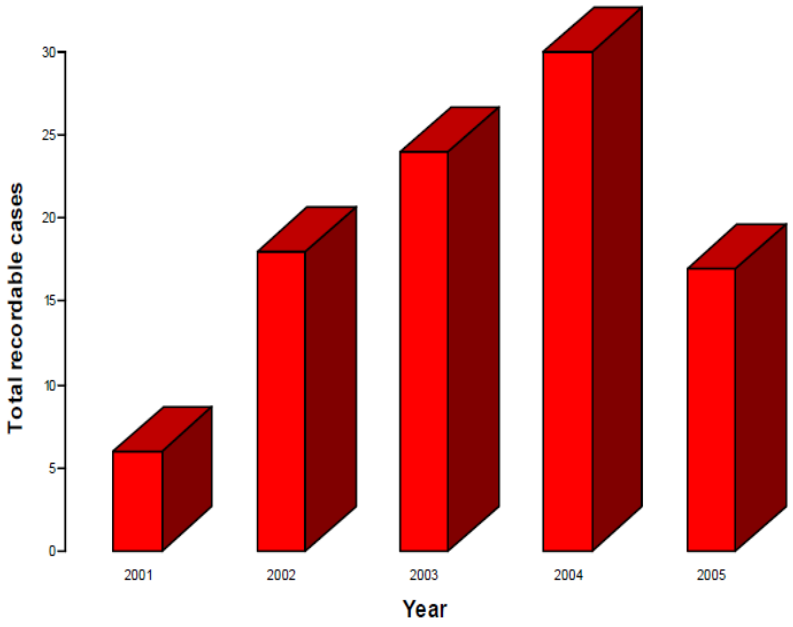


Figure 2.8: The total recordable accident cases in medical laboratories (HKL, HUKM & PPUM) (Anuar, Zahedi, Kadir, and Mokhtar, 2008a).

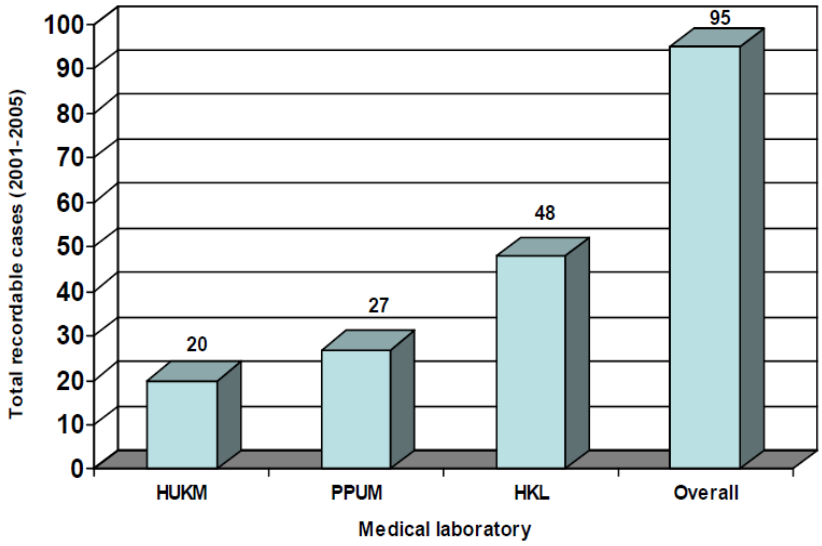


Figure 2.9: Percentage of occupational accidents by medical laboratories (Anuar, Zahedi, Kadir, and Mokhtar, 2008a).

2.5.2 Attitude and Knowledge

Many studies have focused on the factors that contribute to accidents and mishaps at work place. According to the study carried out by Karim and Chee (2000), most of the mishaps were due to carelessness, attitude and education level of staff, discipline and willingness to comply with the regulation towards work. Poor attitude was found to be the major source for such incidents (Goswami, Soni, S.M.Patel, and M.K.Patel, 2011). However, there were no measurements on attitudes or awareness carried out during post-implementation of these actions.

2.5.3 Socio- demography factors

Study showed that the risk perception among personnel in medical laboratory is highly influenced by socio-demography factors such as race, education level, job position and the space in the laboratory unit (Izegbu, Amole, and Ajayi, 2006; Anuar, Zahedi, Kadir, and Mokhtar, 2009). It was noted that the level of education and position among the personnel impose greater effect on the OSH knowledge compared to the differing age group and types of laboratory (Onibokun, Akinboro, Adejumo and Olowokere, 2012). Employer with high er education level perceived lower level of risk (Anuar, Zahedi, Kadir, and Mokhtar, 2009).

2.5.4 Gap between Knowledge and Practice

Besides attitude and demography factors, knowledge and proper practices also influence OSH measurements. One of the frequently occurring incidents due to improper practice is needle stick and sharp injuries (NSSIs). This results in increased spread of diseases like HIV, Hepatitis B and Hepatitis C. Therefore, it has concluded that a huge gap exists between the level of knowledge and working practice among health care professionals despite majority understanding the universal precaution guidelines (Izegbu, Amole and Ajayi, 2006; Rampal, Zakariah, Sook, and Zain, 2010). Hence, it was suggested that the use of highly compliance safety –engineered device would be beneficial and effective in preventing NSSIs and other accidents (Hughes and Ferrett, 2011).

2.5.5 Interest and Commitment in OHS

Despite having a well-equipped laboratory with international standards and recognition, cooperation and understanding between individual and management is believed to be the key factors in promoting awareness and knowledge about OSH among medical laboratories personnel (Ibrahim, Muhammad Noor, Nasirun and Ahmad, 2012). A study by Jegathesan. Chin and Lim (1988) concluded that, interest and full commitment is vital in promoting health and safety awareness. Furthermore, written policies and documents must be explained clearly to the employees and hospital-wide safety inductions should be provided to all beginners by the appointed safety officer (Wood, 2010). It also mandated that a refresher safety course/training should take place every two or three years to ensure all employees are up-to-date with their health and safety knowledge on hazard identification, risk management and safety measures at the work place (Hughes and Ferrett, 2011).

CHAPTER 3

METHODOLOGY

3.1 Sampling Technique

3.1.1 Sample Area

The survey was conducted at the Pathology Department of Hospital Raja Permaisuri Bainun, Ipoh (HRPB). The pathology department of HRPB consists of laboratories such as Biochemistry, Haematology, Histopathology, Cytology, Microbiology and Administration Office.

3.2 Target Population and Sample Size

The respondents of this study consists of clinical pathologists, scientific officers, medical officers, MLTs, laboratory attendants and other administrative staffs. The study involved staffs from all units in the pathology department. The population size of this study was 160 staffs, however only 120 staffs responded. Trainees and third party staffs were excluded from this study.

3.3 Ethical Approval and Permission

This study has been reviewed and approved by University Tunku Abdul Rahman (UTAR) Scientific and Ethical Review Committee (Appendix A) and has been registered in the National Medical Research Registry (NMRR). Approval was also obtained from the Ethical and Research Committee of

Ministry of Health, Malaysia (MOH) (Appendix B), Director of the HRPB and Head of Pathology department of HRBP (Appendix C).

3.4 Development of Questionnaire

Thirty-two (32) questions (Appendix D) based on knowledge, attitude and practice of OSH were designed and pre-tested among ten (10) MLTs in Hospital Tuanku Ja'afar Seremban. After analyzing the feedbacks, enhancement and rectification were carried out to improve the questionnaire for the target study population.

3.5 Methodology

A cross sectional survey was conducted between November 2012 and January 2013 among medical laboratory personnel at HRPB. The respondents signed consent form, and the confidentiality and anonymity of study participants were maintained at all-time pre, and post study. Prior to the survey, importance of the study and the Do's and Don'ts was clearly explained to all respondents. Every question was explained clearly face-to-face to all respondents, especially to medical laboratory attendants who were facing difficulties in understanding them.

3.5.1 Data Collection Tool

The questionnaire was adopted from Schools Insurance Programs for Employees (SIPE) and redesigned to suits the context of the study. The questionnaire was designed in dual language, English and Bahasa Melayu and comprised of five sections. The patterns of questions consists of pre-determined scale, True or False, Yes or No and matching correct answer (refer Appendix A)

3.5.1.1 Section A: Respondent's Background Information

All questions in this section were demographic elements such as designation, department/unit they belonged to, educational qualification, experience, age, gender and ethnicity. Respondents only need to tick √ in the box ☐ prepared.

3.5.1.2 Section B: Personal Protective Equipment (PPE)

In this section, awareness and practice in using PPE were tested. Five statements with pre-determined scales such as strongly agree, agree, disagree, neither disagree nor agree and strongly disagree were assigned to each questions. Six questions were allocated for this section.

3.5.1.3 Section C: Employer-Employee Responsibility towards OSH

This section consists of 14 questions to evaluate the cooperation and responsibilities between employer and employee towards OSH. This section

deliberately shows to what extend both parties were concerned and cared about OSH and their perception towards OSH.

3.5.1.4 Section D: Functions of Health and Safety Committee (HSC)

According to Section 30 of the OSH Act (1994), every employer should establish a safety and health committee if there are a total number of 40 or more employees at their work place. Four questions in this section assess the participation in HSC and perception about HSC among all respondents.

3.5.1.5 Section E: OSH knowledge and Hazard Symbol Identification

In this section, seven OSH knowledge based on 'True' or 'False' questions were asked. The questions required respondents' knowledge of OSH Act and basic issues about hazards. Besides that, eight hazard symbols, which are related to biomedical field, were asked to be matched with the correct answer.

3.5.2 OSH Awareness Campaign (OSHAC)

The OSHAC has been designed to increase the KAP among medical laboratory personnel and it functions as an intervention tool for the current study. The results of cross sectional survey were used as guidelines to design and develop the OSHAC. Hazard recognition, OSH Regulations and HSC issues were identified and emphasized more during the OSHAC. OSHAC has been successfully coordinated and conducted with the cooperation of HSC of

Pathology Department of HRPB. Photographs which were taken during OSHAC attached through Appendix E.

3.5.2.1 Development and Design of OSHAC

Prior to the OSHAC development, the researchers have had few official meetings with HSC members of the department. First meeting was held on 14 January 2013 and the second meeting was on 21 January 2013. During the first meeting, all issues such as design, theme, budget and other related issues to OSHAC were discussed. The date of OSHAC was finalized to be on 30 January 2013 until 1 February 2013 (three days). The theme of OSHAC decided consensually by all HSC members to be slogan as ***"Adakah Anda Selamat?"*** (Are you Safe?).

3.5.2.2 OSHAC Structure and Promotion

The HSC members requested the OSHAC to be simple and effective. Thus, only three events were mainly focused in this campaign. They were OSH Poster Exhibition, Safety Talk and Video Presentation. To attract more staffs to participate in OSHAC, regular promotional strategies were activated, especially through intra-department flyers. Moreover, buntings (as shown in Figure 3.1) were designed and exhibited all over the department few days before the campaign.

Figure 3.1: Specially Designed Bunting for the OSHAC

3.5.2.3 Poster Exhibition

OSH related posters were obtained from Unit Keselamatan Pekerjaan dan Alam Sekitar (KPAS), Jabatan Kesihatan Negeri (JKN) Perak and KPAS, JKN Negeri Sembilan. The posters were chosen carefully to be on par with the objective of the campaign. Posters related to OSH Act and medical laboratory hazards exhibited redundantly in order to get more attention from audience as shown in Figure 3.2. Posters related to occupational diseases also given an equal importance in the exhibition. In addition, occupational related MSD was emphasized more. However, priority was given to hazards identification and risk management where these were the areas which showed lack of knowledge. Nevertheless, HSC members of 2013 of the department were recognized and the organization chart of HSC members was exhibited as shown in Figure 3.3.

Figure 3.2: Poster Exhibition during OSHAC

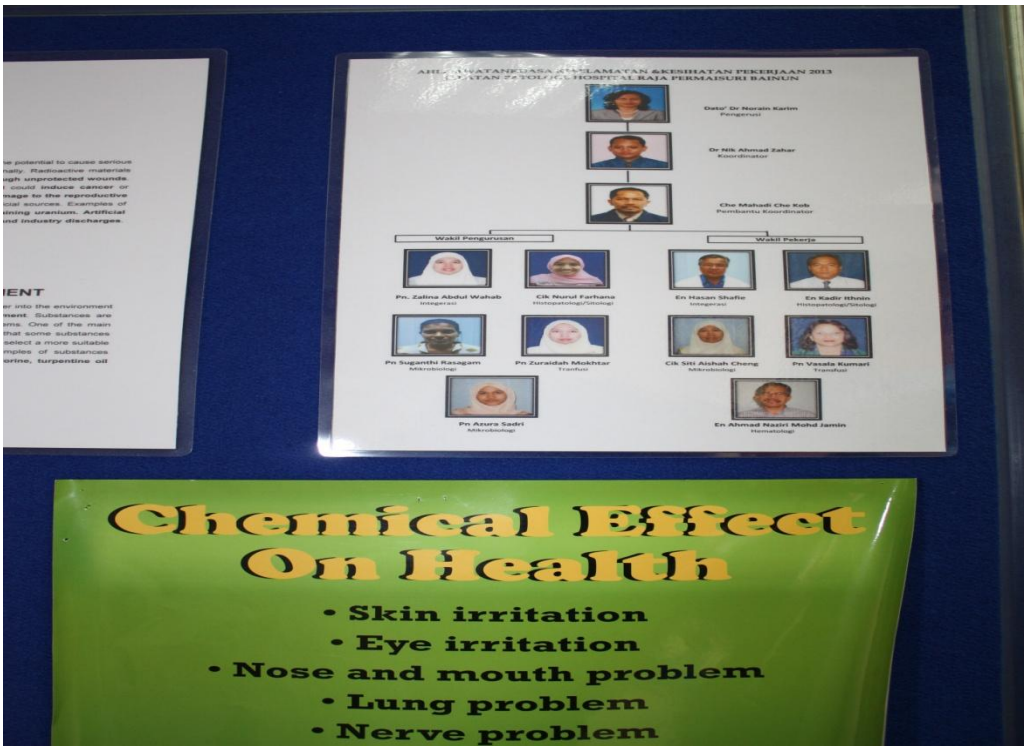


Figure 3.3: Organization Chart of HSC Members, Department of Pathology, HRPB

3.5.1.4 Safety Talk

The safety talk agenda focused three areas. They were hazard identification and risk management, importance of HSC and OSHA. The title of the talk was 'Introduction to Hazard Identification, Risk Assessment and Risk Control (HIRARC)'. The speaker was a qualified OSH medical officer who has vast experience in OSH issues (as shown in Figure 3.4). The speech took place for two hours.

