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KNOWLEDGE, ATTITUDE AND PRACTICE OF ASPECTS OF LABORATORY SAFETY IN PATHOLOGY LABORATORIES AT THE UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL , NIGERIA

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ABSTRACT

Objective: To assess current knowledge, attitudes and practice of aspects of laboratory safety in pathology laboratories at the University of Port Harcourt Teaching Hospital in view of perceived inadequacies in safety practices in clinical laboratories in developing countries.

Materials and Methods: Sixty (60) self- administered questionnaires were distributed to all cadres of staff in four (4) different laboratories (Chemical Pathology, Haematology, Blood bank and Medical Microbiology) at the Hospital.

Result: Gross deficiencies were found in the knowledge, attitudes and practice of laboratory safety by laboratory staff in areas of use of personal protective equipment, specimen collection and processing, centrifuge – related hazards, infective hazards waste disposal and provision and use of First Aid Kits.

Conclusion: Issues pertaining to laboratory safety are not yet given adequate attention by both employers and employees in developing countries in this ear of resurgence of diseases such as HIV/ AIDS and Hepatitis Band C, is emphasized.

INTRODUCTION

Medical laboratories are potentially hazardous places and hazard containment should be a priority[1,2] . It is therefore essential that a laboratory safety programme should be in place in every medical labortory[2]

The laboratory safety programme will ensure that employer's state unequivocally policies which operate in the work environment. These policies should be communicated to staff on recruitment into the work place and be adhered to by all staff. In many developing countries e.g Nigeria laboratory safety is not accorded proper attention largely as a result of ignorance. We conducted this brief study to evaluate the knowledge, attitude and practice of safety procedures in order to draw attention to this often-neglected aspect of laboratory practice. The findings are presented in this paper.

MATERIALS AND METHODS

A total of Sixty (60) questionnaires were administered to staff working in four (4) different laboratories (chemical Pathology, Hematology, Blood Bank and Medical Microbiology) at the University of Port Harcourt Teaching Hospital. From this number, Fifty one (51) questionnaires were properly completed and all further analysis were carried out on this number alone. Five (5) questionnaires were invalid because of inconsistency of responses while four (4) respondents did not return their questionnaire

RESULTS

Respondents: The mean age of respondents was 35.3±8.8 Years (range 25 – 57 Years) .Twenty – eight (54.9%) were males while 23 (45.12%) were females, giving a male : female ratio of 1.2: 1 .The respondents were spread over the four laboratories with 21 respondents (41.2%) in Chemical pathology, 13 respondents (25.5%) in Hematology and Blood Bank, 16 (31. 4 %) respondents in Medical Microbiology. One respondent did not state his affiliation

Efforts were made to include every cadre of teaching staffing the survey in order to assess better the safety attitudes among the various cadres of staff in the laboratories. (See Table 1)

Specimen Collective and Use of Personal Protective Equipment (PPE):

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Twenty respondents (39.2%) wore gloves while 25 respondents (49%) did not wear gloves when collecting blood samples from patients. Amongst respondents who wore gloves. they were changed only once daily. Other protective clothing worn while collecting blood included laboratory coats and face masks by 28 (54.9%) and 1 (2%) respondents. respectively. These coats were generally laundered at home because there was no laundry service for laboratory coats in the hospital.

When carrying out routine laboratory work. only 13 respondents (21.3%) wore gloves while only 20 respondents (32.2%) wore laboratory coats. A total of 23 respondents (37.7%) did not war any PPE. Five respondents (8.72%) did not state what type of PPE they wore. Only 2 respondents (3.9%) wore safety goggles while working in the laboratory with acids corrosive substance

Sample Processing:

Thirty – two (32) respondents (65.2%) had worked at reception bench for periods ranging from once a month to four times a week (Table 11). One half (50%) of the respondents reported that some samples received were not well sealed and this therefore led to spillages. When these spillages occurred there was no clear – cut policy by laboratories as to what should be done with the sample. The action taken therefore depended on the discretion of the staff and it ranged from merely cleaning off the spilt sample from the specimen container to outright rejection of the sample. Eight of the respondents (13.8%) would clean the specimen container with a disinfectant. while only two (3.5%) would send a free specimen bottle to the attending physician for a repeat collection after rejection of the sample.

