"OCCUPATIONAL HEALTH HAZARDS AND SAFETY MEASURES IN LABORATORY DEPARTMENT"

A Dissertation submission in partial fulfilment of the requirements
For the award of

Post Graduate Diploma in Health and Hospital Management

By

Garima Bajaj

International Institute of Health Management Research

New Delhi - 110075

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OCTAVO SOLUTIONS PVT. LTD.
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Certificate of Internship Completion

Dated: 30th April'13

TO WHOM IT MAY CONCERN

This is to certify that **Ms. Garima Bajaj** has successfully completed her 3 months internship in our organization from **February 01, 2013** to **April 30, 2013**. During this internship period, she has worked on "**Occupational Health Hazard & Safety Measures in Laboratory**" under the guidance of Ms. Sonia Verma and her team at **Octavo Solutions Pvt. Ltd.**

She has successfully completed her dissertation, proven herself professionally, and her performance has been commendable throughout.

We wish her good luck for her future assignments

Sonia Verma
Assistant Consultant

Gauri Madan
Asst. HR Manager

Certificate of Approval

The following dissertation titled "**Occupational Health Hazards & Safety Measures in Laboratory**" is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Post- Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation

Name	Signature
Dr. Shelly	

Name of Student :-
Gaurima Bajaj

Certificate from Dissertation Advisory Committee

This is to certify that **Ms. Garima Bajaj** a graduate student of the **Post-Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled **"Occupational Health Hazards & Safety Measures in Laboratory"** in partial fulfilment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management**.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Faculty Mentor DR. NITISH DOGRA

Designation ASST. PROF.

IIHMR

New Delhi

Date 01/05/2013

Organizational Advisor
Sonia Verma

Designation
Associate Consultant.

Organization
Octaus Solutions Pvt. Ltd.

Address
B4/167 Safdarjung Enclave.

Date 2/05/13.

FEEDBACK FORM

Name of the Student: Garima. Bajaj

Dissertation Organisation: Octavo Solutions Pvt. Ltd (OSPL)

Area of Dissertation: Occupational Health Hazards & Safety Measures in Lab.

Attendance: Full.

Objectives achieved: She has monitored IBo projects in Orissa & Bengal (Collection of reports from onsite consultants & verification of Reports.)
• Monitored & have work on NABH projects.

Deliverables: Submission of Project Report on Occupational Hazards & Safety Measures in Lab.

Strengths: Sincere & diligent, Willing to learn

Suggestions for Improvement: Interpersonal Skills.

Sonia-V

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date: 2/5/2013
Place: New Delhi

ABSTRACT

INTRODUCTION:-

Occupational hazard can be defined as the risk to the employees of an organisation or hospital while working and will always differ as per the work area and department. In a laboratory there is much kind of hazards which can be happened any time during work. And for reducing the hazards it is needed to keep the safety. In laboratory 5 hazards has been classified in this report. Electrical hazards, Chemical hazards, Biological hazards, Physical hazards & Fire hazards. Safety measures are also given there for preventing these hazards. Each hazard has different safety measures as per the requirement.

OBJECTIVE:-

General objective is to know about the occupational hazards in laboratory & to access the availability, practices and knowledge of laboratory safety measures.

METHODS:-

It is a descriptive observational study. The sample collection has been done in the laboratory department of the super speciality hospital. A checklist & questioner has been used as a tool for the sample collection. The sample size was 7. The data analysis has been done in M-Excel. Primary & secondary both data has been used for report writing.

FINDINGS:-

It has been found that the there were no safety measures found in the laboratory. The average risk of occur any hazard in future was 50%. The staff's average knowledge level about the safety measures and the hazards was 64%. Many gaps were found there. The lab staffs have not been given any training regarding laboratory safety. The reporting error was also found because they said that till now no hazard has been reported. These are the major findings.

ACKNOWLEDGEMENTS

I want to express gratitude to my mentor Dr. Bidhan Das, the MD of Octavo Solutions Pvt. Limited who provided his untiring support in facilitating, motivating and guiding me for the completion of my dissertation Report.

I am sincerely thankful to all my seniors in Octavo Solutions Pvt. Ltd. who were extremely helpful, proactive and cooperative to me throughout the interim study. Specially thanks to my mentor Miss. Sonia in Octavo Solutions Pvt. Ltd. for her cooperation. I also convey my thanks to the entire staff of XYZ Hospital, Gurgaon for helping me while collecting the required data for this project.

I take this opportunity to express my deep sense of gratitude to my guide and mentor Dr. Nitish Dogra, Faculty, IIHMR for his constant support and encouragement.

My dissertation at Octavo Solutions Pvt. Limited, New Delhi has been an enriching experience and gave me the cordial environment and platform to learn and link my theoretical knowledge with practical knowledge.