Figure 3.4: Safety Talk by En. Azizul from JKN, Perak

3.5.1.5 Video Presentation

The videos were obtained from Unit Kawalan Infeksi, HRPB and five videos were carefully chosen for the presentation slot. They were:

1. Safety elements in Medical Laboratory (20 minutes)
2. Cleaning up a spill - Blood-borne pathogens (10.5 minutes)
3. Pipette safety and Ergonomic (9.5 minutes)
4. CDC hand washing method (10 minutes)
5. The workplace stress solution (6 minutes)

3.5.1.6 Impact Evaluation after OSHAC

Impact evaluation was conducted immediately after one week of the campaign. The same type of pre-campaign questionnaire were distributed to all staff members. Since majority of the staff were aware about the post campaign evaluation, no problem arose in obtaining consent. In total 120 samples before intervention and 125 samples after intervention were obtained from the survey but only 110 were chosen (those who participated in pre and post intervention survey only) to measure the impact of OSHAC.

3.6 Data Analysis and Interpretation of Result

Data obtained from the pre and post campaign survey were analyzed using IBM SPSS version 20 software. Prior to the analysis, all questions with pre-determined scales questions such as strongly agree, agree, disagree, neither disagree nor agree and strongly disagree which scored 5 to 1, were re-coded 0

to 1. Thus, the mean score for all questions fell between 0 and 1. Score between 0 to 0.49 categorized as poor KAP, 0.50 to 0.74 as moderate KAP and 0.75 to 1.0 as good KAP. The two windows of this software gave the Data View as seen in Figure 3.5 and variable view as seen in Figure 3.6. Descriptive statistic results were produced at the end of the analysis as shown in Figure 3.7. The statistic values produced for variables discussed using descriptive statistical tools. First, demographic characteristics elements were discussed using frequency and percentage. Secondly, variables, which show significant results in terms of high frequency value and low frequency value discussed and justified. Thirdly, Paired-t Test used to compare the Mean score before intervention (MSBI) and mean score after intervention (MSAI). Finally, the study concluded according to the outcome of the study.

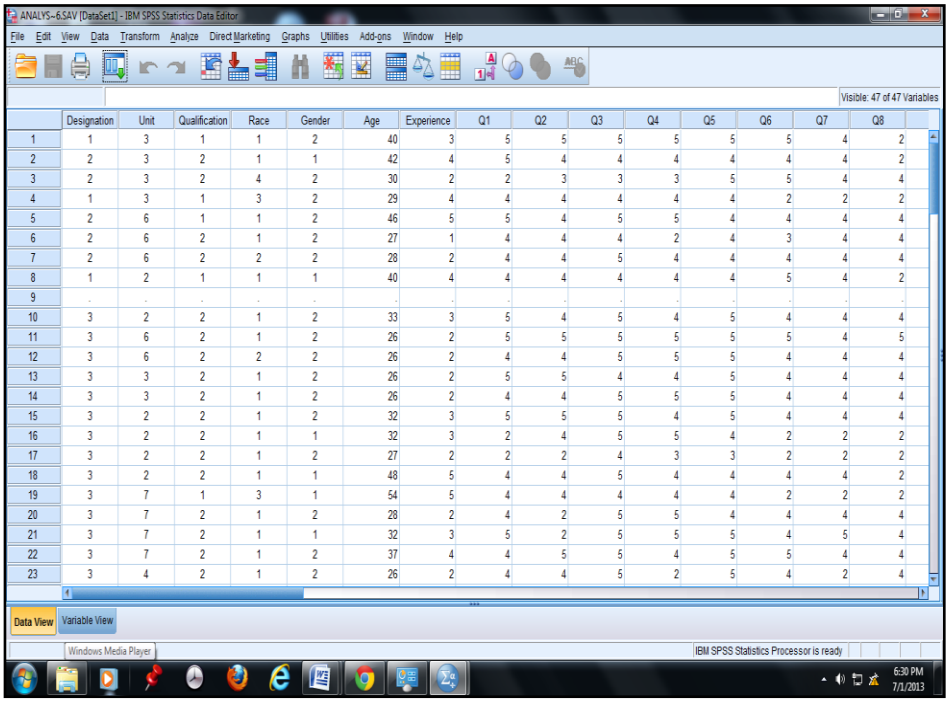


Figure 3.5: Data View of SPSS V.20.

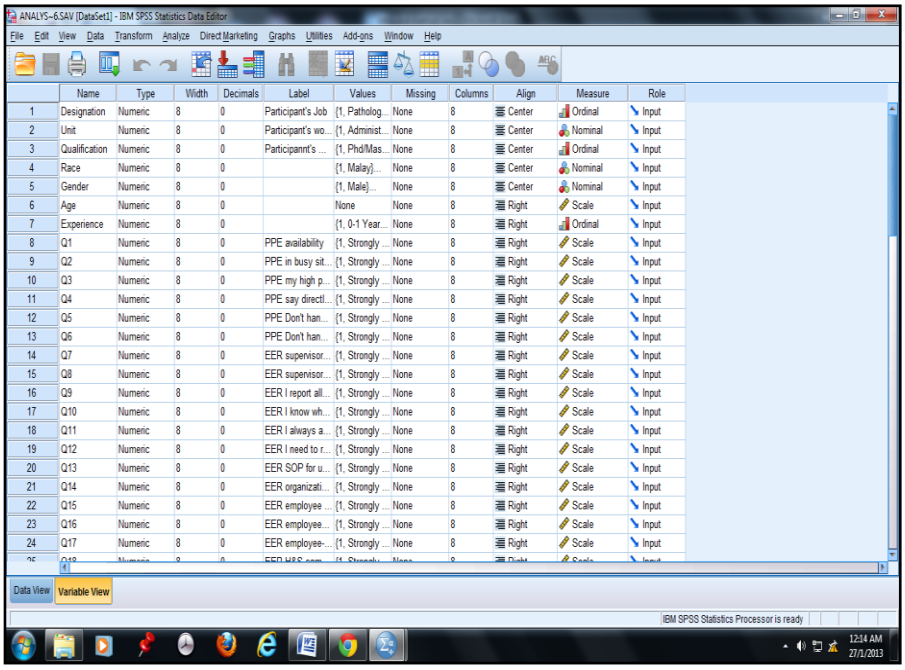


Figure 3.6: Variable View of SPSS V.20.

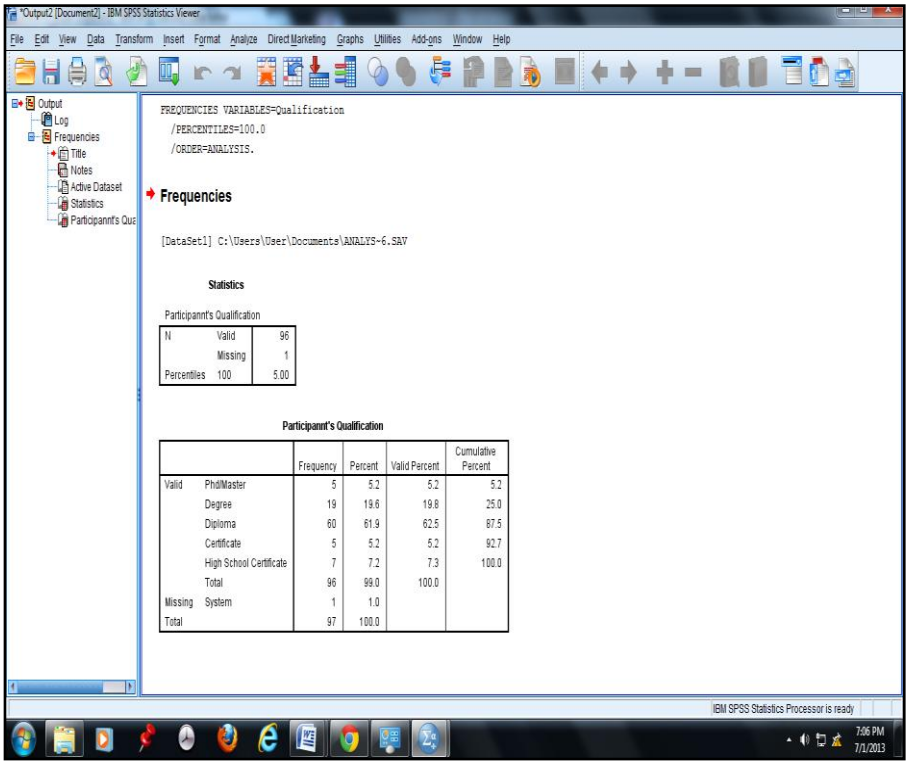


Figure 3.7: Analysis Output of SPSS V.20.

CHAPTER 4

RESULTS

4.1 Demographic Characteristics

A total of 110 respondents from 160 staffs had participated in this study with 68.7% response rate. However, around 8.3% from 120 respondents before the intervention and 12% from 125 respondents after intervention were excluded from the study. The dropouts were those respondents who did not participate in pre and post intervention survey as well as respondents who did not provide proper information in the survey form. Majority of the respondents were MLT (61.8%) with 73.5% of them were female and 26.4% were male followed by 12.7% of scientific officers, 7.3% laboratory attendants, 5.5% medical officers, 4.5% pathologists and administrative staffs and 3.6% of staff nurses.

The qualifications of respondents varies from High School Certificate to Master degree. Staffs with Master degree were 6.4% followed by 18.2% Bachelor degree, 61.8% Diploma, 6.4% certificate and 7.3% High School Certificate. In addition, this study identified that 70% of respondents were Malay followed by Chinese (13.6%), Indian (13.6%) and 2.7% belonged to other races. Respondents from biochemistry laboratory were found to be 22.7% followed by Transfusion and Microbiology laboratory (20%), Histopathology laboratory (16.4%), Cytology and Hematology laboratory (8.2%) each and 4.5% were Administrative Staffs'. Detailed demographic characteristics are as shown in Table 4.1 and Table 4.2.

Table 4.1: Demographic Characteristics of Respondents

Characteristics	Frequency	Percentage (%)
Age group		
20-29	39	35.5
30-39	39	35.5
40-49	15	13.6
50-59	17	15.4
Gender		
Female	78	70.9
Male	32	29.1
Race		
Malay	77	70.0
Chinese	15	13.6
Indian	15	13.6
Other	3	2.7
Designation		
Pathologist	5	4.5
Medical Officer	6	5.5
Scientific Officer	14	12.7
MLT	68	61.8
Staff Nurse	4	3.6
Administrative staff	5	4.5
Laboratory attendant	8	7.3

Table 4.2: Demographic Characteristics of Respondents (Cont'd)

Attachment of Respondents		
Biochemistry	25	22.7
Transfusion	22	20.0
Microbiology	22	20.0
Histopathology	18	16.4
Cytology	9	8.2
Hematology	9	8.2
Administration	5	4.5
Experience (Years)		
0-1 Years	12	10.9
1-5 Years	32	29.1
5-10 Years	23	20.9
10-15 Years	19	17.3
15 Years above	24	21.8

4.2 Knowledge on OSH

4.2.1 Knowledge on Patient's Sample

Table 4.3 clearly illustrates 92.7% respondents were aware that patient's sample may contain pathogenic microorganisms. The number increased to 95.5% after the intervention program. MSBI was equal to 0.933 and MSAI was equal to 0.953. Paired- t (109) was equal to -1.347, $p > 0.05$

Table 4.3: Knowledge on Patient's Sample.

Patient's sample may contain pathogenic microorganisms	Frequency Before Intervention	Percentage (%) Before Intervention	Frequency After Intervention	Percentage (%) After Intervention
True (Correct answer)	102	92.7	105	95.5
False (Wrong answer)	8	7.3	5	4.5
Total	110	100	110	100

4.2.2 Knowledge on Carcinogen Substance and Cancer

Table 4.4 below clearly shows that 90% of the respondents were aware that carcinogen can cause cancer. The percentage increased to 93.6% after intervention. MSBI was equal to 0.903 and MSAI was equal to 0.941. Paired- t (109) was equal to -2.028, $p < 0.05$.

Table 4.4: Knowledge on Carcinogen Substance.

Carcinogens are substance that can cause cancer	Frequency Before Intervention	Percentage (%) Before Intervention	Frequency After Intervention	Percentage (%) After Intervention
True (Correct answer)	99	90	103	93.6
False (Wrong answer)	11	10	7	6.4
Total	110	100	110	100

4.2.3 Knowledge on Existence of OSH Act 1994.

Study shows that 91% of the respondents aware about existence of OSH Act 1994 as shown in Figure 4.1. After the intervention the percentage of respondents who aware about this Act increased to 94%. MSBI and MSAI were 0.931 and 0.912 respectively. Paired t (109) equal to 1.421 and the $p>0.05$.