Request Forms:

Requests forms may get stained with body fluids when spillage occurs. Fifty respondents (98%) had received such stained forms. The frequency with which such forms were obtained ranged from once a month to more than four times a week (Table **III**). In this instance. there was no clear – cut laboratory policy. and staff response varied from destruction of the stained form and filling of a replacement by 28 respondents (49.1%) to outright rejection of the form and sample by 18 respondents (31.6%) and processing of the sample without filling another form by 11 respondents (19.3%).

Forty respondents (75.8%) admitted that their laboratory ran out of specimen containers and the frequency with which this occurred ranged form once a month to once a year. When this happened, old specimen bottles were recycled until a fresh stock could be bought on an emergency basis in order to prevent a breakdown in service

In some laboratories. e.g. Chemical pathology and the Blood Bank. there is usually a need for secondary containers to be used in storing serum / plasma. Twenty seven respondents (45. 8%) affirmed that bijou bottles. which are often recycled. are used as secondary containers. Other secondary containers used include washed Lithium heparin / Ethylene diamante tetra- acetic acid (EDTA) bottle. test tube and commercial single – use plain bottles.

Centrifuge Related Hazards:

Twenty six respondents (51%) did not cover sample before centrifugation while twenty four (47.1%) did. In addition. eight respondents (15.7%) opened centrifuges before the rotors had stopped completely.

Infective Hazards:

A total of 41 respondents (86.32%) had received samples from individuals who may be classified as "high risk or who were Human immunodeficiency virus (HIV) or hepatitis B virus (HBV) positive. The frequency with which such samples were received ranged from once a day by 6 respondents (13.6%) to once a week by 2 respondents (4.5%). These samples were usually not identified or "Flagged" as high –risk samples. They were also not usually sent in any leak – proof bags. In addition. there were no designated centrifuges for separating these samples. neither were there no designated centrifuges for separating these samples. neither were there any staff that were specially trained in the handing of these samples.

Hepatitis B Virus Immunization:

Despite the fact that 50 respondents (98%) considered hepatitis B Immunization important and 36 respondents (70 .6%) had initiated the process of being vaccinated; only 6 respondents (16.7%) had complete their immunization schedule.

Waste Disposal:

In the laboratories evaluated. 31 respondents (60.8%) admitted that there was no defined waste disposal disposal system. Of the 19 respondents who suggested the existence of one. their description showed that the waste disposal system revolved round the use of a plastic waste basket. When respondents were asked to describe what was considered as an adequate waste disposal system. various description as shown in Table IV were given Enquiries concerning how specific materials were disposed showed the following:

(a) Fifty respondents (98%) confirmed that needles used in collecting blood were generally recapped and thrown into the laboratory dustbin. Other

materials used in venepuncture e.g swabs, plaster etc are thrown into the dustbin

(b) Sample wastes are either poured down the laboratory sink or the specimen containers thrown away along with the waste in the laboratory dustbin

(c) Forty eight respondents (94.1%) noted that the chemicals are generally disposed of by pouring them down the sink.

First Aid

In the laboratories evaluated, 46 respondents (90.2%) confirmed that there was no first aid box while 3 respondents (5.9%) suggested the existence of one. Forty-nine respondents (96.1%) noted that there was on eye wash station. Two respondents did not give any response to both questions. Only 6 respondents (9.8%) stated that a report of eye injury would be made to the Chief Technologist or the Head of Department, while 45 respondents 90.2% did not consider it necessary

Eighteen respondents (36%) had suffered needle – stick injuries while recapping needles. In some instances, the wound was cleaned with only water before it was dressed with plaster (20%) while in other instances; it was cleaned with spirit and dressed with iodine or plaster (45% &10% respectively). In 25% of cases, no treatment was given. In 72. 7% of the cases, the injury was not reported.