Garima Bajaj

CONTENTS

ABBREVIATIONS

S. No.	Acronyms	Full form
1.	BMW	Bio medical waste
2.	Lt	Litre
3.	BLS	Basic Life Support
4.	ACLS	Advanced Cardiac Life Support
5.	ICCU	Intensive Cardiac Care Unit
6.	CCU	Coronary Care Unit
7.	ILO	International Labour Organisation
8.	WHO	World Health Organisation
9.	HIV	Human Immunodeficiency Virus
10.	HBV	Hepatitis B Virus
11.	HCW	Health Care Worker
12.	HCV	Hepatitis C Virus
13.	FTE	Full-Time Equivalent
14.	CDC	Centres for Disease Control and Prevention
15.	OSHA	Occupational Safety and Health Administration
16.	PPE	Personal Protective Equipment
17.	MSDS	Material Safety Data Sheet
18.	PEP	Post Exposure Prophylaxis

Part – 1

INTERNSHIP REPORT

Objective of the Internship:-

The objective of the internship at Octavo Solutions Pvt. Ltd. was to gather an exhaustive knowledge about the Dimensions of a Healthcare Consulting Organization and apply the insights so gained to succeed in the same industry. The Dimensions of a Healthcare Consulting Organization are Planning, System Development and Operation, Quality Healthcare Certification, Public Private Partnership, Capacity Building, Information and Technology, Knowledge Management and Public and Rural Health. Main objective of the internship was to understand the working of my Organization on Quality Management System and Quality Assurance Program.

As a Management Consultant, my roles and responsibilities included understanding the current ongoing Projects being handle by my Organization and understand the functioning of the unit. We are involved in improving the Clinical and Non Clinical Performance Indicators of the Health Facilities. When we talk of improving the performance indicators and achieving the best out of available resources, role of a Healthcare Management Professionals like Management Consultant becomes crucial as they are the person who suggests measures for inputs rectify all the process flow of the healthcare facilities and finally will monitor the healthcare indicators.

Organisation profile:-

Octavo Solutions Pvt. Ltd. (OSPL) a multidisciplinary Health & Hospital Management Consulting firm, established and managed by health management experts, supported in its initiatives and efforts by experienced and reputed experts in field (like Architecture, Engineering, Public Health, Bio-medical Engineering, Clinical Experts, National and International Quality Gurus, Project Management experts), who have successfully undertaken health, hospital and other infrastructure projects ranging from small nursing homes to large medical college hospitals, including public health. We are associated with a number of reputed consulting organizations and thus can draw upon qualitative and latest expertise as and when required. With our ongoing in-house research and quality improvement efforts, we always strive to be up-to-date and able to provide the client qualitative, cost effective and

comprehensive solutions. Our experts have worked with QCI, JCI and Australian Council of Health Standard International (ACHSI) and donor-funded projects like, the World Bank and the distinguished clients served includes the Ministry of Health, Govt. of India; State Governments, Private clients, Corporate House & Charitable Hospitals. Octavo Solutions Pvt. Ltd. is the first Consulting firm registered with Quality Council of India (National Accreditation Board for Education and Training) for providing consulting services in field of Healthcare.

MISSION

To become the Leader in Healthcare Consulting in India by providing value for money, effective, efficient solutions and hands on support.

VISION

To focus on continuous development of processes for understanding the needs and expectations of the Clients; leading to continual improvement and achievement of real Client satisfaction.

To redesign (existing) and develop (new) quality healthcare institutions and hospital with competitive process designs/ models matching national and international standards.

VALUE

- Client Delight
- Competent
- Honest
- Truthful
- Ethical
- Sincere
- Disciplined
- Teamwork
- Focused
- Integrity

SERVICES

1. Project & Strategic Planning
• Business Case Writing
• Facility Plan Draft, Architect Briefs
• Equipment Planning
• Equipment Procurement
• Turn Key Project
• Vision Documents
• Resources Plan Draft

3. Quality Healthcare Certifications
• Gap Analysis & Preparation for Accreditation
• NABH Accreditation
• ISO 9001:2008 Certification
• ACHS International Certification

5. Public & Rural Health
we take up advisory/ consulting role on boards of NGO/ Government/ PSU/ Corporate for planning, implementing or monitoring of their projects in the fields of

- Epidemiology
- Bio Statistics
- Vital Statistics & Surveillance
- Environmental Health
- Health Services Administration