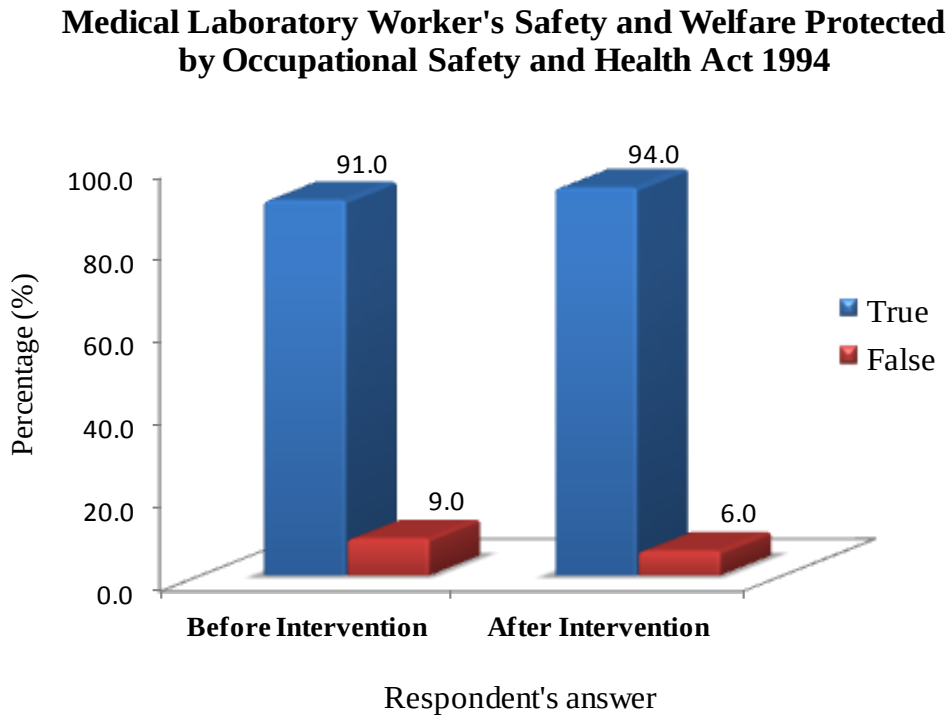


Figure 4.1: Knowledge on existence of Occupational Safety and Health Act 1994.

4.2.4 Knowledge on Non-Existence of Specific OSH Act in Malaysia

Even though the knowledge on existence of OSH Act 1994 among respondents was highly remarkable, but 67% of respondents were not aware about non-existence of specific OSH Act in Malaysia to protect medical laboratory staffs. Figure 4.2 below explained the data obtained. However, MSBI and MSAI were 0.331 and 0.442 respectively. Paired t (109) equal to -3.653 and $p < 0.05$.

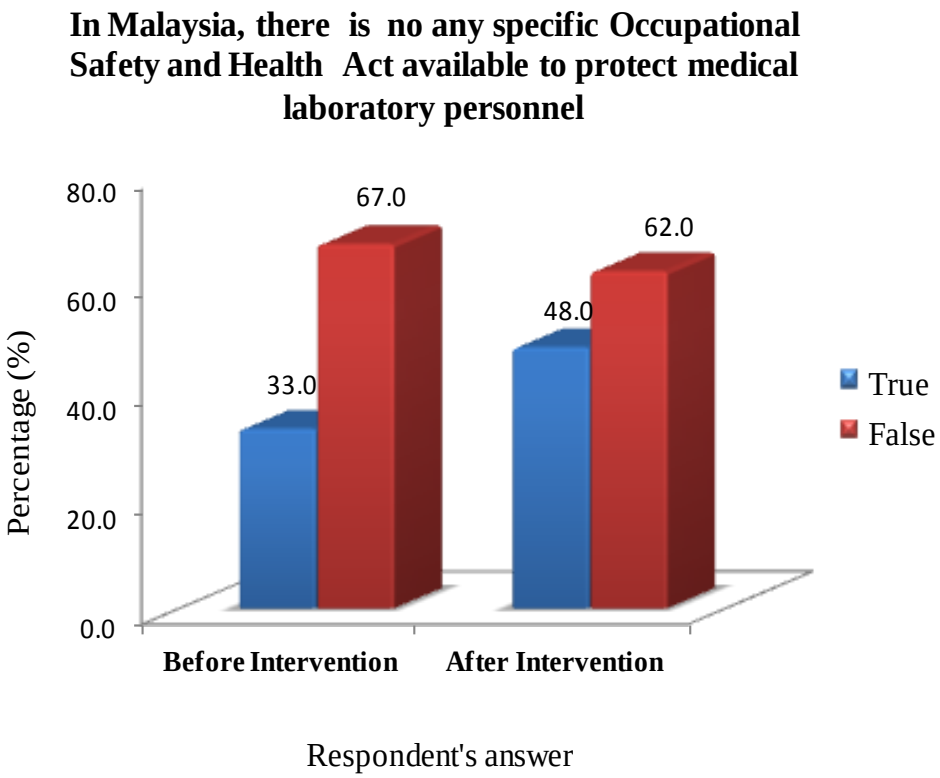


Figure 4.2: Knowledge on Non-Existence of Specific OSHA in Malaysia.

4.2.5 Knowledge on Oxidizing Hazard Symbol

Table 4.5 below clearly explains the impact of identification of the oxidation hazard symbol before and after the intervention. There were 68% respondents who managed to identify the oxidizing hazard symbol before the intervention and the number increased to 76% after intervention. MSBI was equal to 0.682 and MSAI equal to 0.761. Paired- t (109) was equal to -2.372, $p < 0.05$.

Table 4.5: Oxidizing Hazard Symbol Identification.

	Oxidizing Hazard Symbol Identification			
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Office (n=6)	5	4.5	5	4.5
Scientific Officer (n=14)	13	11.8	14	12.7
MLT (n=68)	47	42.7	51	46.4
Staff Nurse (n=4)	2	1.9	3	2.7
Laboratory Attendant (n=8)	0	0	3	2.7
Admin Staff (n=5)	3	2.7	3	2.7
Total	75	68	84	76

4.2.6 Knowledge on Biohazard Symbol

As shown in Table 4.6, 70% of the respondents were able to recognize the biohazard symbol before intervention and there was an increment of 13% totaling to 83% after intervention. MSBI was equal to 0.701 and MSAI was equal to 0.832. Paired- t (109) equal to -3.099, $p < 0.05$

Table 4.6: Biohazard Symbol Identification.

Biohazard Symbol Identification				
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Officer (n=6)	3	2.7	4	3.6
Scientific Officer (n=14)	10	9.1	10	9.1
MLT (n=68)	50	45.5	63	57.2
Staff Nurse (n=4)	3	2.7	2	1.8
Laboratory Attendant (n=8)	2	1.8	2	1.8
Admin Staff (n=5)	4	3.6	5	4.5
Total	77	**70**	91	**83**

4.2.7 Knowledge on Radioactive Hazard Symbol

Table 4.7 below clearly explains the impact of identification of the radioactive hazard symbol before and after intervention. There were 75% who managed to identify the radioactive hazard symbol before ntervention and the number increased to 86% after the intervention. MSBI was equal to 0.750 and MSAI was equal to 0.861. Paired- t (109) was equal to -2.626, $p < 0.05$.

Table 4.7: Radioactive Hazard Symbol Identification.

Radioactive Hazard Symbol Identification				
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Officer (n=6)	5	4.5	4	3.6
Scientific Officer (n=14)	11	10	11	10
MLT (n=68)	52	47.2	63	57.2
Staff Nurse (n=4)	3	2.7	2	1.8
Laboratory Attendant (n=8)	3	2.7	5	4.5
Admin Staff (n=5)	4	3.6	5	4.5
Total	83	**75**	95	**86**

4.2.8 Knowledge on Heated Surface Hazard Symbol

As shown in Table 4.8, 74% of the respondents were able to recognize the heated surface hazard symbol before intervention and there was only a small increment of 4% totaling to 74% after the intervention. MSBI was equal to 0.743 and MSAI was equal to 0.786. Paired- t (109) was equal to -1.516, $p > 0.05$.

Table 4.8: Heated Surface Hazard Symbol Identification.

	Heated Surface hazard Symbol Identification			
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Office (n=6)	5	4.5	5	4.5
Scientific Officer (n=14)	13	11.8	14	12.7
MLT (n=68)	53	48.2	52	47.2
Staff Nurse (n=4)	2	1.8	3	2.7
Laboratory Attendant (n=8)	0	0	4	3.6
Admin Staff (n=5)	3	2.7	3	2.7
Total	81	**74**	86	**78**

4.2.9 Knowledge on Explosive Hazard Symbol

As detailed in Table 4.9, 90% of the respondents managed to recognize the explosive hazard symbol before the intervention. There was only a small percentage of increment resulting in 95% respondents correctly identifying the explosive hazard after the intervention. MSBI was equal to 0.901 and MSAI was equal to 0.954. Paired- t (109) was equal to -1.516, $p > 0.05$.

Table 4.9: Explosive Hazard Symbol Identification.

Explosive Hazard Symbol Identification				
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Officer (n=6)	6	5.4	6	5.4
Scientific Officer (n=14)	14	13.0	14	13.0
MLT (n=68)	64	58.2	63	57.2
Staff Nurse (n=4)	4	3.6	4	3.6
Laboratory Attendant (n=8)	1	0.9	7	6.4
Admin Staff (n=5)	5	4.5	5	4.5
Total	99	**90**	104	**95**

4.2.10 Knowledge on Toxic Hazard Symbol

Table 4.10 below depicts the impact of identification of the toxic hazard symbol before and after the intervention. There were 87% of respondents who managed to identify the toxic hazard symbol before the intervention and the number increased to 96% after the intervention. MSBI was equal to 0.871 and MSAI was equal to 0.962. Paired- t (109) was equal to -3.302, $p < 0.05$.

Table 4.10: Toxic Hazard Symbol Identification.

Toxic Hazard Symbol Identification				
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Officer (n=6)	4	3.6	5	4.5
Scientific Officer (n=14)	12	11	14	13
MLT (n=68)	66	60	68	62
Staff Nurse (n=4)	4	3.6	4	3.6
Laboratory Attendant (n=8)	0	0	5	4.5
Admin Staff (n=5)	5	4.5	5	4.5
Total	96	**87**	106	**96**

4.2.11 Knowledge on Electric Hazard Symbol

As shown in Table 4.11, 92% of the respondents managed to recognize the electric hazard symbol correctly before intervention and there was a small increment of 6% totaling to 98% after the intervention. MSBI was equal to 0.923 and MSAI was equal to 0.981. Paired- t (109) equal to -2.372, $p < 0.05$

Table 4.11: Electric Hazard Symbol Identification.

Electric Hazard Symbol Identification				
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Officer (n=6)	6	5.4	6	5.4
Scientific Officer (n=14)	14	13	14	13
MLT (n=68)	67	61	67	61
Staff Nurse (n=4)	4	3.6	4	3.6
Laboratory Attendant (n=8)	0	0	7	6.4
Admin Staff (n=5)	5	4.5	5	4.5
Total	101	**92**	108	**98**

4.2.12 Knowledge on Corrosive Hazard Symbol

As detailed in Table 4.12, 91% of the respondents managed to recognize the corrosive hazard symbol before intervention. There was only a small percentage of increment resulting in 95% respondents correctly identifying the corrosive hazard after the intervention. MSBI was equal to 0.910 and MSAI was equal to 0.951. Paired- t (109) was equal to -1.913, $p > 0.05$.

Table 4.12: Corrosive Hazard Symbol Identification.

	Corrosive Hazard Symbol Identification			
n=110	**Correctly answered Before Intervention**		**Correctly answered After Intervention**	
	n	**%**	**n**	**%**
Pathologist (n=5)	5	4.5	5	4.5
Medical Officer (n=6)	6	5.4	6	5.4
Scientific Officer (n=14)	13	11.8	14	12.7
MLT (n=68)	67	60.9	66	60
Staff Nurse (n=4)	4	3.6	4	3.6
Laboratory Attendant (n=8)	0	0	5	4.5
Admin Staff (n=5)	5	4.5	5	4.5
Total	100	**91**	105	**95**

4.3 Attitude towards OSH

4.3.1 Prioritization on Safety and Health

From Table 4.13, it clearly portrays that 97.3% of respondents gave priority to safety and health while performing their daily work. No significant changes was noted on mean score after the intervention. MSBI was equal to 0.973 and MSAI equal to 0.982. Paired- t (109) equal to -1.000, $p > 0.05$

Table 4.13: Prioritization on Job Safety and Health.

Health and Safety is a high priority when I am performing my job	**Before Intervention**		**After Intervention**	
n=110	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	55	50	53	48.2
Agree	52	47.3	55	50
Neither agree/disagree	3	2.7	1	0.9
Disagree	0	0	1	0.9

4.3.2 Freedom of speech on Health and Safety Related Issues

Table 4.14 explains that only 63% of respondents believed that they have the freedom to voice out when they have concern about health and safety issue. The percentage only increased to 65% after the intervention. MSBI was equal to 0.636 and MSAI equal to 0.654. Paired- t (109) was equal to -0.576, $p > 0.05$.

Table 4.14: Freedom of Speech on Health and Safety Related Issues.

Employees are encourage to speak out when they have concerns about safety and health issue	**Before Intervention**		**After Intervention**	
n=110	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	17	15.5	18	16.4
Agree	53	48.2	54	49.1
Neither agree/disagree	8	7.3	13	11.8
Disagree	26	23.6	22	20
Strongly disagree	5	5.5	3	2.7

4.3.3 Stop Work Advice during Unsafe Act

Table 4.15 clearly explains that prior to the intervention 80.9% of respondents mentioned that they always advice those employees who commit unsafe practice. Not much of change was noted after intervention in term of mean score and p- value. MSBI was equal to 0.809 and MSAI was equal to 0.818. Paired- t (109) was equal to -0.446, $p > 0.05$

Table 4.15: Stop Work Advice during Unsafe Act.

