ORIGINAL ARTICLE

Biosafety Practices in Different Clinical Laboratories in Karachi, Pakistan

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ABSTRACT

Introduction: In Pakistan the number of diagnostic and research laboratories is increasing in both public and private sectors but there is still a lack of awareness regarding biosafety practices among the lab employees. These employees can be technicians, technologists, researchers or even keeping staff who gets exposed directly or indirectly to a plethora of pathogens daily. The need is to spread awareness regarding the importance of fundamental biosafety practices.
Objective: To determine and compare the level of awareness and implementation regarding biosafety practices among different laboratories and their workers in Karachi, Pakistan.
Methodology: A survey was conducted from 10 different diagnostic laboratories of Karachi, participants were interviewed and made to fill out a questionnare.
Result: In the category of general safety 60% confirmed that they receive a formal biosafety training. 20% of the participants received a safety handbook. Usage of personal protective equipments were 80%.however 10% labs provide eye station and emergency shower facilitiy and 60% of the participants confirmed that fire station was not available in their lab. In the category of equipments, 80% of the participants agreed that their equipments were in working order, 60%of the participants confirmed that the PPM of their equipments were carried out on regular basis and Back up cold storage was available in only 20% of the laboratories. 40% of the participants said that the maintenance of biosafety cabinets was carried out regularly in their laboratories and only 40% were unaware regarding the certification of their biosafety cabinets. Whereas Proper disinfection and decontamination of biosafety cabinets was carried out in 70% of the cases.
Conclusion: The outcome of our survey confirms a lack of practice and implementation of good biosafety practices in the clinical laboratories.

Key words: Biosafety, laboratory, practices, Karachi.

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INTRODUCTION

There are number of research and diagnostic laboratories in Karachi working under private clinics or government or private sector hospitals. In these laboratories a dozen of employees are working as lab techologists, technicians, researchers and housekeeping staff. These staff members are daily exposed to multiple occupational health risks that consist of various infectious materials such as radiations, flammable chemicals, cultures etc[1].

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Regulation and execution of biosafety measures are a major concern for clinical laboratories. Laboratory biosafety has always been an important issue worldwide more specifically in developing countries where no authentic standard operating procedures(SOPs) are available or are not being implemented stricly[1].

Like other developing countries Pakistan is also facing a lack of awareness regarding biosafety practices among the lab employees who get exposed directly or indirectly to plethora of pathogens daily[1].

All procedures in the medical diagnostic laboratories have associated risks. Lab personnel handling clinical specimes containing highly infectious agents as Hepatitis, Dengue, HIV, MTB etc are at a high risk of acquring laboratory-acquired infection[2]. Injuries through infected needles and sharp cutting instruments used in labs and different medical procedures are also the basic source of laboratory- acquired infections[2].

Lack of general biosafety practices and poor handling are main sources of spreading infection beyond the laboratory into the general community[3,4]. These infections are also spread due to little knowledge of working in critical areas, negligence, shortcuts, working too fast, excessive self confidence and work load of the laboratoy samples received[5-7]. Protective clothing and safety precautions only can not guarantee the safety, need is to make combination of policies and system that protect the laboratory worker from seious risk of acquring laboratory infections and spread awareness regarding the importance of fundamental biosafety practices in order to restrict the number of incidents that are injurious to lab employees' health[5].

Knowledege of housekeeping staff regarding the waste diposal is also important because they are the key source of spreading infection in general population. Proper disoposal of hazardous material and injurious equipments should be regulated[8].

The main purpose of this study is to collect data from different laboratories of Karachi regarding the laboratory safety practices and biosafety risk. The awareness of laboratory personels about risk-assesment was also analyzed for personal protection and for the protection of other co-workers. Questionnare was developed based on routine laboratory practices such as hand washing, use of personal protective equipments (PPE), knowledge of laboratory equipments and their maintanence, use of biosafety cabinets, sample handling and sharp disposal were included.

Survey Methodology:

This questionnaire base study was conducted by DOW University and Health sciences in which 50 questions were included. Questionnare was divided into three sections, first section was related to general biosafety practices and facilities provided to their laboratories, second section was based on equipement and its maintenance. However last section of the questionnare consisted on proper mentanence of Biological safety cabinets (BSC).

In order to assess the level of awareness related to biosafety rules and regulations among laboratory workers from different clinical laboratories in Karachi a survey was conducted. An informed consent was obtained for each participant, who were then interviewed and made to fill out a questionnare. The questionnare was prepared on the basis of available standard literature and contained fundamental questions related to routine laboratory practices regarding general laboratory safety, equipments, hand hygine, personal protective equipments (PPE), biological safety cabinets (BSC), waste decontamination, sample handling and disposal of sharps and needles were also included. This survey also callect the information of each participants. questionnare were designed to take no more than 20 minutes to complete and the names of the participants and laboratories were kept confidential.

Survey Data Analysis:

Result of this survey for each section were compiled and analyzed by using spread sheet of Microsoft Excel. The results were generated according to the responce of participants.

Participant Laboratories of this Survey:

Most of the laboratories which have participated in this Biosafety survey were diagnostic laboratories. These laboratories perform variety of tests and were dealing with multiple pathogens such as HIV, Hepatitis, MTB and dengue etc.

