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RESEARCH ARTICLE

A COMPARATIVE ANALYSIS TO DETERMINE THE KNOWLEDGE AND PRACTICE OF LABORATORY SAFETY MEASURES AMONG TECHNICAL STAFF OF THE LABORATORIES IN MEDICAL COLLEGE AND HOSPITAL

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ABSTRACT

Background: While working in a clinical laboratory, sometimes it happens that the health and safety can be overlooked, inadvertently pushed aside or forgotten–with dire consequences. However, with proper training and practice in noticing the mundane i.e. safety measures, we can find and correct many common mistakes and prevent hazards and injury. Aim: A study was carried out to study the knowledge and practice of safety measures being adopted in clinical laboratories.
Material and methods: The study consists of 97 respondents. Questionnaire was given in the form of pre-test and post-test to survey knowledge and practice of technical staff in the laboratory. In between training was conducted for improving the knowledge of the staff.
Results: Regarding laboratory symbols and laboratory safety knowledge - majority of the participants knew most of the symbols, health safety measures and their knowledge improved after training.
Conclusion: Laboratory safety in India has to be a part of overall safety programme in hospitals and all this can be achieved by having a good training programmes in hospitals in general and laboratories in particular.

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INTRODUCTION

In today's era clinical Laboratories are growing vastly. A growing number of clinical investigations are available to the physician and there is an increasing need for technicians to perform these laboratory tests in time. Workload of the laboratory clinicians and technicians has increased causing less focus on safety measures in the working place (Stricoff *et al.,* 1990). That's why occupational hazards exist wherever health care is practiced. Hence lot of accidents are occuring in the laboratories due to lack of proper knowledge regarding laboratory safety measures, indifference in attitude & improper implementation of safe laboratory practices (Leggett, 2012). Most hazards encountered fall into three main categories: chemical, biological, or physical. These hazards are dangerous to the life of persons working their in the laboratories. The danger can be aggravated by ignorance of the hazards, lack of knowledge on safety measures and inadequate safety measures adopted by laboratories (Leggett, 2012; Edward *et al.,* 2001). Therefore there is an urgent need that, every Laboratory personnel should be aware of the potential hazards in their workplace. It is important for them to ensure safety in their practice (Ejilemele *et al.,* 2004). The prevention of laboratory accidents requires great care and constant vigilance from both side i.e. the workers and the management. Understanding the required need and recognizing hazards will help them in identifying and minimizing many of the common safety and health hazards associated with working in laboratory (Stevens, 2003).

Aim: In view of this, the present study was carried out to analyse the knowledge and practice of laboratory safety measures whether carried out or not among technical staff of laboratory in the hospital.

MATERIALS AND METHODS

This was a comparative study which used a standardized, structured self-administered questionnaire to survey knowledge and practice of technical staff in the laboratory. The study enrolled 97 respondents. The forms were given to 110 participants but only 97 forms were completely filled up due to unavoidable reasons. Questionnaire is given in Table 1. The questionnaire was self generated and adapted from the literature regarding safety and health hazards in the laboratory.

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Table 1. Questionnaire

Part-1: Knowledge regarding laboratory symbols


1.Recognize the sign and define


2.Recognize the sign and define

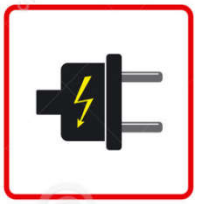

3.Recognize the sign and define


4.Recognize the sign and define


5.Recognize the sign and define


6.Recognize the sign and define


7.Recognize the sign and define


8.Recognize the sign and define


9.Recognize the sign and define


10.Recognize the sign and define


11.Recognize the sign and define


12.Recognize the sign and define

Part-2: Knowledge regarding laboratory safety

	Question
1	Laboratory Safety starts before entering and starting the laboratory work
2	Protective clothing should be decontaminated with sodium hypochlorite before washing
3	First Aid kits are available for the emergency conditions in laboratory
4	MSDS are used internationally to provide the information required to allow the safe handling of hazardous substances at work.
5	Blood samples to be discarded after serum separation.
6	Safe disposal of sharps in a sharps container.

Part-3: Practice about laboratory safety

7	I wear gloves during blood collection
8	I report needle prick injury
9	I always follow biomedical waste management rules
10	I am immunized with Hepatitis B vaccine

Table 2. Correct response towards knowledge regarding laboratory symbols before and after training in %

Recognize the sign and define		Correct response (%)		Recognize the sign and define		Correct response (%)	
Que No.	laboratory symbols	Before Training	After Training	Que No.	laboratory symbols	Before Training	After Training
1		88.63	98.66	7		71.93	82.31
2		82.31	96.10	8		69.87	93.10
3		93.41	99.10	9		52.07	72.31
4		68.97	81.78	10		48.21	52.07
5		82.31	93.10	11		48.21	52.07
6		89.96	99.10	12		52.07	52.07

It was self-administered, and consisted of twenty two standardized questions. Before questionnaires were handed over to the participants, the aims and objectives of the study were explained to them. Questionnaires were handed out to the group of staff members of laboratories under the supervision of the study in charge so that they don't consult each other. A post education (after training on Laboratory safety) Questionnaires that one is same as Pre Education Questionnaires was administered to all participant staff after Induction training on Laboratory safety. Questionnaires consisted of 12 questions on laboratory symbols and 10 questions related to safety in laboratory practices. The data for pre-test and post-test were collected was analysed in % and score.