If I saw another employee committing unsafe practice without PPE, I would say something directly to him or her n=110	Before Intervention		After Intervention	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	52	29.1	32	29.1
Agree	57	51.8	58	52.7
Neither agree/disagree	7	6.4	6	5.5
Disagree	11	10	12	10.9
Strongly disagree	3	2.7	2	1.8

4.3.4 Employees Protection from Workplace Hazards

Table 4.16 illustrates that only 65% of respondents believe that employer considered the employee as valuable assets who need to be protected from workplace hazard. Not much of changes noted in term of mean score after the intervention. MSBI was equal to 0.654 and MSAI was equal to 0.627. Paired- t (109) was equal to -1.135, $p > 0.05$.

Table 4.16: Respondent's Perception towards Employer in OSH.

My organization considers employees to be valuable assets who should be protected from workplace hazards. n=110	Before Intervention		After Intervention	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	25	22.7	31	28.2
Agree	47	42.7	38	34.5
Neither agree/disagree	15	13.6	18	16.4
Disagree	18	16.4	18	16.4
Strongly disagree	5	4.5	5	4.5

4.3.5 Recognition and Rewards for Employees Safe Act

From Table 4.17, it clearly describes that only 34.5% agree that employee were rewarded for working safely. Amazingly, there were 65.5% believed that employee were not rewarded or appreciated for working safely. Surprisingly, after intervention the number of respondents who against the statement increased significantly. MSBI was equal to 0.345 and MSAI was equal to 0.273. Paired- t (109) was equal to 2.595, $p < 0.05$.

Table 4.17: Recognition and Rewards for Employees Safe Act.

Employees are recognized and rewarded for working safely	**Before Intervention**		**After Intervention**	
n=110	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	16	14.5	9	8.2
Agree	22	20	21	19.1
Neither agree/disagree	15	13.6	24	21.8
Disagree	43	39.1	41	37.3
Strongly disagree	14	12.7	15	13.6

4.3.6 Effectiveness of Health and Safety Campaign

Table 4.18 below explains the results on effectiveness of health and safety campaign in promoting and educating workers on health and safety measures. There were more than half of the respondents, 52.7% who strongly agreed and almost another half, 46.4% agreed on the implication of health and safety campaign in promoting safety among the employees. However, there was only 0.9% of the respondent disagreed on the statement. No significant differences noted after intervention program. MSBI was equal to 0.991 and MSAI was equal to 1.000. Paired- t (109) was equal to -1.000, $p > 0.05$.

Table 4.18: Effectiveness of Health and Safety Campaign.

Health and safety campaign is an effective way to promote and educate workers n=110	**Before Intervention**		**After Intervention**	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	58	52.7	44	60
Agree	51	46.4	66	40
Neither agree/disagree	1	0.9	-	-

4.3.7 Acceptance and Consideration on Workers Opinion

Table 4.19 shows huge number of respondents (98.2%) wanted their opinion to be considered by HSC in order to protect the wellbeing of workers. Since majority of respondents supported the statement, there was not much impact noted after intervention. MSBI was equal to 0.982 and MSAI was equal to 0.973. Paired- t (109) was equal to 1.000, $p > 0.05$.

Table 4.19: Acceptance and Consideration on Workers Opinion.

In order to be an active and effective body, HSC should accept and consider workers opinion	**Before Intervention**		**After Intervention**	
n=110	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	33	30	43	39.1
Agree	75	68.2	64	58.2
Neither agree/disagree	1	0.9	2	1.8
Disagree	1	0.9	1	0.9

4.3.8 Employee-Management Cooperation in Safety Programs

Table 4.20 shows majority of respondents (91.8%) believed that the employee - management cooperation is critical in transforming safety programs into successful events. After the intervention, the figure has increased to 95.4% and significant changes were noted. MSBI was equal to 0.918 and MSAI was equal to 0.954. Paired- t (109) was equal to -2.028, $p < 0.05$.

Table 4.20: Employee-Management Cooperation in OSH.

For a safety program to be succeed, employee-management participation and support is critical	Before Intervention		After Intervention	
n=110	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly agree	44	40	41	37.3
Agree	57	51.8	64	58.2
Neither agree/disagree	3	2.7	2	1.8
Disagree	6	5.5	3	2.7

4.4 Practice on OSH

4.4.1 Practice on PPE usage

Figure 4.3 below depicts the percentage of respondents towards the usage of PPE where 82.7% of the respondents did not handle patient's sample without wearing glove. After the intervention the percentage increased to 84%. Mean scores before and after intervention were 0.827 and 0.845 respectively. Paired t (109) was equal to -1.421 and the p-value >0.05.

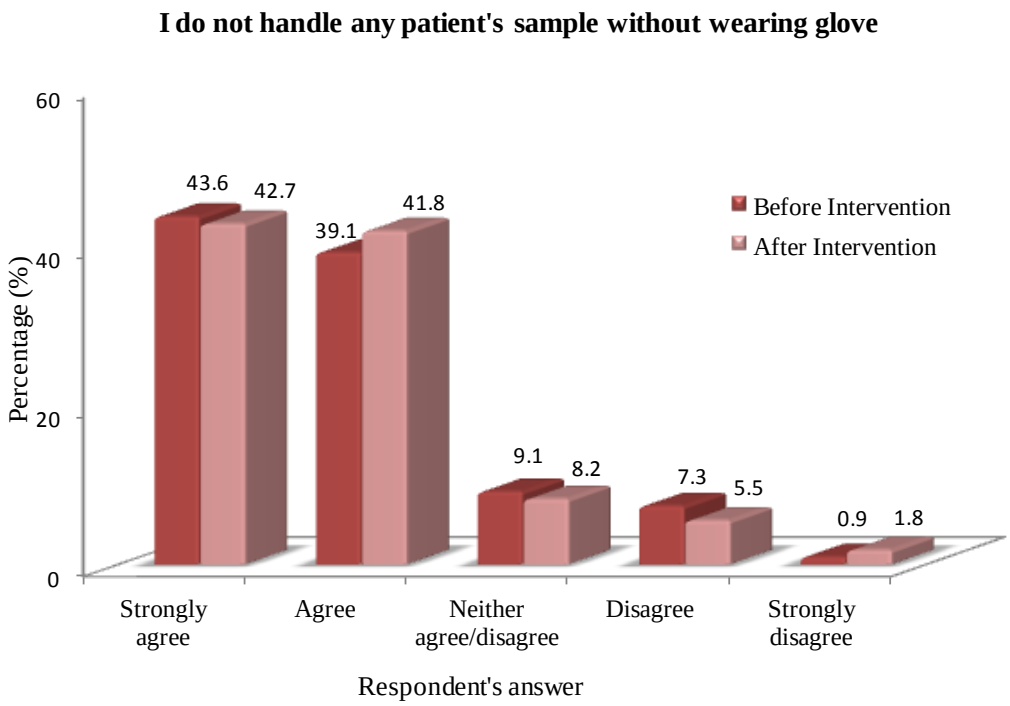


Figure 4.3: Practice on PPE usage.

4.4.2 Practice on MSDS

Figure 4.4 below shows that 77.2 % of respondents have the practice of referring to MSDS prior to handling any chemicals. Surprisingly, the percentage has dropped to 73% after the intervention. Mean scores before and after intervention were 0.773 and 0.736 respectively. Paired t (109) was equal to -1.421 and the p-value <0.05.

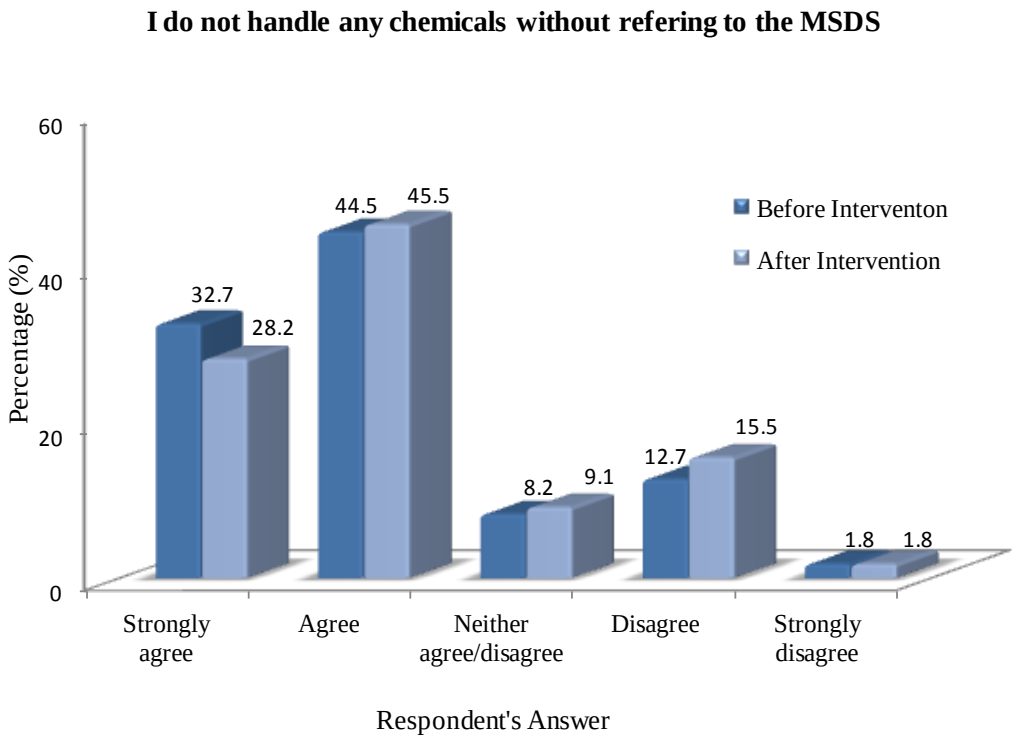


Figure 4.4: Practice on MSDS.

4.4.3 Emergency Contact Person

Figure 4.5 shows that 70% knoew who to contact at time of emergency in the absence of a superior or safety officer before intervention and the number increased to 81.8% after intervention. Mean scores before and after intervention were 0.709 and 0.836 respectively. Paired t (109) was equal to -3.696 and the p-value <0.05.

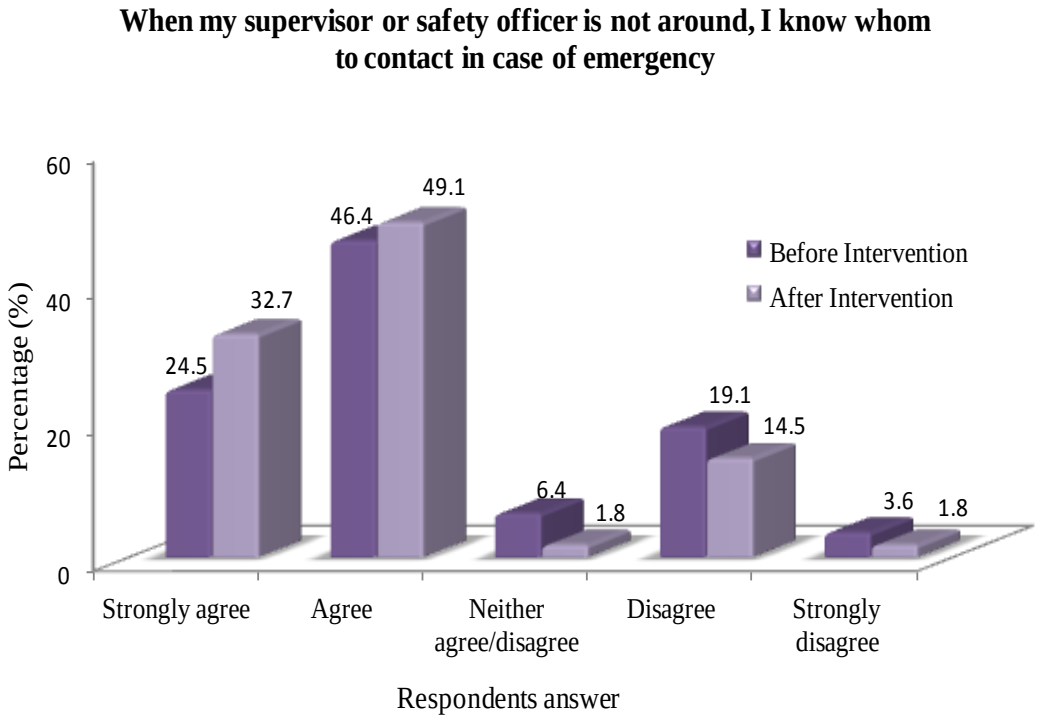


Figure 4.5: Emergency Contact Person.

4.4.4 Practice on Incident Reporting

Figure 4.6 below illustrates that 70.9% showed a positive response towards the practice of incidence reporting before intervention and the percentage increased to 80.9% after intervention. Mean scores before and after intervention were 0.736 and 0.809 respectively. Paired t (109) was equal to -2.174 and the p-value <0.05.

