

Review of Occupational Hazards Facing Laboratory Technicians

Nasser Saleh Alwsaidi¹, Yasser Suliman Alhelio², Ahmed Omar Alhussain³, Abdurhman Rashed Aldhafiri⁴, Salam Abdullah Aljabr⁵, Ghadah Mazrua Almazrua⁶, Sarah Abdulrahman Aldayel⁷, Mai Albgumi⁸, Saad Tayir Saeed Alahmari⁹, Fahad Abdullah Mohammad Alqarni¹⁰, Tarfuh Qalil Shihab Alruwaili¹¹, Nawal Yhaya Halwainy¹²

1. Supervisor of Molecular Microbiology Lab, Prince Mohammed Bin Abdulaziz Hospital, alwsaidin@pmah.med.sa
2. Senior Medical Laboratory Specialist, Prince Mohammed bin Abdulaziz Hospital in Riyadh, Saudi Arabia, alhelioy@pmah.med.sa
3. Senior Medical Laboratory Specialist, Department of Medical Laboratories - College of Applied Medical Sciences - Majmaah University, ao.alhussen@mu.edu.sa
4. Medical Laboratory Specialist, Zulfi General Hospital, araldhafiri@moh.gov.sa
5. Medical Laboratory Specialist, Master's student, aljabr@hotmail.com
6. Laboratory Specialist, Master's student, ghadamaz1998@hotmail.com
7. Lab specialist, Riyadh Third Health Cluster - Shaqra General Hospital, SAALDAYEL@moh.gov.sa
8. Health Education, senior patient educator, National Guard (king Abdulaziz medical city). albgumima@mngha.med.sa
9. Specialist Laboratory, Dhurma Hospital, Ministry of Health, kingdom of Saudi Arabia. Stalahmari@moh.gov.sa
10. Lab Tech, Sabt Al Alaya Hospital, Ministry of Health, kingdom of Saudi Arabia. falqarni2@moh.gov.sa
11. Laboratory Technician, Ministry of Health, kingdom of Saudi Arabia. tgalrawily@moh.gov.sa
12. Technical laboratory, King Fahd Hospital Jazan, Ministry of Health, kingdom of Saudi Arabia. lolo_05600@hotmail.com

ABSTRACT

This review looks at the following hazards that are likely to affect workers especially in medical laboratories Mechanical, Chemical, biological, physical and psychological hazards. It also underlines the risks which people take at workplaces having inadequate protective equipment and knowledge. That is why the problem of managing risk factors and the promotion of occupational health is significant; PPE, proper laboratory design, the need to consider safety guidelines. Some proposals as regards to improving the situation are to promote education about safety issues, to create specific occupational health sections, and to promote reporting and documentation of dangers. The measures that need to be taken include intending to protect the worker health and safety, cutting down on organizational costs, and also lifting overall healthcare standards.

KEYWORDS: Occupational Hazards, Laboratory Technicians, Workplace Safety, Chemical

Exposure, Biological Risks.

1. Introduction

Each year, occupational hazards lead to the poor health or disability of hundreds of millions more individuals and cause or contribute to the untimely death of millions more people globally. In terms of daily hazards, the burden of disease attributable to specific occupational risk factors is 1.5% of the worldwide burden. According to the World Health Report 2002, occupational risks rank as the tenth most common cause of both morbidity and death. Nearly 310,000 deaths annually are attributed to work-related injuries, according to the survey. However, a greater variety of occupational risks and hazards are encountered by workers, such as excessive levels of psychological stress, insufficient ergonomic practices, and chemical, physical, and biological threats (WHO, 2002).

The definition of occupational health is the promotion and maintenance of the highest level of physical, mental, and social welfare of employees in all occupations through risk management, health deviation prevention, and job and employee adaption. (Agius, 2010). Occupational health include both health promotion and protection. Laboring in a lab is a demanding and dangerous job. There are always risks for laboratory workers, whether they are handling biological material or doing procedures (OSHA, 2011).