RESULTS

Data analysis showed that among the participants, 68% were males and 32% were females. The respondents fall between the age group of 21-43 years. The part-1 of the questionnaire for this study was to assess knowledge of the technical workers regarding laboratory symbols as shown in table 1. Correct response to the questions differs in before and after training of laboratory safety. The symbols of biohazard, chemical hazard, radioactive hazard, recycling were recognized by >80% of the participants before training. The fire hazard symbol was identified by 93.41% of the participants correctly. But few symbols like oxidising, corrosive, gas under pressure and environmental hazards were recognized by ≤50% individuals. The knowledge increased after training as shown in table 2.

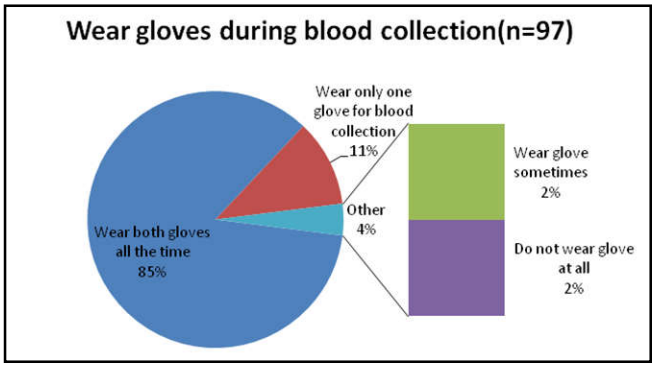


Figure 1. % distribution of data regarding wearing of gloves before training

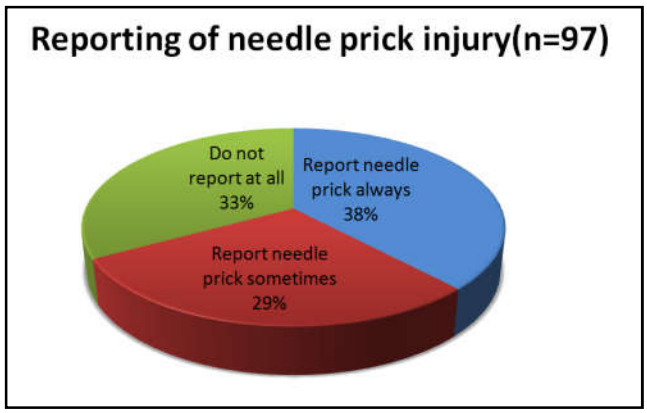


Figure 2. % distribution of data regarding reporting of needle prick injury before training

The part-2 i.e. regarding laboratory safety knowledge- the majority knew the very important issues related with laboratory safety like discarding of blood samples, safe disposal of sharps and first aid kits. But very few were aware regarding protective clothing contamination and MSDS (Material Safety Data Sheets). Their knowledge improved after training except MSDS as shown in table 3. In part-3 as shown in table 4 i.e. in regard to the practice about laboratory safety, all are very much aware about importance of protective devices i.e. Wearing Gloves-85% (Figure 1) and Biomedical waste management-98% (Figure 3). However, less number of participants reported needle prick injuries-38% (Figure 2) and only 69% (Figure 4) individuals were fully immunized with antibody titre done. After the training all the participants agreed to practice safety measures fully (100%) as shown in table 5.

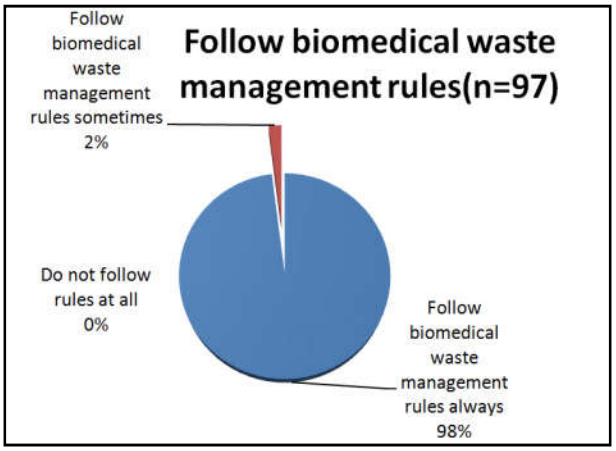


Figure 3. % distribution of data regarding biomedical waste management rules before training

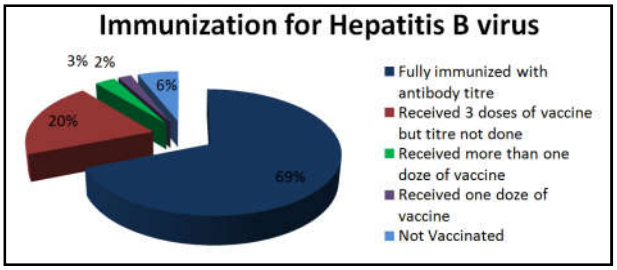


Figure 4. % distribution of data regarding immunization for Hepatitis B virus before training