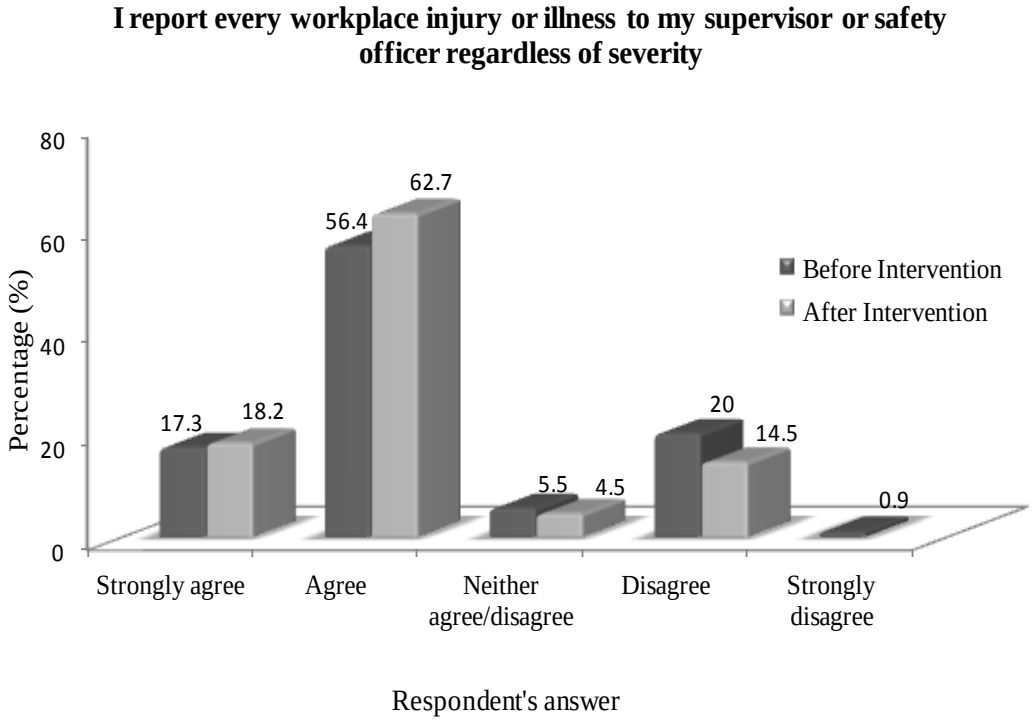


Figure 4.6: Practice on Incident Reporting.

4.4.5 Participation in Activities Conducted by HSC

From Figure 4.7, before the intervention, 72.7% preferred to be involved in activities conducted by HSC and after the intervention; the percentage dropped to 71.8%. Mean scores before and after intervention were 0.727 and 0.718 respectively. Paired t (109) was equal to 0.228 and the p-value >0.05.

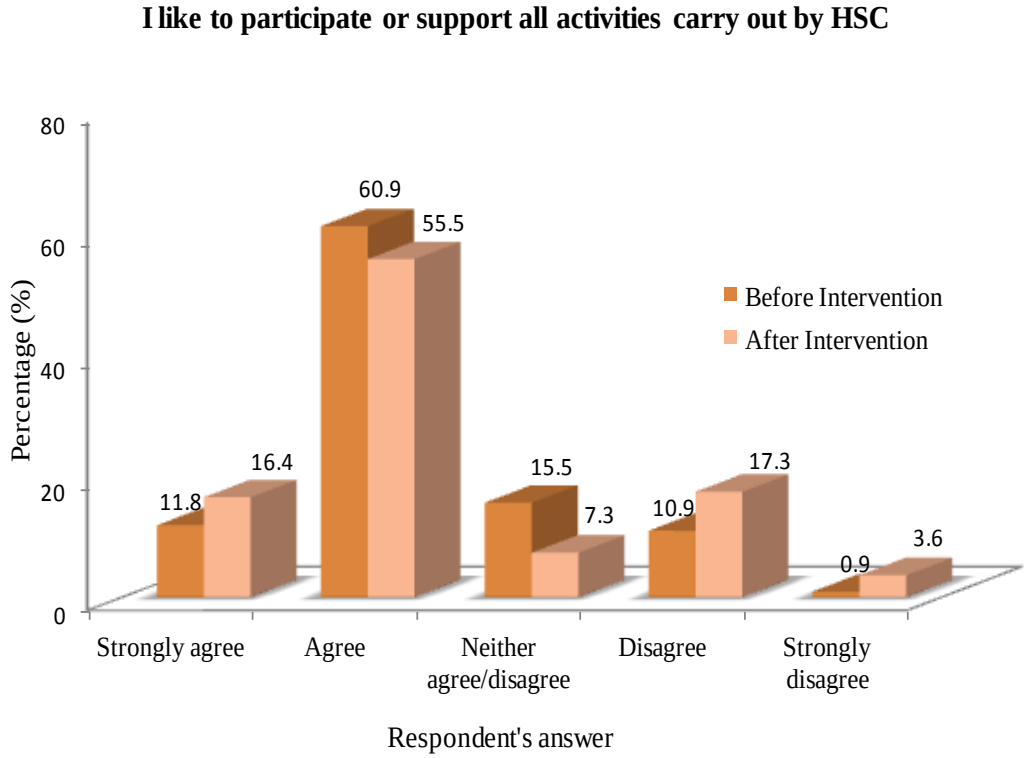


Figure 4.7: Participation in Activities Conducted by HSC.

4.4.6 Participation in Health and Safety Campaign/Course

From Figure 4.8, before the intervention, 71.8% of the respondents had recorded the highest number for agreeing to take part in health and safety campaign or courses conducted by the department, and the percentage increased to 73.6% after intervention. Mean scores before and after intervention were 0.718 and 0.736 respectively. Paired t (109) was equal to -0.815 and the p-value >0.05.

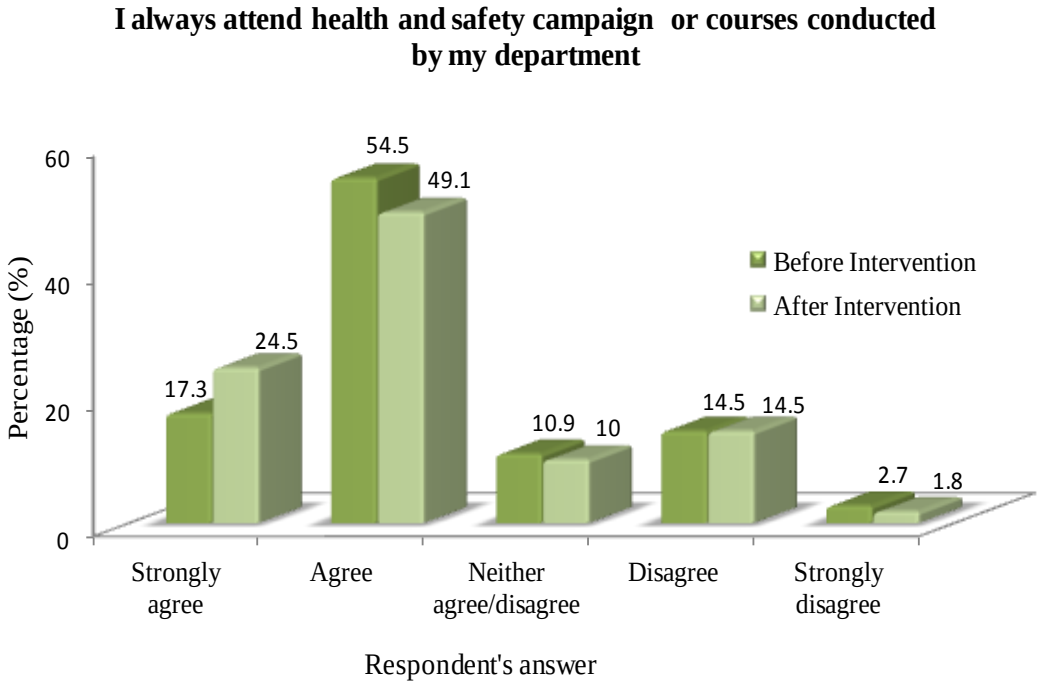


Figure 4.8: Participation in Health and Safety Campaign/Course.

4.4.7 Safety Audit

From Figure 4.9, before the intervention, 47.3% agreed that the HSC in their department conducted regular safety audit and the percentage dropped to 35.5% after intervention. Mean scores before and after intervention were 0.472 and 0.355 respectively. Paired t (109) was equal to 3.822 and the p-value <0.05.

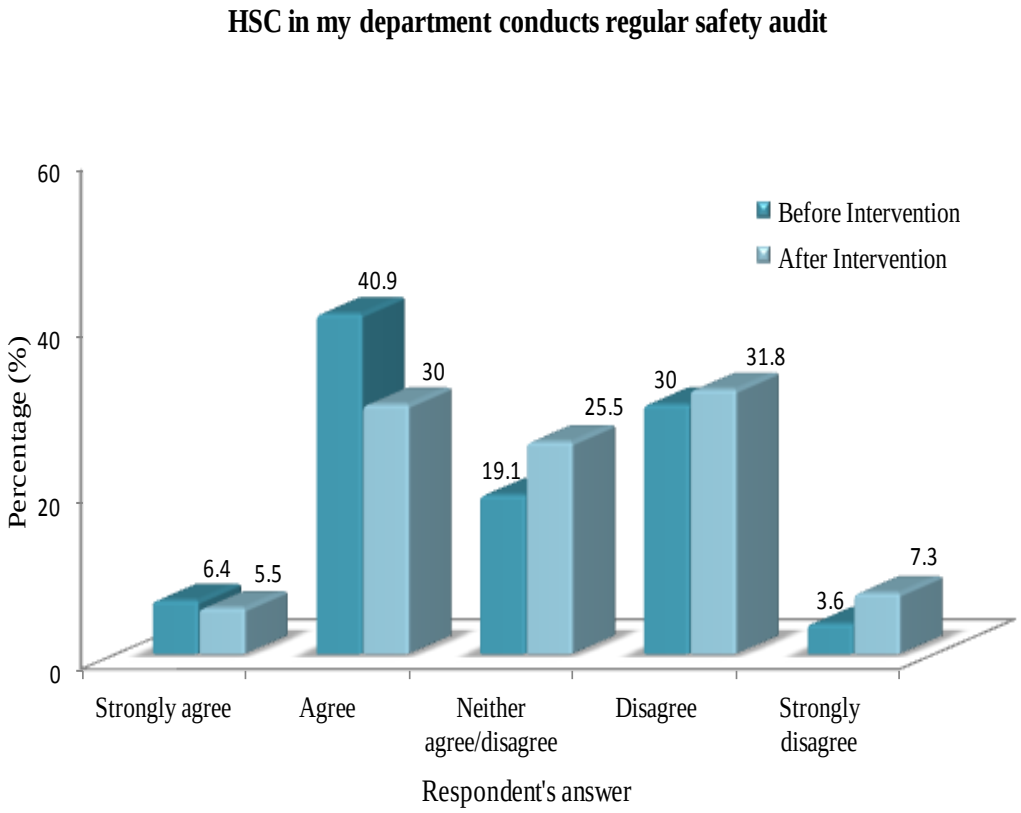


Figure 4.9: Participation in Regular Safety Audit.

4.5 Impact of OSHAC

From Table 4.20, it is clearly shown that only the knowledge among the respondents had significantly increased after the intervention. However, there were no significant differences encountered in attitude. Similarly, practice showed only a slight increase after the intervention but not statistically significant.

	Mean Score/SD Before Intervention	Mean Score/SD After Intervention	t-value	df	p-value
Knowledge on OSH (GOOD)	0.796 (0.198)	0.859 (0.126)	-5.29	109	0.000
Attitude on OSH (GOOD)	0.788 (0.156)	0.785 (0.140)	0.43	109	0.670
Practice on OSH (MODERATE)	0.703 (0.237)	0.724 (0.200)	-1.56	109	0.121

Table 4.21: Impact of OSHAC

p-value < 0.05

CHAPTER 5

DISCUSSION

5.1 Awareness on Existence of Pathogen in Patient's Sample

Knowledge on pathogenic condition of patient's sample is critical because most of the mishaps are due to lack of knowledge in the particular field. According to universal precaution, a guideline from CDC, all blood sample and body fluids of any patients is considered potentially infectious for HIV, HBV and other blood borne pathogens (Izegbu, Amole and Ajayi, 2006). Thus, precaution needs to be taken prior to handling any types of samples regardless of patient's health status. Current study showed 92.7% were aware of patient's sample may contain pathogenic microorganisms indicating that majority respondents have good knowledge in universal precaution. In contrast, study by Izegbu, Amole and Ajayi (2006) showed that only 28% from their 154 respondents aware about universal precaution and the KAP of biological hazard prevention were noticed to be poor. In addition, study by Lugah, et al. (2010) noted that 62.7% of respondents were found to be aware of the importance of PPE usage when handling patient's sample. Even though the mean score of knowledge on existence of pathogen in patient's sample increased from 0.93 to 0.95 after intervention, the result was statistically not significant.

5.1.1 Awareness on Carcinogenic and Cancer

Carcinogenic substances are cancer causative agents. Therefore, awareness of their property is vital in order to prevent exposure. Paraffin wax pellets, which are widely used in Histopathology laboratory caused bladder tumor among mice (Ball, Field, Roe and Walters, 2008) as how formalin caused cancer (Tang, et al., 2009). Current study shows 90% were aware that carcinogenic substances are causative agent for cancer. After the intervention, a significant increment in mean score from 0.90 to 0.94 was noted with significance level of $p<0.05$. In contrast, Chatzis et al. (2004) concluded that only 6.6% from 482 male respondents were aware of occupational exposure of carcinogenic substances.

5.1.2 Awareness on Existence of OSH Act 1994 and Non-Existence of Specific Act as Protective Remedy

OSH Act 1994 requires management to provide safe workplace and safe system. The organizations that implemented safety regulations as recommended by OSH Act 1994 prove to be better and safer place to work for employees (Ibrahim, Muhammad Noor, Nasirun and Ahmad, 2012). However, poor awareness about OSHA 1994 remained exist among employees of healthcare sectors in Malaysia (Lugah, et al., 2010). A contrast result obtained in current study whereby 91% were aware of the existence of OSH Act 1994 and the figure has increased to 94% after intervention without statistical significance. However, 67% of respondents were not aware that there is no any specific Act in Malaysia to protect medical laboratory personnel except OSHA

1994 which only provides general protection to all sectors. MSAI has increased from 0.33 to 0.44 with p-value < 0.05. However, the outcome concluded as poor knowledge on non-existence of specific Act to protect medical laboratory personnel.