RESULTS

General Biosafety Practices(section A):

The participants were asked questions regarding their general safety, equipments and biosafety cabinets used in clinical laboratories. In the category of general safety 60% confirmed that they receive a formal biosafety training whereas 40% did not. However 20% of the participants received a safety handbook and 80% did not. The usage of personal protective equipments was found to be a common practice in 80% of the participants. Only 10% of the paticipants confirmed that their lab was supplied with eye wash station and emergency shower whereas 80% lacked the facility and 10% did not know if they were provided with the mentioned facilities or not. Hand washing and decontamination of work bench top were the most highly/strictly followed practices and 100% of the participants agreed to carry them out regularly. Logbook for incident reporting is not maintained in 40% of the cases, 30% were unaware of it and 30% filled it accordingly. 60% of the participants confirmed that fire station was not available in their lab although 40% were provided with this facility.

Table 1(a): Awearness regarding General biosafety practices in different diagnostic labaratory of Karachi.

	No. of lab	YES Result in %	NO Result in %	Dont know Result in %
Lab safety training	10	60	40	00
Safety handbook	10	20	80	00
PPE	10	80	10	10
Decontamination of bench top	10	100	00	00
Logbook for incident reporting	10	30	40	30

Table 1(b): Physical facilities provided by laboratories

	No. of lab	YES Result in %	NO Result in %	Dont know Result in %
Eye wash station	10	10	80	10
Emergency shower	10	10	80	10
Availablity of fire station	10	40	60	00

Equipments and Maintenance(Section B):

In Equipments section (Section B) participants were asked to answer questions regarding working, registration and maintenance of the equipments. Participants were also asked about the presence of a back up cold storage in case of emergency. 80% of the participants agreed that their equipments were in working order, 10% did not and the rest were not aware if their equipments were working properly or not. The registration and identification number was provided to the equipments in 70% of the cases and was not provided in 20% of the cases. The rest of the 10% did not know if their equipments have a registration and identification number or not. 60%of the participants confirmed that the predictive and preventative maintenance of their equipments were carried out on regular basis although 20% did not and 20% were not sure if this was practiced in their laboratory or not. Back up cold storage was available in only 20% of the laboratories whereas 60% did not have any back up at all and 20% were not aware of its presence in their lab.

Table 2: Knowledge Equipements and Mentainance(Section B)

	No. of lab	YES Result in %	NO Result in %	Dont know Result in %
Equipments are in working order	10	80	10	10
Instruments have registration and identification numbers	10	70	20	10
Predictive and Preventative Maintenance of equipments	10	60	20	20
Back up cold storage	10	20	60	20

(BSC) Biological Safety Cabinets (Section C):

Usage of BSC included questions related to its maintenance, certification and proper decontamination practice. Participants were also asked if they kept their biosafety cabinets uncluttered or not. 40% of the participants said that the maintenance of biosafety cabinets was carried out regularly in their laboratories although this was not the case with 20% and 40% did not even know if it was practiced or not. 40% of the participants were unaware regarding the certification of their biosafety cabinets in the prior year.

In only 10% of the cases the biosafety cabinets were certified in the prior year whereas in the rest of the 30% they were not. Proper disinfection and decontamination of biosafety cabinets was carried out in 70% of the cases. The safety cabinets were kept uncluttered in 50% of the labs whereas 50% of the participants agreed that theirs were usually cluttered.

Table 3: Usage of BSC included questions related to its maintenance, certification and proper decontamination practice

	YES Result in %	NO Result in %	Dont know Result in %
BSC Maintenance	40	20	30
BSC Certification	10	50	40
Proper disinfection of BSC	70	30	00
Clear/Uncluttered	50	50	00

DISCUSSION

Our study shows that most of the laborarory workers have lack of awareness related to basic biosafety practices. According to previous study conducted in Karachi, out of 44 laboratories only two to three laborartories use proper gloves during bench work. In PPE gloves are the main source of spreading contaimination[9] hence the use of proper PPE is a good code of conduct and play a vital role in personal protection.

The manuals of Biosafety in Microbiology and Biomedical Laboratories published by The Centers for Disease Control and Prevention (CDC) state that all the biosafety cabinates and worktables should be decontaminated twice a day on daily basis. The data of our study revealed that over all 70% laboratory workers disinfect their work table daily, which minimize the risk of cross contamination and also improve the quality of work[3]. Similar study conducted in 2012 related to the use of disinfectant in Karachi show that approximatly 71% of the laboratories in Karachi use disinfectant to clean their work benches before and after work[3].

Although for BSL-2 laboratory facilities like biosafety cabinets, eyewasher, emergency shower, fire extinguishers, fire exit and separate place for eating and drinking are significant requirements, in our study only 40% of laboratories have fire station, 10 % have eyewash facility and 10% have emergency shower in their labs.

According to the previous study in 2012, upto 85% of the workers did not have traning courses on biosafety in Sindh, Pakistan[5,9]. Whereas in our study 40% of the participants in lab did not recieve any biosafety courses or traning.

CONCLUSION

The outcome of our survey confirms a lack of practice and implementation of good biosafety practices in the clinical laboratories among laboratory workers. In order to ensure complete security of laboratory employees against lab infections and incidents a strict regulation of biosafety practices is required. The need is to address this issue immediately. A biosafety officer should be appointed in each lab whose purpose is to ensure that all the lab personnels are following the required biosafety code of conduct. A regular and up to date record should be maintained regarding laboratory accidents and safety to avoid such incidents in future. Biosafety training sessions, workshops and lectures should be organized in order to spread awareness among lab workers. Moreover, a legislation regarding good biosafety practices should be passed in the parliment as well in order to implement such policies at government level so that it becomes mandatory on each and every private as well as public sector laboratory to follow the standard biosafety guidelines.

Most of the laboratories in Karachi are working without any recommanded standard operating procedures, need is to develop a proper system at the national level for laboratories before issuing them license.

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