The five categories of risks to which a worker may be exposed are mechanical, chemical, biological, psychological, and chemical. Heat burns, heat cramps, cold trench foot, frost bite, occupational cataract, and other illnesses are caused by physical risks. Chemicals, gases, and dusts are the causative agents of chemical hazards. Psychological risks include anxiety, tension, and sadness; biological risks mostly include anthrax and tetanus (Park, 2000). The most common types of occupational hazards in medical laboratories are biological hazards are bacteria (39.45%). Meanwhile, the most common chemical hazards include flammable liquids and solids (33%). Whereas, the most common physical hazards the most common were related to electricity (26.32 %). The most contributive control measure to mitigate occupational hazards is providing PPE (94.3%). The most common factors that stymie good practice in medical laboratories included poor laboratory design (61% and lack of awareness about laboratory safety procedures (58.1%) (Algarni, 2023).

The health concerns of laboratory staff have come to light as a significant issue for hospital management. Medical laboratory technologists typically sustain illnesses or harm at work as a result of being exposed to many workplace risks. The absence of safety measures will increase the medical hazards of the laboratory staff as well as increasing the operational costs and turnaround time, besides from having an impact on their loyalty and satisfaction. The incidence of occupational hazards in medical laboratories is caused by several reasons, including staff members' lack of training and expertise. Consequently, proper awareness, understanding, training, and adherence to OSHMS are crucial concerns in laboratory settings across the globe, particularly in poor nations. (Almutairi, 2020). Laboratory workers are exposed to a

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wide range of hazards associated with the materials they employ and the methods they use in the course of their work. The literature on medical laboratory hazards has largely centered on infections and, therefore, on microbiological establishments. This is partly because laboratory-acquired infections tend to be more easily remembered than other hazardous events (Harrington&Shannon, 1977).

Over 100 million workers worldwide are subjected to various occupational health risks, including but not limited to physical agents, carcinogenic agents, incidents of pulmonary or other physical diseases, and pressures from their jobs such as noise, crowding, or stress. Genetic alterations, chronic lung illness, cancer, degenerative diseases of several important organ systems, and birth defects can all be linked to exposure to hazardous substances or physical dangers. According to estimates, these exposures cause an additional 400,000 cases of occupationally linked disease each year in addition to 100,000 deaths from illnesses related to the workplace in the United States. However, many workers receive insufficient protection from typical risks. Recent experience has shown that work environment modifications, job performance patterns, or both can be used to control occupational dangers. Changing the work environment to reduce exposures and injuries, giving workers specialized protective gear, establishing guidelines for equipment design and maintenance, and offering appropriate training to staff members are some of the health protection methods that are accessible ("Health protection: Occupational safety and health," 1983)

health care workers (HCWs) are sometimes thought of as "immune" to disease or injury because part of their work description involves caring for the sick and disabled. They frequently have to forgo their personal health in order to care for patients. As much as miners or construction workers need protection from these working hazards, so do HCWs. However, safeguarding the health of medical personnel also has the added advantage of enhancing patient care and the stability of the healthcare system. Medical personnel are shielded against harm by some of the same precautions taken to keep patients safe from illnesses, such as having enough staff. The 2006 World Health Report Working Together for Health on Human Resources highlighted the need to support and safeguard the health workforce in light of the global health staff deficit, which had reached crisis proportions in 57 countries. Because of work-related illnesses and injuries as well as the ensuing dread of occupational infections, such as those caused by HIV and tuberculosis, unsafe working conditions are a contributing factor to the attrition of health workers in many countries (WHO, 2006).

Due to its importance and uniqueness, laboratory medicine is a medical specialty that complements other specializations and treats nearly all medical diseases. The majority of doctors require laboratory reports to finish patient examinations because they are essential for accurate diagnosis, treatment planning, and follow-up care. Laboratory medicine is regarded as one of the fundamental medical specialties and is complimentary to all other specialties. Research has demonstrated that between 50% and 80% of diagnosis, treatment, and follow-up care are performed in laboratories. This underscores the significance of this profession and its area of expertise. Situated midway between science and medicine, laboratory medicine is a relatively recent field of study. As a result, it takes up a lot of room in the field of life and health

sciences and medicine (Laboratory Medicine, March 2012 issue of Palestinian Technology Association magazine, p. 7).