Mouth Pipetting:

None of the laboratories evaluated is automated and therefore, glass mouth pipettes were routinely used. Only 7 respondents (13.7%) used pipette filters. Thirty seven respondents (72.5%) still used mouth-pipette and 20 respondents (41. 7%) had accidentally sucked samples while mouth pipetting.

Decontamination of Work Surfaces / Wash Hand Basins:

In the laboratories valuated, work surfaces in the laboratory were regularly decontaminated at least once a day as stated by 42 respondents (82.4%). The decontaminating fluid used included hypochlorite and phenolic disinfectants. On the other hand, the wash basin used for hand washing was also used for waste disposal. Only 20 respondents (39. 2%) suggested that these sinks were decontaminated. The frequency with which this was done ranged from once a day to once a mouth.

Table I. **Distribution of Resondents According To Professional Cadre**

Cadre of staff	No.	%
Chief Technologist	1	1.96
Assistant Chief Technologist	3	5.88
Senior Laboratory Science Officer	2	3.92
Principal Laboratory Science Officer	12	23.53
Medical Laboratory Science 11	4	7.84
Chief Laboratory Technician	2	3.92
Senior Laboratory Technician	3	5.88
Laboratory Technician	3	7.84
Senior Laboratory	4	7.84
Senior Laboratory Assistant	1	1.96
Laboratory Assistant	1	1.96
Youth Corpers	10	19.61
Cleaner	1	1.96
Laboratory Supervisor	1	1.96

Table 11: **Frequency Rotation of Respondents at Reception Desk**

Frequency of Rotation at Reception Desk	No.	%
Once / week	9	18.4
Twice / week	5	10. 2
Thrice / week	3	6.1
Four times /week	11	2.2
Once / month	1	2.0
2 – 3 times / month	3	6.1
Not at all	13	26.5
Not stated	4	8.2

Table 111: **Frequency of Reception Stained Forms by Laboratory Staff**

Frequency of Receiving Stained Forms	No.	%
Once / week	21	44.7
Twice / week	4	8.5
Thrice / week	5	10.6
Four times / week	5	10.6
Once / month	1	2.1
Once / while	1	2.1
Not stated	10	21.3

Table IV: **Description of Adequate Waste Disposal System**

Description of waste Disposal System	No. of Respondents	%
Use of bags in covered bins and incineration	2	7.1
Well covered dustbin	6	21.4
Decontaminate before disposal	1	3.6
Autoclave bio – hazardous waste before disposal	1	3.6
Use of sharp Container	1	3.6
Use of pedal bin	1	3.6
Use of incineration	3	10.7
No description	13	46.4

DISCUSSION

This study has shown that the number of staff who uses PPE is not high as expected. Reasons given for not using PPE included non- provision and high ambient temperature due to lack of air conditioning in the laboratories. This practice is contrary to recommendations is the Occupational Safety and Health (OSHA) laboratory 29 CFR 1910. 132[4] and will undoubtedly increase exposure of staff to various types of hazards in the laboratory.

Personal protective equipment should be laundered by the hospital laundry department. Laundering of laboratory coats at home should be discouraged in order to reduce exposure of the other members of the family to infective hazards.

We found that more than sixty percent (60%) of the staff had cause to work at the reception desk at one time or the other. Often times, samples received were not well sealed and this led to spillages. Inadvertently, this led to increased exposure of staff to infective hazards. This was further worsened by the lack of a clear-cut policy by the laboratory on how these spillages could be handled. Ninety-eight of respondents had received request forms stained with samples. Again there was no clear-cut laboratory policy on how such request forms should be handled. This would therefore increase the exposure of laboratory staff to infective hazards.

The use of bijou bottles and other washed bottles as secondary containers as against single- use disposable plastic container is also potentially hazardous but this is necessitated by a desire to keep the cost of laboratory services affordable. Efforts made by the laboratory to reduce hazards to staff included soaking of the bijou bottles in hypochlorite solution overnight before washing.