DISCUSSION

A laboratory is a place, building or part of a building used for scientific and related work that may be hazardous. The hazards encountered in a laboratory are many and varied and may result in short term or long term health effects if individuals are exposed to these hazards (Ozsahin *et al.,* 2006; Wayne, 2004). Before starting any work in the lab, personnel should be familiar with the procedures and equipment being used. Safety consciousness and safe laboratory practices are therefore of primary importance for the protection of laboratory workers against injury and infection and the prevention of damage to property (Gupta *et al.,* 2006). In this study >75% participants were having knowledge regarding various laboratory symbols which improved after training, thereby increasing the % of correct response in post-test.

Table 3. Data in % for knowledge regarding laboratory safety before and after training

	Knowledge regarding laboratory safety Question (n=97)	Before training(%)		After training(%)	
		Agree	Disagree	Agree	Disagree
1	Laboratory Safety starts before entering and starting the laboratory work	85.76	14.24	89.66	10.34
2	Protective clothing should be decontaminated with sodium hypochlorite before washing	27.59	72.41	65.52	34.48
3	First Aid kits are available for the emergency conditions in laboratory	75.14	24.86	91.35	8.65
4	MSDS are used internationally to provide the information required to allow the safe handling of hazardous substances at work.	34.52	65.48	41.66	58.34
5	Blood samples to be discarded after serum separation.	100.00	00.00	100.00	100.00
6	Safe disposal of sharps in a sharps container.	100.00	00.00	100.00	00.00

Table 4. Data in % regarding practice about laboratory safety before training

Practice about laboratory safety before training		
7	Wear gloves during blood collection	Participants(n=97)
	Wear both gloves all the time	82 (85%)
	Wear only one glove for blood collection	11 (11%)
	Wear glove sometimes	2 (2%)
	Do not wear glove at all	2 (2%)
8	Reporting of needle prick injury	Participants(n=97)
	Report needle prick always	37 (38%)
	Report needle prick sometimes	28 (29%)
	Do not report at all	32 (33%)
9	Follow biomedical waste management rules	Participants(n=97)
	Follow biomedical waste management rules always	95 (98%)
	Follow biomedical waste management rules sometimes	2 (2%)
	Do not follow rules at all	0 (00%)
10	Immunization for Hepatitis B virus	Participants(n=97)
	Fully immunized with antibody titre	67 (69%)
	Received 3 doses of vaccine but titre not done	19 (20%)
	Received more than one doze of vaccine	3 (3%)
	Received one doze of vaccine	2 (2%)
	Not vaccinated	6 (6%)

Table 5. Data in % regarding practice about laboratory safety after training

	Practice about laboratory safety	After Training (Yes in %)
7	I wear gloves during blood collection	100
8	I report needle prick injury	100
9	I always follow biomedical waste management rules	100
10	I am immunized with Hepatitis B vaccine	100*

*Participants promised to get fully immunised.

The knowledge regarding laboratory safety of the participants were better in regard of safe disposal of samples and sharps as well as availability of first aid kits which is similar to other studies (Michael, 1992). Very few participants were aware of protective clothing decontamination method. This can be seen in study conducted by hospital in Nigeria in which the knowledge of decontamination was not clear among the staff (Ejilemele and Ojule, 2005). Material Safety Data Sheets (MSDS) are used internationally to provide the information required to allow the safe handling of hazardous substances at work. In our study only 35% participants were having the knowledge of MSDS. This was also seen in study conducted by Naduva A in which it was found that most health facilities lacked awareness on safe chemical waste management which is similar that of our study findings (Naduva, 2006). The awareness of usage of gloves and biomedical waste was better which shows the good laboratory practice, but immunization status was not up to the mark. The reporting of needle prick injury was of not much importance according to the participants which was not good for their safety. Some studies support our findings (Ejilemele and Ojule, 2005; Jegathesan *et al.,* 1988) while some are contrast to our findings of needle prick injury (Yassi *et al.,* 2007). The induction training on Laboratory safety is very important and motivating exercise for improving the laboratory safety measures (Berte, 2007).

A laboratory safety program should consist of commitment by authorities of the management, promise to establish a safe work place, responsibilities of management, inchanges and laboratory staff as a group to support the program, establishment of appropriate on the job training and development and implementation of effective safety measures (Berte, 2007; Aksoy *et al.,* 2008). This way healthcare system would be safer at all levels to prevent injuries and risks.

Conclusion

This study indicates that emphasis on safety practice, proper disposal systems and education in the form of training, should be employed to reduce exposure to hazardous chemicals and other materials among the laboratory staff. Laboratory safety should be a part of overall safety programme in hospitals and all this can be achieved by having a proper training program in hospitals in general and laboratories in particular.

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