Everywhere that health care is provided, there are occupational hazards, and safety monitoring is crucial to both worker safety and the standard of care. The presence of radioactive, biological, and chemical risks in small areas in laboratories raises concerns about safety that must be addressed. Laboratories can be extremely dangerous environments in the absence of appropriate regulations, worker training, and awareness of the dangers that individuals are taking (Akhter, 2011)

Handling blood or any other biological sample puts lab personnel at risk for exposure or unintentional harm. All hospital-based laboratory workers in the public and commercial sectors are constantly exposed to known and/or undiscovered pathogens, which puts them at risk for occupational infections (Karamat, 2005).

According to Michell (2010), employers do not give health workers' health the consideration it merits, and they have been identified as a neglected group when it comes to monitoring their occupational health status.

Workplace accidents According to Powell et al. (1995), it is described as unexpected, unplanned, and sudden events that occur at work and cause harm or damage to at least one bodily component.

Workplace illnesses Work-related dangers are present in practically every occupation, despite ongoing attempts to improve working conditions and the quick development of safety and health solutions for the workplace. The definition of occupational diseases given by the International Labor Organization (ILO) in paragraph 6(1) of the recommendations NO.121 is as follows: "Under prescribed conditions, each Member should recognize as occupational diseases related diseases known to arise out of the exposure to substances and dangerous conditions in process, trades, or occupations." Any condition acquired as a result of exposure to risk factors resulting from work activity is defined as an occupational disease under the 2002 protocol of the Occupational Safety and Health Convention, which was established in 1981 (African Newsletter on Occupational Health and Safety, 2002).

Any ailment connected to a certain industry or occupation is considered an occupational disease. Numerous biological, chemical, physical, and psychological elements that are present in the workplace or are otherwise met while working can cause these disorders. Occupational medicine studies the impact of various types of labor on an employee's health as well as how that health affects an employee's productivity. It is possible to avoid occupational disorders linked to unfavorable working conditions. Reducing occupational health risks increases worker morale and health, which lowers absenteeism and boosts productivity. It also lowers the frequency of work-related illnesses and accidents. The expenses of removing occupational dangers are typically greatly outweighed by the moral and financial advantages (Encyclopedia Britannica, 2009).

Types of occupational hazards

1. Biological hazards

Health care providers may come into contact with biological hazards—living things

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that are typically microscopic and pose substantial risks—as a result of working with infected individuals. These live things come in a variety of forms and pose a risk to human health. The AIDS and hepatitis B outbreaks have affected medical and support practices and are regarded as occupational risks because they may have spread through direct patient contact or handling of tainted bodily fluids. Infectious infections that are contracted at work most commonly involve hepatitis B. The most frequent injuries in the medical field are pinstick injuries. Preventing needlestick injuries and HIV transmission is crucial, especially in areas with high HIV incidence (WHO, 1997).

The World Health Organization (WHO, 2005 b) estimates that unsterilized syringes cause between 8 to 16 million cases of hepatitis B, 3 to 4.7 million cases of hepatitis C, and 80,000 to 160,000 cases of HIV every year. Needle stick and other sharps injuries are a serious hazard in any medical care situation. These injuries are caused by different types of needles and sharps, such as scalpels and broken glass containers. Contaminated needles and sharps may inject healthcare workers with blood that contains pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), all of which pose a grave, potentially lethal, risk. Although immunization is available to prevent hepatitis B illness, no immunization is available to prevent HCV or HIV (CDC, 2010).

Organic materials that endanger human and other living things' health are referred to as biological hazards, or biohazards. In general, pathogenic microorganisms, viruses, poisons derived from biological sources, spores, fungus, and bioactive compounds are considered biological risks. Biological carriers of illness, or biological vectors, can also be regarded as biological risks. Biological risks extend beyond the health domain to encompass agents that disturb society and economy, inflict harm on property, and deteriorate the environment, like insect infestations or plagues. An estimated 320000 workers worldwide pass away each year from communicable diseases brought on by biological hazard exposure at work (Driscoll et al., 2005; OSHA 2007).