Centrifuges are a potential hazard in the laboratory[5] . Every effort should therefore be made to make their use as safe as possible. All staff that makes use of centrifuges should be instructed on its proper usage. In this way, aerosol and droplet genera nation and breakages are minimized. The laboratory should therefore have written policies on how to handle such spillages and breakages.[1,5] About 11.3% of blood samples submitted to these laboratories may be infected with Human Immunodeficiency Virus (HIV) [6] while about 14.5% may be infected with the hepatitis B (HBV) virus [7]. These constitute "high risk" samples. In order to minimize infection risk to laboratory staff, every laboratory should have a clear- cut policy on how samples from these individuals should be handled. This policy should include proper identification and "flagging" of high- risk samples by requesting physicians for safer handling and processing of such samples. In addition, hospitals should be encouraged to protect staff that are at risk of exposure to HBV by providing active immunization. This will go along way towards reducing hospital-acquired infections [1,7] Laboratory infections wastes and toxic material must be disposed off in a manner which prevents environmental contamination in communities where there laboratories are located, as well as reduce exposure of laboratory staff to these toxic/ infectious agents [1,8] To this end, all potentially infectious wastes e.g. blood stained swabs, red- cell residue or other body fluid residue should be placed in sealed leak proof bags/ containers and autoclaved before final disposal, preferably by incineration [3,9,10.] All sharp objects e.g. needles, syringes, pipette tips, disposable glass ware, scalpels, broken glass, etc. should be placed in a rigid puncture- resident disposable container with a lid and clearly labeled as containing sharps before transportation for incineration [1,3, 9, 10.]

Re- useable items e.g. glass pipettes, beakers, etc. which may have been contaminated with biological or chemical agents, should be decontaminated appropriately before re-use [5-10] All non – infectious dry wastes, e.g. waste- paper, paper hand towels, etc. should be placed in a plastic bag separately before disposal [10.] . Radioactive and other hazardous chemicals should be disposed of in accordance with existing regulations [2]. The method of waste disposal in the laboratories evaluated was grossly inadequate. There is therefore a need for the development of disposal policies and appropriate staff education in order to reduce occupational exposure to hazardous waste and prevent unnecessary exposure of the community to laboratory wastes. Laboratories should be equipped with first aid kits, emergency shower stations and eye wash stations [2,5,10.] All members of the staff should be aware of where these facilities are

located and be conversant with their use. In addition, all laboratory accidents requiring the use of any of the facilities stated above should be recorded and reported to a supervisor [2]. Usually these injuries indicate a hazardous situation, which requires correction. In addition, these injuries may lead to permanent disability, which may requires compensation in future. The laboratories evaluated lacked adequate first aid facilities. There was also no established incident reporting system. There is therefore a need to equip these laboratories with these facilities.

One of the requirements for good safe working practice in laboratories is the use of pipette fillers and safety goggles when working with corrosive materials [1,8]. At the time the laboratories were studied, these measures were not fully in place.

Working surface decontamination using an appropriate decontaminant should be an integral part of laboratory safety. [2,10] Sinks used for hand washing should be separated from that used for waste disposal [11] In the laboratories studied, work surfaced were regularly decontaminated with either hypochlorite or phenolic agents. However, the same sink was used for hand washing and waste disposal.

CONCLUSION

The laboratories studied are laboratories in an apex tertiary institution (Teaching Hospital) in Nigeria, where relatively best standards of practice are observed. The results of this study clearly show that issues pertaining to laboratory safely are not given adequate attention by both employers and employees. The situation in the laboratories in smaller and less funded general hospitals and health centers would be better imagined.

There is therefore a need for laboratories in Nigeria to embrace safely measures in the work place. There is also a need for continuing education of staff on safety practices. Already existing legislation should be instituted on waste disposal and a process for enforcing compliance with such legislation should be instituted. This will go a long way towards reducing hazards in the workplace and injuries related to the presence of these hazards.

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