5.1.3 Oxidizing and Heated Surface Hazard Symbol Identification

Current study has revealed significant findings in hazard symbol identification especially oxidizing hazard symbol where only 68% successfully identify the hazard correctly. Seventy-four percent respondents managed to identify the heated surface hazard symbol. Study revealed that none of the laboratory attendants (n=8) managed to identify both hazards. Interview and direct observation by researcher showed there was confusion, which existed in identification of oxidizing hazard and heated surface hazard among respondents. Even though lack of knowledge and exposure was found to be the main reason for this problem, some hidden underlying causes such as simplicity of hazard symbol and color need to be further investigated. Consequently, employees who undergo rotation after servicing within the department for more than 6 months might encounter danger if the continuous education does not exists (Hughes and Ferrett, 2011). For example, cytology work process does not involve usage of hydrogen peroxide but in Histopathology, it is a routinely used chemical. Consequently, workers who are not aware or overlook the oxidizing hazard may face serious injury. To avoid this, refresher training is important to keep workers updated on the knowledge and protocol of work system (comcare, 2005).

5.1.4 Biohazard Symbol Identification

Even though 70% of the respondents managed to identify the biohazard symbol, the awareness in biohazard symbol needs serious attention. Significantly, failure rate in identifying the biohazard symbol was fairly noticeable from the lower category staffs to higher category staffs except pathologists. Four scientific officers (n=14) and three medical officers (n=6) failed to identify the biohazard symbol. Performance of laboratory attendants was also found to be poor in identifying biohazard symbol where only two from eight laboratory attendants correctly identified the hazard. Biohazard is the top most and frequently exposed hazard by healthcare workers regardless of job designation. The consequences of not knowing and understanding the biohazard can lead to many types of infections especially the notorious HIV, HBV and *Mycobacterium tuberculosis* which are difficult to be differentiated from normal exposure (Harrington, 1982; Beltrami, Williams, Shapiro and Chamberland, 2000; Singh, 2009). Centrifugation of blood sample prior to the analysis is found to be routine work of laboratory attendants in HRPB and failure to understand the biohazard alarming a serious exposure to tuberculosis infection as noted by Harrington (1982) and Gestal (1987). Although 73% of MLTs manage to identify the biohazard symbol, serious attention is needed as these category of workers have high exposure probability compared to other category workers due to their job nature.

5.1.5 Globally Harmonized System

Globally Harmonized System (GHS) is an approach by the United Nation to improve the old Hazard Communication System into new classification where the chemical hazards are categorized into health, physical and environment hazards. International mandate from the United Nations Conference on Environment and Development (UNCED) 1992 Agenda 21, Chapter 19 says *"A globally harmonized hazard classification and compatible labeling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000."* (OSHA, 2012). According to the GHS, the new hazard symbol system must include three labeling elements which are the, symbol (pictogram), signal word and hazard statement, compared to old hazard symbol which does not provide such elements as shown in Figure 5.1 (OSHA, 2012). OSHA (2012) also noted that this new system is estimated to prevent 43 fatalities and 585 injuries and illnesses annually in the United States. DOSH of Malaysia has developed Malaysian Standard (MS 1804:2008) on GHS and the implementation were to take place early 2013 to improve the safety system (Ministry of International Trade and Industry, 2012).

New GHS Hazard Labeling System	Old Hazard Labeling System
Flame (**Signal Word**)	
 **Pictogram**	
Self- Heating/ Emits Flammable Gas **(Hazard Statement)**	

Figure 5.1: Comparison between New Hazard labeling System (Left) and Old Hazard labeling System (Right) (OSHA, 2012).

5.2 Prioritization on Safety and Health

Attitude on job safety priority originated from risk-taking behavior of workers (Scott, 2005). However, the safety culture and safety climate of an organization highly dominate such behavior (Sokas, Jorgensen, Nickels, Gao and Gittleman, 2009). This study showed 97% of respondents gave high priority to safety and health when performing their job, similar to the result of Onibokun, Akinboro, Adejumo and Olowokere (2012), But in this study, direct observation showed that such behavior was absent in few essential circumstances.

5.2.1 Freedom of Speech on OSH

Successful safety culture is only possible if the management and the employee considered each other's opinion. Freedom of speech among respondents in this study was in moderate level where, only 67% of them were noted that they were given opportunity to voice out safety issues. In another corner, 98% of respondents in this study wanted their opinion to be accepted by the HSC to improve the safety programs. Study by Onibokun, Akinboro, Adejumo and Olowokere (2012), said that 84% of respondents did not encounter any difficulty in discussing safety issues with senior staffs and supervisors. Previous study revealed that the management should create opportunities to allow workers the chance to contribute ideas and opinion in safety and health issue in order to develop a sense of belonging and commitment (Cameron, Hare, Duff and Maloney, 2006; Akpan, 2011).

5.2.2 Stop Work Advice during Unsafe Act

To build up a steady safety culture, full commitment from employees regardless of designation, gender or age is essential (Jegathesan, Chin and Lim, 1988). Therefore, employee who is concerned about safety should not remain quiet if he or she saw another employee committing unsafe practice. In this study, 80% of respondents said that they will voice out on unsafe practice by other employee. Previous study by Onibokun, Akinboro, Adejumo and Olowokere (2012) noted that 60% of respondents believed working with colleagues who were not aware about universal precaution puts them in danger.

5.2.3 Respondent's Perception towards Employer on OSH

This study showed that 65% of the respondents believed that the employer valued them as an important asset who should be protected from occupational hazards. Respondent's perception towards employer on OSH plays an important role in motivating the employee towards better safety practice (Akpan, 2011). This perception can also be a good indicator to illustrate to what extend the employer value the employee and protect them from workplace hazards. Study by Onibokun, Akinboro, Adejumo and Olowokere (2012) showed that 89.4% of respondents perceive that management really care about their safety at workplace. OSH Management System only succeeds if the value of its contribution directed towards workers through consultation and culture of trust (Makin and Winder 2008). Self- Ownership of health and safety among workers favored them to be more proactive in safety and health activities (Wood, 2010).

5.2.4 Can Rewards and Incentives Boost the OSH Practice?

Rewards are motivating factors for human being to enhance or to heighten job productivity. In this study, only 34% of respondents believed that employee are recognized and rewarded for working safely. After intervention, the percentage was reduced to 27%. This obviously shows that the HRPB management does not have clearly defined reward system for working safely. Scott (2005) conveyed that in behavior-based safety, a habit is formed if some behavior happens frequently and consistently. Eventually, the habit state, which is transformed from self-directed state, requires rewards or recognition

to sustain positive safety behavior. According to Donoghue (2001), reward and incentive system had better upshot compared to penalty in occupational management system because workers get de-motivated and undergo remarkable stress if penalized in wrongdoing. Reward in terms of allowances and insurance coverage are more preferable compared to appreciation certificates among healthcare workers to compensate for high -risk situation such as the Severe Acute Respiratory Syndrome (SARS) outbreak (Hasni, Nor Izzah and Ezat, 2005).

5.2.5 Importance of Management-Employee Cooperation in OSH

Commitment from management and employee is a fundamental progress towards building up an effective health and management system. Clearly defined safety policies and democratic leadership are able to build a staunch (Makin and Winder, 2008; Akpan, 2011). A complete health and safety management system (HSMS) includes elements such as clear safety and health policy, well-defined health and safety organization, clear safety and health plan, measurement of safety and health performance, reviewing performance and auditing (Hughes and Ferrett, 2011). This study showed 92% of respondents believe that management-employee cooperation was essential for the ultimate success of safety programs.

5.3 Practice on PPE usage

About 82% of respondents admitted that they do not handle patient's sample without wearing glove. Previous studies noted majority of respondents wore glove for all procedures in laboratory (Izegbu, Amole and Ajayi, 2006; Onibokun, Akinboro, Adejumo and Olowokere, 2012). Study by Lugah, et al. (2010) revealed that only 62% of respondents acknowledged that wearing glove is essential in preventing blood borne diseases. This clearly shows that practice of universal precaution in preventing blood-borne pathogens is on par with laboratory safety policies and regulation. Surprisingly direct observation found the above-mentioned practice did not stay alive in few circumstances as captured in Figure 5.2 and Figure 5.3 and Figure 5.4.

Figure 5.2: Unsafe Practice of Handling Biohazard Samples without Glove at Specimen Receiving Counter, Pathology Department of HRPB

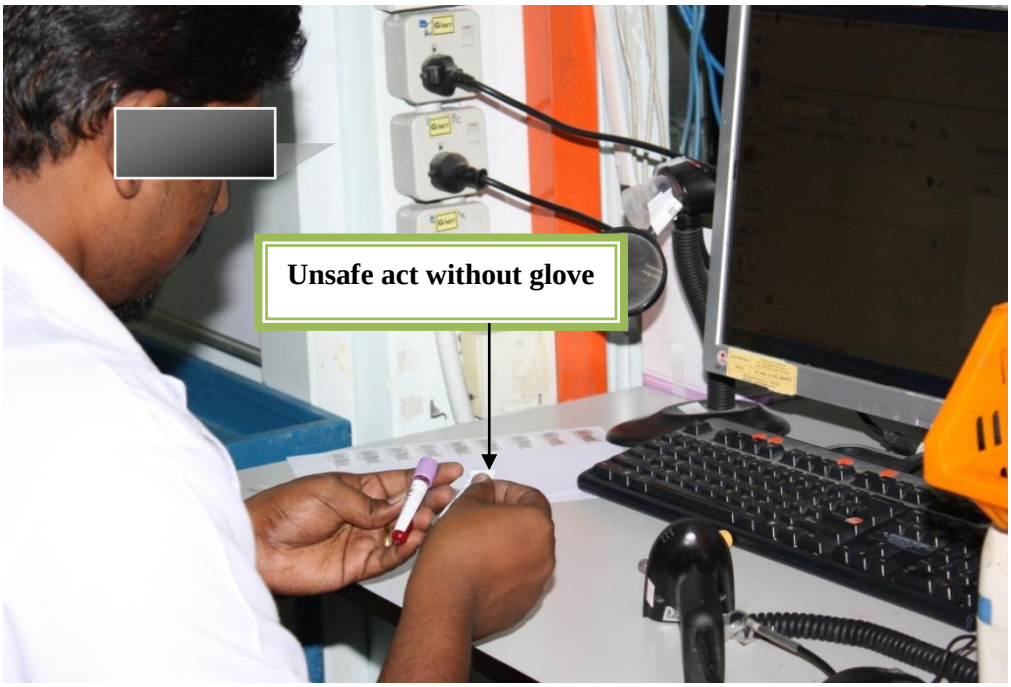


Figure 5.3: Unsafe Practice of Handling Biohazard Samples without Glove at Sample Processing Area, Pathology Department of HRPB

Direct observation and interview also revealed that most of the Histopathology laboratory staffs were not aware of possible infections from formalin fixed tissue. They did not wear glove during sectioning of formalin fixed tissue as shown in

Figure **5.4**. Most of them assume that there is no chance for virus and bacteria to survive after the tissue has been fixed in formalin. Creutzfeldt-Jakob disease (CJC), a brain degenerative disease is found to have high survival rate in brain tissue even after it is fixed in formalin (Demiryu, Bayamoglu and Ustacelebi, 2002; Taylor, 2003). The prion, which is the infective agent for CJC is proven to be transmitted to mice from formalin-fixed tissue (Demiryu, Bayamoglu and Ustacelebi, 2002). These prion proteins are also closely associated with dementia (Bell and Ironside, 1993).

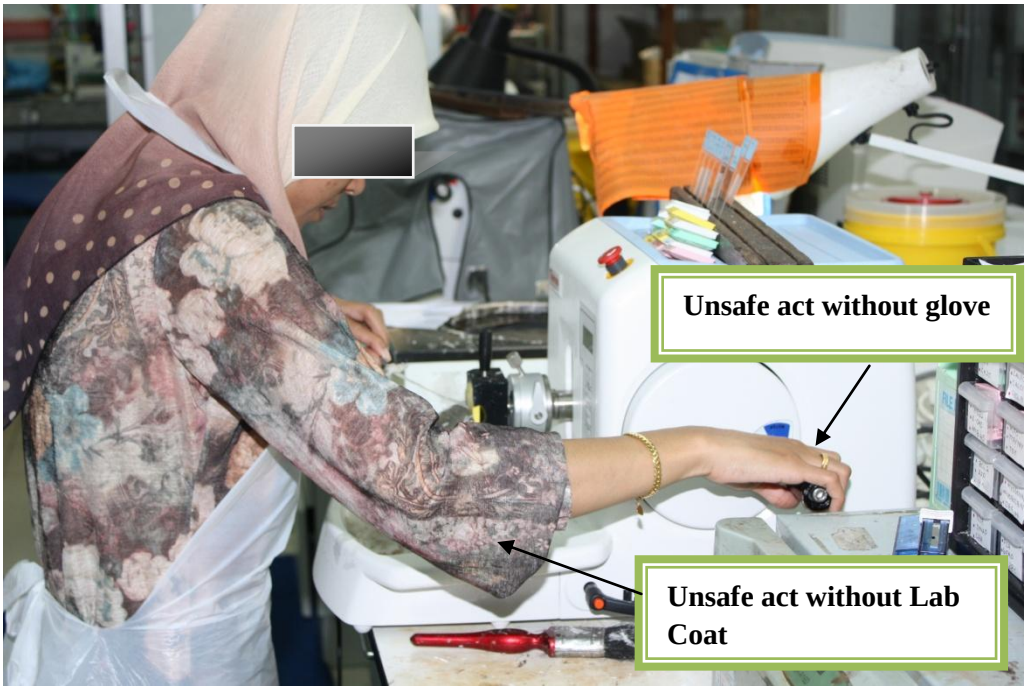


Figure 5.4: Unsafe practice (not wearing glove and lab coat) during tissue sectioning in histopathology laboratory, Pathology Department of HRPB

5.3.1 Practice on MSDS Usage.

Chemical hazards can be controlled effectively only if there is proper labeling and provision of MSDS (Wood, 2010). MSDS creates good hazard communication between manufacturer, management and users, hence, chemical hazards are controlled (Kan, 2007). Practice on MSDS usage during handling chemicals was found to be moderate among respondents where 73% of them considered they do not handle chemical without referring to MSDS. Previous study showed only 48% of respondents managed to write full forms of MSDS (Goswami, Soni, Patel and Patel, 2011).