In any medical setting, there is a significant risk of needle stick and other sharp object injuries. Various kinds of needles and sharp objects, including scalpels and shattered glass containers, are at blame for these injuries. Healthcare workers may be exposed to blood contaminated with viruses such as HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV) through contaminated needles and sharps. This poses a serious and perhaps fatal risk. While hepatitis B can be prevented by vaccination, neither HIV nor HCV can be prevented by vaccination (CDC, 2010).

Through a national surveillance program, the Health Protection Agency (HPA) of the United Kingdom (UK) keeps an eye on major occupational exposures as well as possible HIV, HCV, and HBV transmission from patients to healthcare professionals. Accidental skin penetration by a needle or other sharp instrument is known as a needle stick or sharps injury. A risk of infection transfer exists if the needle or sharp object is tainted with blood or other bodily fluid (Health Commission of London, 2004).

According to the National Audit Office's April 2003 study, "A safer place to work," injuries from needle sticks and sharp objects cause 17% of incidents involving

National Health Services (NHS) personnel. These injuries are also the second most common cause of injury, behind handling and moving (18%). The main blood-borne infections that should be of concern in relation to needlestick injuries are: The viruses that cause hepatitis B and hepatitis C HIV stands for human immunodeficiency virus (Cullen et al., 2006).

A WHO report on the illness burden among healthcare workers as a result of sharps injuries was released in 2003. Worldwide, there are three million exposures annually. Needlestick injuries thus account for 40% of hepatitis B, 40% of hepatitis C, and 4.4% of HIV infections among healthcare professionals. HIV-related occupational deaths claim the lives of 1,000 healthcare professionals annually; these deaths may and should be avoided. Unfortunately, despite the 95% efficacy of HBV immunization, over 80% of healthcare personnel are still unvaccinated in many regions of the world (WHO, 2003).

According to estimates from the Centers for Disease Control and Prevention (CDC), hospital employees in the US sustain 385, 000 needle sticking and other medical sharps injuries annually (CDC, 2008). According to estimates from other authors, the annual rate in the US is somewhere between 500,000 and 800,000 (Jagger J. et al, 2008). According to Ramphal, L. et al. (2010), there are an estimated 100,000 needle stick injuries in the UK and 500,000 in Germany per year. Given research on medical sharps injury underreporting, the epidemiology of these injuries may be higher. For example, a comprehensive survey conducted in the United States of America revealed that 58% of medical injuries caused by sharp objects were not reported, but other studies place the figure at 90% (Braun, B., 2011).

One of the known occupational dangers for healthcare workers is medical sharps injuries. Around 2 million HBV, 900,000 HCV, and 170,000 HIV infections among healthcare workers worldwide are brought on by medical sharps injuries each year (WHO, 2006). Many Asian and African nations are concerned about these blood-borne illnesses due to their severe effects, which can include permanent illness, disability, and even death (Al-Ansi et al., 2006).

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Every year, 3 million healthcare professionals worldwide are exposed to blood-borne pathogens through percutaneous procedures; 90% of these occurrences take place in underdeveloped nations (WHO, 2006).

Numerous studies have demonstrated that medical sharps injuries and needle sticks are common among healthcare professionals. 75.6% of the 352 healthcare workers in

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Iran who participated in a descriptive cross-sectional survey reported having at least one needle stick injury during the course of the year (Nasiri et al., 2010).

According to estimates, for every 100 hospital beds occupied, there are 28 sharps injuries per year among hospital personnel. This indicates the likelihood of injury among hospital workers (Perry et al., 2009 b).

Despite the significant risk of occupational exposure to HIV among health care workers in busy labor wards, a cross-sectional retrospective survey conducted in South Africa to determine the prevalence of needle-stick and sharps injuries revealed that (21%) of the respondents had been subjected to sharps injuries (Wafula, 2012).

2. Chemical hazards

Daily occupational exposure to organic solvents can have detrimental consequences on laboratory workers' health and wellbeing. In laboratories, a few common-sense precautions can be implemented to reduce or eliminate these exposures. For a few years, environmental and public health professionals have been deeply concerned about the detrimental effects of organic solvents. Consequently, numerous prevention measures have been put in place to limit or minimize needless exposures (Brautbar & Williams 2002).

Hazardous chemicals should only be handled in chemical fume hoods, hence laboratories should be properly set up for handling them. Additionally, workers in laboratories should wear the appropriate personal protective equipment (PPE). To further lower risk, dangerous compounds should be replaced or eliminated wherever possible with ones that have comparable technical qualities. Furthermore, it's critical that lab workers limit or prevent coming into touch with solvent vapors on their skin. Workers should wash their hands again before eating or drinking after utilizing solvents, especially if they are handling dichloromethane (OSHA's Sanitation Standard-29CFR1910.141). However, as chemical and laboratory safety should be a fundamental objective for every laboratory employee, workers should not consume food or beverages in the lab (Alexis (2012)].

A 1999 study by Burnett et al. looked at cancer mortality among healthcare science workers. They made use of mortality information gathered from death certificates in the National Occupational Mortality Surveillance Database between 1984 and 1995. The Proportionate Cancer Mortality Ratios (PCMR) were computed for specific malignancies among female health and scientific technicians between the ages of 18 and 90 at the time of death. They discovered that women between the ages of 18 and 64 had a higher non-Hodgkin lymphoma death rate among clinical laboratory technologists. The authors came to the conclusion that workplace chemical exposure may be connected to the rising cancer incidence (Burnett, 1999).

Depending on the settings and procedures used at work, exposure to organic solvents can change. Acute exposures, which involve a single dose and high concentration over a short period of time, and chronic exposures, which involve repeated or continuous exposure over extended periods of time, have the potential to trigger hazardous reactions or alter the way the body's organs work (Occupational Health and Safety 29CFR1910). To avoid negative health effects, though, a specific set of

working and monitoring procedures is needed (Dimenstein, 2009).

A 2010 study by Viegas et al examined the genotoxic consequences of formaldehyde exposure at work. Eighty personnel completed the study in Portugal: thirty worked in the production of formaldehyde-based resins and fifty worked in the pathology and anatomy departments. The goal of the exposure assessment was to determine the formaldehyde ceiling values. The micronucleus test was used to analyze the genotoxic effects on exfoliated buccal mucosal epithelial cells and peripheral blood lymphocytes. The pathology laboratory workers had a far higher frequency of micronucleus in their peripheral blood nucleus than did the industrial workers, according to the authors' observations. For workers who had long-term exposure to formaldehyde, a positive association was also observed between the number of years of exposure and the frequency of micronuclei in peripheral blood lymphocytes and epithelial cells (Viegas, 2010).

There is proof that exposure to chemicals by humans at levels previously believed to be safe may have unfavorable consequences. For example, exposure to formaldehyde, formalin, and xylene in a pathology laboratory poses a risk to safety as these substances are classified as carcinogens by the International Agency for Research on Cancer (Bancroft & Gamble, 2008).

Daily occupational exposure to organic solvents can have detrimental consequences on laboratory workers' health and wellbeing. In laboratories, a few common sense precautions can be implemented to reduce or eliminate these exposures. For a number of years, environmental and public health professionals have been deeply concerned about the detrimental effects of organic solvents. Consequently, numerous prevention measures have been put in place to limit or restrict needless exposures. There is proof that exposure to chemicals by humans at levels previously believed to be safe may have unfavorable consequences. For example, exposure to formaldehyde, formalin, and xylene in a pathology laboratory poses a risk to safety as these substances are deemed carcinogenic by the International Agency for Research on Cancer (Alexis, 2012).

Although laboratories can be sites of study and discovery, they can also be dangerous places if appropriate safety measures are not followed. In laboratories, organic solvents are widely used for both routine and experimental work. Although the level of hazard varies, all solvents should be regarded as potentially hazardous (Ridgway et al., 2003).