5.3.2 Emergency Contact Person

Good emergency response plan and information on whom to contact during emergency are essential to reduce the severity of accidents (Akpan, 2011). In this study, about 70% of respondents knew whom to contact during emergency when supervisor or safety officer are not around. In contrast, only 40.5% respondents knew that they have to contact immediate supervisor instead of safety officers because the former would have better understanding in controlling hazards, which varies between different departments (Lugah, et al., 2010). About 10% of increment was noted in mean score with statistical significance $p<0.05$. The increment could be due to the exhibition of the organizational chart of HSC members during the campaign.

5.3.3 Practice of Incident Reporting

Incident rate is a precise indicator for lack of proper management in safety and health tool. The recordable incidents can be injury, illnesses or death (Anuar, Zahedi, Kadir and Mokhtar, 2008b). In this study 73% of respondents claimed that they reported all injuries regardless of severity. This result increased to 80% after the intervention program with statistical significance of $p< 0.05$. There was a to similar result noted, where 68% of respondents reported needle stick injuries (Onibokun, Akinboro, Adejumo and Olowokere, 2012). In contrast, one third of percutaneous injuries were unreported and without proper documentation (Doebbeling, et al., 2003; Saleh, Elghorory, Shafik and Elsherbini, 2009). Recorded incident cases among medical laboratory workers in three referral medical hospitals in Malaysia noted increment from 2003 to

2004 (Anuar, Zahedi, Kadir and Mokhtar, 2008b). In Malaysia, Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease (NODOPOD) Regulation 2004, reminds the employers to report all mishaps stated in the above regulation to local DOSH office within seven days. Failure to do so is deemed to be an offence and liable to a fine of RM 10,000 or imprisonment for year or both (DOSH, 2013c).

5.3.4 Frequency of Safety Audit

Safety audit is normally divided into two. Internal safety audit and External safety audit. HSC is responsible to conduct internal safety audit in laboratory of hospitals from time to time to make sure that the safety system is on par with DOSH's requirement (Ibrahim, Muhammad Noor, Nasirun and Ahmad, 2012). External safety audit is normally brought together by accreditation programs. Laboratories which is accreditated with MS 15189 have high competence with HSMS compared with laboratories which are not accreditated (Anuar, Zahed, Kadir and Mokhtar, 2008b). In this study, only 47% of respondents stated that HSC conducted regular safety audits within the department. However, a contrasting observation was noted as the Pathology department of HRPB was accreditated by National Association of Testing Authorities, Australia (NATA) and Deaprtment of Standard Malaysia (DSM). Thus, there was limited chances for safety audits to be missed out.

5.3.5 Participation in Safety and Health Activities Conducted by HSC and Management

Management's responsibility does not only stop at providing information which is compliant with law in force, but also accountable to promote and conduct safety programs to create awareness among workers (Ibrahim, Muhammad Noor, Nasirun and Ahmad, 2012; Saldaria, Herrero, Rodriguez and Ritzel, 2012). In this study, practice of participation in activities conducted by HSC and department were found to be moderate. Surprisingly, approximately around 100 staffs participated in the safety talk and video presentation during the intervention programs.

5.3.6 Impact of Intervention Program

OSHAC as an intervention program was a new approach where there was no previous literature found. However, trainings as an intervention program was well documented in previous studies (Saleh, Elghorory, Shafie and Elsherbini, 2009; Sokas, Jorgensen, Nickels, Gao and Gittleman, 2009; Manothum and Rukijkanpanich, 2010; Goswami, Soni, S.M.Patel and M.K.Patel, 2011; Saldaria, Herrero, Rodriguez and Ritzel, 2012). Even though health and safety campaign in this study was a new approach, the impact of this program was very significant in terms of knowledge on OSH. Attitude and practice require a long intervention time in terms of training program to show remarkable improvement. But intervention study in terms of training as done by Manothum and Rukijkanpanich (2010) showed significant improvement in practice of OSH.

Knowledge on OSH showed tremendous improvement after the health and safety campaign was conducted, which was similar to how previous training program from other studies have shown (Saleh, Elghorory, Shafik and Elsherbini, 2009; Sokas, Jorgensen, Nickels, Gao and Gittleman, 2009; Goswami, Soni, S.M.Patel and M.K.Patel, 2011). The relationships between KAP are highly influenced by many factors. Knowledge has limited influence towards attitude and behavior (Bohner and Wanke, 2002). Interestingly, behavior is determined by sensory and motor capabilities, opportunity and motivation, in addition to learning (Domjan, 2003). Attitude works as mediator between information (knowledge) someone perceive and how he or she respond towards the information. In addition, attitude influence and change the behavior, practice or performance (Bohner and Wanke, 2002). In occupational safety and health perspective, if the worker do not like to be expose to infection or accidents (attitude) surely he or she will take all remedial action (practice) regardless of situation.

5.4 Limitations

Implementation of the OSHAC as an intervention program was one of the biggest challenges in this study. This is because, there was no OSHAC conducted before in the department except at hospital level. Initially, the campaign was planned for at least five days with more effective activities, but due to budget constraint and limited time line, the OSHAC was conducted only for three days and compromising few activities. Safety audit and poster designing competition were dropped from the list. The HSC members were

found to be passive during the OSHAC where there was no full commitment from them. This could be due to their busy working schedule. Obtaining ethical approval from the MOH and the Hospital consumed more time. Centralized decision-making style and busy working environment at research area delayed the OSHAC implementation. However, the support from higher management made the event successful.

5.5 Future Studies

This study has revealed that there are plenty of opportunities to explore OSH of medical laboratories in Malaysia. Since there were not many KAP studies of OSH on medical laboratory conducted, therefore, truthful findings and new discoveries remain untouched. Following are the areas or field which are feasible for future studies:

1. Developing training modules and looking for impact before and after intervention.
2. Studies related to potential of prion transmission among histotechnologists in Malaysia.
3. Current study can be extended to the personnel from different hospitals in Malaysia.

CHAPTER 6

CONCLUSION

In conclusion, the intervention program conducted only managed to improve the knowledge. No significant improvement was noted in attitude and practice of OSH. Although the general knowledge in OSH was found to be good, serious attention and action are needed to improve chemical hazard knowledge, and more importantly biohazard knowledge. OSH legislation issues need to be updated to employees especially issue such non-existence of specific OSH Act to protect medical laboratory personnel, hence, employees to realize the importance of OSH.

Generally, attitude of OSH was noted to be in good tract but attitude of sense of belonging towards department needed attention, hence, safety culture cab be nurtured and developed. Management must always listen to employees opinion when it comes to OSH because newly emerged hazards and uncontrolled hazards are difficult to be identified without employees input. In addition, management should also value the employees as valuable asset who need protection from occupational mishaps. Since difficulty was presented in differentiating the occupational disease from normal exposure, prevention is the only option available for medical laboratory personnel.

Generally, the practice of OSH among medical laboratory personnel showed moderate level where there are more rooms for improvement noted. Even though direct observation are assumed as isolated cases and do not tally with

statistical findings, serious attention needed to avoid prolonged unsafe practice. Incident reporting is the only available option to notify and investigate incidents, thus the awareness on this issue should be increased from time to time. This because, it was noted that incident reporting was neglected in small incidents even though in the presence of NODOPOD Regulation 2004.

Nurturing safety culture among medical laboratory personnel will surely direct the HSMS to be on par with international OSH guidelines, hence, mishaps free safety-working environment will be enforced.

OSHAC as an intervention program successfully executed and significant changes were noted in terms of knowledge of OSH. Attitude and practice did not show any changes after intervention as these two parameters need longer intervention time. However, as planned, the awareness of OSH among respondents was successfully inculcated.

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Appendix A

Ethical Approval for Research from UTAR

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

12 July 2012

Ms. Anton Cordelia Tanislaus Antony Dhanapal
Department of Chemical Science
Faculty of Science
Universiti Tunku Abdul Rahman
Perak Campus
Jalan Universiti
Bandar Barat
31900 Kampar
Perak

Dear Ms. Anton,

Ethical Approval For Research Project/Protocol

We refer to your application dated 15 June 2012 for ethical approval for your proposed research project and are pleased to inform you that your application has been approved by the UTAR Scientific and Ethical Review Committee (SERC) via email circulation dated 9 July 2012.

The details of your research project are as follows:

Research Title	Study on Occupational Safety and Health Awareness among Medical Laboratory Personnel
Research Area	Science
Approval Validity	2012 - 2013

The University wishes you all the best in your research.

Thank you.

Yours sincerely,

Professor Dr Lee Sze Wei
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Science
Director, Institute of Postgraduate Studies and Research

Address: No.9, Jalan Bersatu 13/4, 46200 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Postal Address: P O Box 11384, 50744 Kuala Lumpur, Malaysia.
Tel: (603) 7958 2628 **Fax:** (603) 7956 1923 **Homepage:** http://www.utar.edu.my

Appendix B

Ethical Approval from Ministry of Health, Malaysia

PEJABAT TIMBALAN KETUA PENGARAH KESIHATAN
OFFICE OF THE DEPUTY DIRECTOR-GENERAL OF HEALTH
(PENYELIDIKAN & SOKONGAN TEKNIKAL)
(RESEARCH & TECHNICAL SUPPORT)
KEMENTERIAN KESIHATAN MALAYSIA
MINISTRY OF HEALTH MALAYSIA
Aras 12, Blok E7, Parsel E, Presint 1
Level 12, Block E7, Parcel E, Precint 1
Pusat Pentadbiran Kerajaan Persekutuan
Federal Government Administrative Centre
62590 PUTRAJAYA
Tel. : 03-88832543
Faks : 03-88895184

JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN
KEMENTERIAN KESIHATAN MALAYSIA
d/a Institut Pengurusan Kesihatan
Jalan Rumah Sakit, Bangsar
59000 Kuala Lumpur

Ruj. Kami : (2) dlm.KKM/NIHSEC/08/0804/P12-633
Tarikh : 5 Oktober 2012

Suresh Narayanan
Jabatan Sains Bioperubatan, Fakulti Sains
Universiti Tuanku Abdul Rahman

Tuan,

NMRR-12-597-12688
Study on Occupational Safety and Health Awareness among Medical Laboratory Personnel

Lokasi Projek : Hospital Raja Permaisuri Bainun

Dengan hormatnya perkara di atas adalah dirujuk.

2. Jawatankuasa Etika & Penyelidikan Perubatan (JEPP), Kementerian Kesihatan Malaysia (KKM) mengambil maklum bahawa projek tersebut adalah untuk memenuhi keperluan akademik Program Sarjana Muda Bioperubatan, Universiti Tunku Abdul Rahman (UTAR)

3. Sehubungan dengan ini, dimaklumkan bahawa pihak JEPP KKM tiada halangan, dari segi etika, ke atas pelaksanaan projek tersebut. JEPP mengambil maklum bahawa kajian ini tidak melibatkan sebarang intervensi dan hanya menggunakan borang soalselidik dan temuramah sahaja untuk mengumpul data kajian. Segala rekod dan data pegawai adalah SULIT dan hanya digunakan untuk tujuan kajian dan semua isu serta prosedur mengenai *data confidentiality* mesti dipatuhi. Kebenaran daripada Pengarah Hospital di mana kajian akan dijalankan mesti diperolehi terlebih dahulu sebelum kajian dijalankan. Tuan perlu akur dan mematuhi keputusan tersebut.

4. Adalah dimaklumkan bahawa kelulusan ini adalah selama setahun dan Tuan perlu menghantar *'Continuing Review Form'* setiap tahun bagi memperbaharui kelulusan etika. Laporan tamat kajian dan sebarang penerbitan dari kajian ini hendaklah dikemukakan kepada Jawatankuasa Etika & Penyelidikan Perubatan selepas tamatnya kajian ini.

Sekian terima kasih.

BERKHIDMAT UNTUK NEGARA

Saya yang menurut perintah,

(DATO' DR CHANG KIAN MENG)
Pengerusi
Jawatankuasa Etika & Penyelidikan Perubatan
Kementerian Kesihatan Malaysia

Appendix C

Permission to Conduct Research at HRPB

Versi 2.0 Tarikh: 15 Feb

INVESTIGATOR'S AGREEMENT, HEAD OF DEPARTMENT'S AND INSTITUTIONAL APPROVAL

PERSETUJUAN PENYELIDIK, PENGESAHAN KETUA JABATAN DAN INSTITUSI

This document is intended for online submission for purpose of formal research review and approval. It is to be used in lieu of other equivalent manually printed document such as Borang JTP/KKM 1-2 and Borang JTP/KKM 3. After completing the form below and obtaining the required signatures, please scan this document and submit online.

Dokumen ini adalah untuk penghantaraan atas talian (online) mengikut prosedur rasmi semakan dan persetujuan penyelidikkan. Borang ini dikeluarkan sebagai gantian dokumen kebenaran manual yang serupa seperti Borang JTP/KKM 1-2 dan Borang JTP/KKM 3. Selepas melengkapkan borang di bawah dan mendapatkan tanda tangan yang diperlukan, sila imbaskan dokumen ini dan hantar atas talian.