3. Physical hazards

Raskeviciene & Maroziene carried out a cross-sectional epidemiological investigation in 2005. Employees of six hospitals in Kaunas City's biochemical and clinical laboratories were given the questionnaire. The study's goals were to assess the most common health issues among lab employees and identify the connection between health issues and working conditions in clinical and biochemical laboratories. Compared to other workers, laboratory assistants were subjected to more working dangers. Among lab assistants, all health concerns were likewise more common. In comparison to other professions, the most common complaints among them were weakness, fatigue, headaches, and sleep difficulties. Chemical-induced

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skin irritation was also more common among lab assistants. The hands were the most common site of discomfort. Nearly one-third of respondents reported having eyestrain complaints. Worker complaints of neck, back, waist, and joint pain from prolonged fixed positions were relatively common. An uncomfortable work position raises the risk of neck, waist, and sleep issues. Chemical workers frequently experience mental stress at work (Raskeviciene, 2005).

According to 7.7% of participating laboratories in a UK Health and Safety Executive survey from 2004, exposure to hazardous chemicals or biological agents had a negative impact on the technicians' health. 99.2% of respondents felt that insufficient steps had been done to lower the chance of acquiring an upper limb condition. 15.5% of respondents claimed that workers were not given proper training on mechanical and electrical hazards. Among laboratory professionals, stress-related illnesses were the most common cause of significant work-related illness. Stress was the reason given by 15% of respondents in the private sector for technicians quitting or changing jobs (Akhter, 2011).

4. Ergonomic hazards

Regular laboratory tasks like pipetting, utilizing cell counters, operating microscopes, operating microtomes, and typing at computer terminals put workers at risk for repetitive motion injuries. Over time, repetitive motion injuries arise from stressing muscles and joints, inflaming tendons, pinching nerves, and limiting blood supply. Ergonomics issues can also arise from standing and working awkwardly in front of biological safety cabinets or laboratory hoods. Through understanding how to manage risk variables connected to laboratory ergonomics, businesses can lower the likelihood of workplace accidents while simultaneously increasing worker comfort, output, and job satisfaction. Employers in the laboratory sector are reminded of a few easy workplace modifications in addition to the standard ergonomic guidelines. Although there isn't yet a specific OSHA requirement concerning ergonomics in the laboratory, it is advised that employers give laboratory workers the knowledge found in the newly released OSHA fact sheet (Gile, 2009).

Numerous lab tasks have the potential to cause pain or even harm. Certain laboratory procedures, like pipetting, microscopy, moving large objects, and extended standing at lab benches or hoods, might cause ergonomic issues. (Caskey, 1999).

5. Psychosocial hazards

Hospitals are difficult places for employees because of psychological issues (Sadleir, 2010). Healthcare personnel experience job strain and stress due to the combination of high job demand and an excessive workload in hospitals. Psychological risks such as heavy workloads, demanding work schedules, physical and mental exhaustion, and burnout are prevalent in hospital environments, leading to stress, despair, and mental exhaustion among employees (Sadleir, 2010).

at order to evaluate the occupational hazards faced by nurses and midwifery students during their clinical practice at all degree program nursing and midwifery schools in Addis Ababa, a cross-sectional descriptive survey was carried out between November 2008 and June 2009. According to the study's findings, 93.1% of the

participants reported having needle pricks, blood splashes, and skin wounds while practicing medicine. The outcome validates that occupational hazards in clinical practice are caused by mechanical, biological, psychosocial, and physical variables (2009, Chewaka).

The managerial environment has an impact on the ratio of exposure to physiological and psychological risks. Workplace injuries among public hospital staff are strongly correlated with occupational (chemical, physical) and organizational (lack of safety training, low level of safety atmosphere, practices) risk factors. Hospital employees are susceptible to occupational injuries due to a lack of training, a poor degree of safety climate, and safety procedures (Gimeno et al., 2005).

Despite their belief of a significant danger of contracting an illness at work, healthcare professionals rarely take preventative measures to avoid getting infections at work. A significant body of research and literature has been generated in response to the strain on healthcare facilities, examining the impact of AIDS on healthcare and identifying variables that are particularly stressful (2009, Chewaka).

2. Recommendations

The researcher recommends reading scholarly literature regarding occupational safety and health to reduce dangers in laboratory settings. This recommendation because it's critical to understand the risks and workplace dangers associated with working with chemicals

Regarding the theoretical aspect of safety procedures, it is crucial for employees and students in this field of work to establish a dedicated section for occupational health and safety that is directly connected to senior management. This will guarantee the availability of specialized committees and supervisors who can provide follow-up and control measures as well as safety procedures. The importance of carrying out additional research and studies on the topic of workplace safety and health is equivalent to that of the earlier recommendations. The studies are crucial theoretical instruments that help produce deeper outcomes and aid in the creation of superior educational establishments.

In addition, the development of workers' abilities should involve the choice of hazards controls and programs evaluation activities, identification and assessment of the risks from health hazards, encouragement of laboratory workers to know their legal rights if they are exposed to any occupational hazards, and encouragement of laboratory workers to record any occupational hazards.

References

- African Newsletter on Occupational Health and Safety Volume 12, number 2, August 2002.
 Akhter Javed, PhD, Sameera Al Johani, MD, Loulwah Hammad, BSc, Khalid Al Zahrani, MSc.(2011). Laboratory Work Practices and Occupational Hazards among Laboratory Health Care Workers: A Health and Safety Survey.
 Al-Ansi, S.A., Mohan and. Platt. A.J.(2006);" Hand surgery on patients who are high risk for blood viruses". J. Hand Surg; 31: 426-431.
 Alexis, D, (2012), Occupational Exposures to Chemicals in Laboratories: Master thesis.

- Nasser Saleh Alwsaidi, Yasser Suliman Alhelio, Ahmed Omar Alhussain, Abdurhman Rashed Aldhafiri, Salam Abdullah Aljabr, Ghadah Mazrua Almazrua, Sarah Abdulrahman Aldayel, Mai Albgumi, Saad Tayir Saeed Alahmari, Fahad Abdullah Mohammad Alqarni, Tarfuh Qalil Shihab Alruwaili, Nawal Yhaya Halwainy Melissa.
- Algarni, Abdullah & Alsharman, Abdullah & Elfatih, Mohammed. (2023). Occupational Hazards and Safety Measures Among Medical Laboratories Staff in Eastern Province-KSA. *Journal of Safety Studies*. 8. 1. 10.5296/jss.v8i1.21220.
- Almutairi, Nayef Shabbab F (2020) Effectiveness of occupational safety and health management system on knowledge, attitude, and practices of occupational safety among laboratory staff in Makkah Hospitals, Saudi Arabia. Doctoral thesis, University Putra Malaysia.1372647455
- Agius R. (2010) "Occupational Medicine in the first decade of this millennium: looking to the future". *Occup Med* 60:585–588
- Bancroft JD, Gamble M. *Theory and Practice of Histological Techniques*. 6th ed. New York, NY Churchill Livingstone Elsevier; 2008:27.
- Braun B.(2011);" Sharing Expertise: Sharps injury risk prevention in infusion therapy". Melsugen, Germany.
- Brautbar, J.D. & Williams J. (2002). Industrial solvents and liver toxicity: risk assessment, risk factors and mechanisms. *International Journal of Hygiene & Environmental Health* 205: 479-481.
- Burnett, C., Robinson, C., Walker, J. (1999). Cancer mortality in health and science technicians. *American Journal of Industrial Medicine* 36(1): 155-158.
- Caskey, C. R. (1999). Ergonomics in the clinical laboratory. *Clin Lab Sci*, 12(3), 140-144.
- Centers for Disease Control and Prevention, (2008). "Workbook for Designing, Implementing and evaluating a sharps injury prevention program". United States. Centers for Disease Control and Prevention. Atlanta GA, USA.
- Centers for Disease Control and Prevention, (2010). NIOSH Hazard Review: "Occupational Hazards in Home Healthcare". Atlanta GA, USA.
- Cullen BL, Genasi F, Symington I, Bagg J, McCreddie M, Taylor A, Henry M, Hutchinson SJ, Goldberg D,(5776(."Potential for reported needle stick injury prevention among healthcare workers in NHS Scotland through safety device usage and improvement of guideline adherence: an expert panel assessment", *Journal of Hospital Infection* , 63: 445-451.2
- Dimenstein IB. (2009)."A Pragmatic Approach to Formalin Safety in Anatomical Pathology" *LabMedicine* volume 40 Number 12, 740 -746.
- Driscoll T, Takala J, Steenland K, Corvalen C & Fingerhut M (2005). Review of estimates of the global burden of injury and illness due to occupational exposures. *American Journal of Industrial Medicine*, 48: 491-502.
- Encyclopedia Britannica. (2009). Occupational health and safety.
- Gile, T. J. (2009). "Ergonomics bring safety features to an aging laboratory workforce". *MLO Med Lab Obs*, 41(1), 26-27.
- Gimeno, D., Felknor, S., Burau, K.D., Delclos, G.L.(2005), "Organizational and Occupational Risk Factors Associated with Work Related Injuries among Public Hospital Employees in Costa Rica". *Occupational and Environmental Medicine*, 62(5), 337-343. Retrieved on April 07, 2010.
- Harrington, J.M & Shannon, H.S (1977);" Survey of safety and health care in British medical laboratories" *British Medical Journal*, 1, 626-628.
- Health protection: Occupational safety and health. (1983). *Public Health Rep, Suppl*, 69-80.
- Jagger, J., Perry,J., Gomaa,A., Komblatt Philips, E.(2008). "The impact of US policies on healthcare workers from blood borne pathogens; the critical role of safety engineered devices". *J Infect. Public Health*; 1: 62-71.
- Karamat, K. A., Rahim, E., Khattak, F. H., & Mahmood, B. (2005). "Strategic framework for bio-safety and bio-security in public sector hospitals Pakistan". Karachi, Pakistan: PMRC-Ministry of Health.
- London Health Commission (2004), *Health in London: Review of the London Health*