Unique Research ID : *[Nombor Pendaftaran]*	12688
Research Title : *[Tajuk]*	STUDY ON OCCUPATIONAL SAFETY AND HEALTH AWARENESS AMONG MEDICAL LABORATORY PERSONNEL
Protocol Number if available : *[Nombor Protokol jika ada]*	

Investigator agreement ***[Persetujuan penyelidik]***

I have understood the above titled proposed research and I agree to participate in the research as an investigator.

Saya faham cadangan penyelidikan yang bertajuk di atas dan saya bersetuju mengambil bahagian dalam projek tersebut sebagai penyelidik.

Name of Investigator : *[Nama Penyelidik]*	Suresh Narayanan
IC number : *[Nombor KP]*	740422055399
Site Institution : *[Institusi]*	Raja Permaisuri Bainun Hospital
Signature & Official stamp : *[Tandatangan dan Cop Rasmi]*	
Date : *[Tarikh]*	30/7/2012

Head of Department Agreement ***[Persetujuan Ketua Jabatan]***

I agree to allow the above named investigator to conduct or to participate in the above titled research.

Saya membenarkan pegawai yang bernama di atas untuk menjadi penyelidik dalam projek penyelidikan tersebut di atas.

Name of Head : *[Nama Ketua]*	
Name of Department and Institution *[Jabatan dan Institusi]*	
Signature & Official stamp : *[Tandatangan dan Cop Rasmi]*	DATO' DR NOR AIN KARIM MBBS, MPathUM, FRCPath(UK), FIAC, FAMM FRCPA(AUS), FCAP(USA) Consultant Pathologist and Head of Department Pathology Department, Hospital Ipoh
Date : *[Tarikh]*	

Institutional approval ***[Pengesahan Institusi]***

This section maybe omitted if one of the NIH institute is authorized to approve on behalf of institution. Refer NIH for details.

[Bahagian ini tidak perlu jika salah satu daripada institusi NIH diberi kuasa pengesahan bagi pihak institusi tersebut. Rujuk NIH untuk maklumat lanjut]

I agree to allow the investigator(s) named above to conduct or to participate in the above titled research. Where applicable, I further agree to allow my institution to be one of the sites participating in the research.

Saya membenarkan pegawai yang bernama di atas menjalankan penyelidikan selaku penyelidik dalam projek penyelidikan tersebut. Jika berkenaan, saya juga membenarkan institusi ini mengambil bahagian dalam projek tersebut.

Name of Director : *[Nama Pengarah]*	DR. RAJA LOPE AHMAD BIN RAJA ARIFF MMC NO: 24656 Pengarah Hospital Raja Permaisuri Bainun, Ipoh
Name of Institution *[Institusi]*	
Signature & Official stamp : *[Tandatangan dan Cop Rasmi]*	
Date : *[Tarikh]*	10/8/2012

Appendix D

Questionnaire of the Study

STUDY ON OCCUPATIONAL SAFETY AND HEALTH AWARENESS AMONG MEDICAL LABORATORY PERSONNEL -SURVEY FORM

KAJIAN KESEDARAN KESELAMATAN DAN KESIHATAN PEKERJAAN DI KALANGAN PEKERJA-PEKERJA MAKMAL PERUBATAN

Thank you for consider to participate in this survey. Without your participation, the valuable information generated from this investigation would not be possible. There are no risks involved and you are under no obligation to participate in this research and should feel free to decline. Your participation will be anonymous and all information will be kept confidential.
Terima kasih kerana mengambil bahagian dalam kajian ini. Tanpa sokongan anda, informasi bermanfaat ini tidak mungkin diperolehi. Tiada risiko yang terlibat dan anda tidak dipaksa untuk mengambil bahagian dalam kajian ini. Informasi dan penglibatan anda dalam kajian ini akan dirahsiakan.

Designation/*Pekerjaan* ☐ **Unit** ☐

Hospital ☐

Age/*Umur* ☐ **Gender**/*Jantina* ☐ Male/ *Lelaki* ☐ Female/ *Perempuan* ☐

Race / Bangsa ☐ Malay /*Melayu* ☐ Chinese/*Cina* ☐ Indian/*India* ☐ others/ *Lain-lain*

Qualification ☐ PhD/Master ☐ Degree/*Ijazah* ☐ Diploma ☐ Certificate/*Sijil*

Experience/*Pengalaman* (Years/Tahun)

0- 1 ☐

1-5 ☐

5-10 ☐

10-15 ☐

15 above ☐

1

Feedback questionnaires Part A- Personal Protective Equipment (PPE)

Soal Selidik Bahagian A- Peralatan Perlindungan Peribadi(PPP)

1-Strongly Agree/ *Sangat setuju* 2- Agree/ *Setuju* 3- Disagree / *Tidak setuju*
4- Neither Disagree nor Agree/ *Tidak Besetuju atau setuju*
5- Strongly Disagree/ *Sangat Tidak Setuju*

No	Questions/*Soalan*	1	2	3	4	5
1	The personal protective equipment (i.e gloves, safety glasses, etc) for my job is always available. *Peralatan Perlindungan Peribadi(PPP) seperti sarung tangan, kacamata keselamatan dan peralatan lain bagi tugas saya boleh diperolehi sentiasa*					
2	I always wear my PPE even in busy situation *Saya sentiasa gunakan PPP walaupun dalam keadaan sibuk*					
3	Health and Safety is a high priority when I am performing my job *Saya memberi keutamaan kepada keselamatan dan kesihatan semasa menjalankan tugas saya*					
4	If I saw another employee committing an unsafe practice without PPE, I would say something directly to him or her. *Saya akan menegur secara terus jika mendapati ada kakitangan yang melakukan perbuatan yang tidak selamat*					
5	I don't handle any patient's specimen without wearing a glove. *Saya tidak mengendalikan spesimen pesakit tanpa memakai sarung tangan*					
6	I don't handle any chemicals without referring to the Material Safety Data Sheet (MSDS) *Saya tidak mengunakan bahan kimia tanpa merujuk kepada Material Safety Data Sheet (MSDS)*					

Feedback questionnaires Part B- Employer-Employee Safety & Health Responsibility

Soal Selidik Bahagian B- Tanggungjawab bersama Pekerja dan Majikan keatas Keselamatan dan Kesihatan Pekerja

* Please tick (√) at appropriate column

**Sila tandakan (√) pada petak yang sesuai*

1-Strongly Agree/ *Sangat setuju* 2- Agree/ *Setuju* 3- Disagree / *Tidak setuju*
4- Neither Disagree nor Agree/ *Tidak Besetuju atau setuju*
5- Strongly Disagree/ *Sangat Tidak Setuju*

No	Questions/*Soalan*	1	2	3	4	5
7	My supervisor/ department conduct frequent and effective safety meetings. *Penyelia/Jabatan sentiasa mengadakan mesyuarat keselamatan dan kesihatan dengan berkesan.*					
8	My supervisor often observes my work practices for the purpose of protecting my safety and health. *Penyelia sentiasa memerhatikan jalankerja saya bagi memastikan keselamatan dan kesihatan saya terpelihara.*					
9	I report every workplace injury or illness to my supervisor or safety officer regardless of severity. *Saya membuat aduan tentang semua kecederaan dan penyakit kepada penyelia atau pegawai keselamatan tanpa mengambilkira tahap keseriusan.*					
10	When my supervisor or safety officer is not around, I know whom to contact in case of emergency. *Saya tahu pihak yang perlu dihubungi sekiranya berlaku kecemasan semasa ketiadaan penyelia atau pegawai keselamatan.*					
12	I always attend health and safety campaign/ courses conducted by my department *Saya sentiasa mengambil bahagian dalam kempen atau kursus keselamatan dan kesihatan yang dianjurkan oleh jabatan saya*					

13	In case I fall sick, I need to report to my supervisor or safety officer *Sekiranya saya jatuh sakit, saya perlu maklumkannya kepada penyelia atau pegawai keselamatan.*					
14	Safe operating procedures for using equipment /machines are reviewed and revised as necessary. *Panduan keselamatan untuk penggunaan peralatan makmal/mesin dikaji semula apabila diperlukan.*					
15	My organization considers employees to be valuable assets who should be protected from workplace hazards. *Organisasi saya mempertimbangkan pekerja sebagai aset berharga yang perlu dilindungi daripada bahaya di tempat kerja.*					
16	Employees are recognized and rewarded for working safely. *Pekerja dikenalpasti dan diberi ganjaran kerana bekerja dengan selamat.*					
17	Employees are encouraged to speak out when they have concerns about safety and health issues. *Pekerja digalakkan untuk menyuarakan ketidakpuashatian apabila isu keselamatan dan kesihatan adalah membimbangkan.*					
18	For a safety programme to succeed, employee-management participation and support is critical. *Untuk memastikan program kesedaran keselamatan berjaya, penyertaan dan sokongan daripada pekerja dan pihak pengurusan adalah kritikal.*					
19	Health and safety campaign is an effective way to promote and educate workers. *Kempen kesedaran keselamatan and kesihatan adalah satu cara berkesan untuk menggalakkan dan memupuk kesedaran keselamatan di kalangan pekerja.*					

20. I have trained to use fire extinguisher. Yes ☐ No ☐
Saya pernah dilatih untuk menggunakan pemadam api. *Ya* ☐ *Tidak* ☐

21. Fire drill often conducted as scheduled. Yes ☐ No ☐
Latihan kebakaran dijalankan seperti dijadualkan *Ya* ☐ *Tidak* ☐

Feedback questionnaires Part C- Functions of Health and Safety Committee (HSC)

Soal Selidik Bahagian C- Fungsi Jawatankuasa Keselamatan dan Kesihatan Pekerja(JKKP)

1-Strongly Agree/ *Sangat setuju* 2- Agree/ *Setuju* 3- Disagree / *Tidak setuju*
4- Neither Disagree nor Agree/ *Tidak Besetuju atau setuju*
5- Strongly Disagree/ *Sangat Tidak Setuju*

No	Questions/*Soalan*	1	2	3	4	5
22	Health and Safety Committee (HSC) in my department conducts regular safety audits. *Jawatankuasa Keselamatan dan Kesihatan Pekerja(JKKP) di jabatan saya kerap menjalankan audit keselamatan.*					
23	I like to participate/ support all activities carry out by HSC *Saya suka melibatkan diri/memberi kerjasama dalam aktiviti yang dijalankan oleh JKKP.*					
24	The membership in HSC should get renewed every year in order to everyone's participation. *Keahlian JKKP perlu diperbaharui setiap tahun agar semua pekerja melibatkan diri.*					
25	In order to be an active and effective body, HSC should accept and consider workers opinion and suggestions. *Bagi memastikan JKKP berfungsi dengan aktif dan berkesan, ia harus menerima dan mempertimbangkan pendapat dan cadangan pekerja.*					

Feedback questionnaires Part D- Knowledge in Occupational Health and Safety

Soal Selidik Bahagian D- Pengetahuan Keselamatan dan Kesehatan Pekerja

* Please tick (√) at appropriate column

**Sila tandakan (√) pada petak yang sesuai*

No	Questions	True/Benar	False/Palsu
26	Patient's sample may contain pathogenic microorganisms *Sampel pesakit mungkin mengandungi mikroorganisma pathogen.*		
27	Carcinogens are substance that can cause cancer *Karsinogen merupakan bahan yang boleh mengakibatkan kanser.*		
28	Laboratory hazards varies according to the samples, equipment used and the environment *Bahayan makmal berbeza mengikut sampel, peralatan dan persekitaran.*		
29	Medical Laboratory worker's safety and welfare protected by Occupational Health and Safety Act 1994. *Keselamatan dan kebajikan pekerja makmal dilindungi oleh Akta Keselamatan dan Kesihatan Pekerja 1994.*		
30	There is no any specific Occupational Health and safety Act available to protect medical laboratory personnel. *Tiada akta keselamatan dan kesihatan khas untuk melindungi pekerja makmal.*		
31	NIOSH (National Institute of Occupational Safety and Health) responsible to provide training, consultation and information in the area of OHS *Institut Keselamatan dan Kesihatan Pekerja Negara (NIOSH) bertanggungjawab untuk menyediakan latihan, rundingan dan informasi yang berkaitan dengan keselamatan dan kesihatan pekerja.*		
32	A *hazard* is a situation that poses a level of threat to life, health, property, or environment. *Bahaya adalah satu situasi yang mengancam nyawa, kesihatan, harta benda atau persekitaran.*		

33. Match the **HAZARD** symbol below with correct meaning. *Padankan simbol **BAHAYA** di bawah dengan maksud yang betul.*

Radioactive hazard/ *Bahaya Radiasi*

Explosive hazard/ *Bahaya meletup*

Electricity hazard/*Bahaya sumber elektrik*

Toxic hazard/ *Bahaya toksik*

Oxidizing hazard/ *Bahaya oksidasi*

Corrosive hazard/*Bahaya menghakis*

Biohazard

Heated surface hazard/ Bahaya permukaan panas

Appendix E

Photos Captured during OSHAC

Figure 1: From Right: Dr Nik Ahmad Zahar (Cordinator of HSC, HRPB), Dato'Norain karim (Head of department, Pathology, HRPB), Ms Anto Cordelia Tanislaus Antony Dhanapal (Lecturer, UTAR), Suresh Narayanan, UTAR, En Che Mahadi ,HRPB

Figure 2: From Right: Dr Nik Ahmad Zahar (Cordinator of HSC, HRPB), Suresh Narayanan, UTAR and En Azizul, JKN.

Figure 3: OSH video Presentation by Suresh Narayanan, UTAR.

Figure 4: Preparation (Poster Exhibition) for OSHAC.