Strategy.

- Michell Karen. (2010).” Protection of healthcare workers”: Focus on respiratory health. African Newsletter on Occupational Health and Safety. Vol.20. No.1.20:10- 12.
- Nasiri E, Vahedi M, Siamian H, Mortazavi Y and Jafari H (2010). “Needle Sticks Injury with Contaminated Blood in the Special Unit, S Staff”. Middle-East Journal of Scientific Research. 5 (2): 61-64.
- Palestinian Technology Association magazine: Laboratory Medicine, March 2012, p7
- Park, K.(2000).” Preventive and Social medicine”. Jabalpur: m/s Banarsidas Bhanot publishers. 16 ed; p.no. 557.
- Perry J, Parker G & Jagger J. (2009b). 2006 Percutaneous Injury Rates. Retrieved September 10th,2009.
- Ramphal Lekhraj, Rosidah Zakaria, Leong Whyne Sook, Azahar MD Zain (2010). “Needle stick and sharps injuries and factors associated among healthcare workers in a Malaysian Hospital”. European Journal of Social Sciences. Vol.13.No.3.
- Raskeviciene R. Moroziene S. (2005) Article in Lithuanian. Medicina (Kaunas); 41(6):512-21.
- Ridgway, P., Nixon, T.E., Leach, J.P. (2003).” Occupational exposure to organic solvents and long-term nervous system damage detectable by brain imaging, neurophysiology or histopathology”. Food and Chemical Toxicology 41:153-187.
- Sadleir, B. (2010, May 11).” Environmental and Occupational Health Issues in Hospitals” Retrieved. May 11, 2010.
- Viegas, S., Ladeira, C., Nunes, C., Malta-Vacas, J., et al (2010). “Genototoxic effects in occupational exposure to formaldehyde”: A study in anatomy and pathology laboratories and formaldehyde-resins production. Journal of occupational.
- Wafula, W, (2012), “Occupational risk factors contributing to injury by medical sharps among health workers at Kenyatta national hospital”: Master thesis. Kenya.
- World Health Organization (WHO), (1997).
- World Health Organization (WHO), (2002).
- World Health Organization (WHO), (2003).” Sharps injuries: global burden of disease from sharps injuries to health-care workers”. Geneva (WHO Environmental Burden of Disease Series, No. 3).
- World Health Organization (WHO). (2005 b). “Preparation of National Healthcare waste management plans in Sub-Saharan counties, Guidance manual”. WHO, Geneva, Switzerland.
- World Health Organization (WHO). 2006. The world health report-2006: working together for health. Geneva. Switzerland.