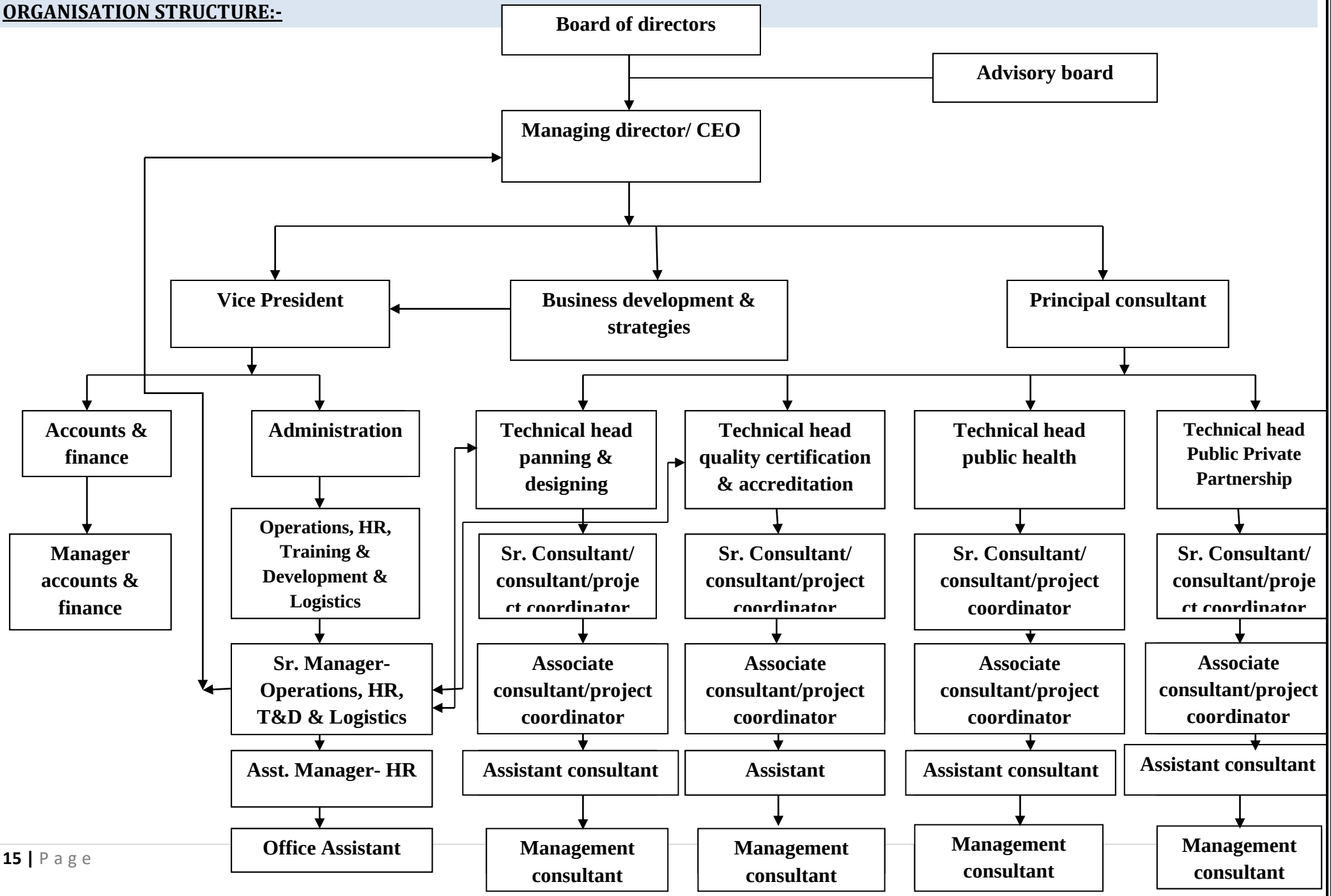
2. Operations & Systems Development
• Managed Operations Contract
• Systems & Policy Development
• Cross Sectional Studies/ Audits
• Process Flow & Mapping
• Change Management
• Facilities Management
• Supply Chain Management

4. Public Private Partnerships

We partner with **Delloitte Teusche/ Feedback Ventures/ Abacus Legal Group** for taking up transaction advisors role in providing consulting services to Government for PPP projects

6. CapacityBuilding
• Manpower (Resource) Allocation & Planning
• Recruitment Contracts
• Continuous Education & Training

ORGANISATION STRUCTURE:-



Key Strengths and Salient Features of OSPL

The primary strength of our company is to partner the client organization to optimize resources & implement the improvement strategies successfully. An assignment begins with an accurate assessment of people, processes, performance and strategies. Our consultants define competitive strengths, threats and opportunities to define performance gaps and growth potential. To assure successful implementation and competitive advantage, we develop an execution action plan with essential controls for the management system under consideration, (PERT Chart). Unique Bottom-Up consulting approach of our consultants ensures success of our consulting assignments. This approach ensures that plans are accepted & practiced at all the levels of management. We have an unmatched 100% success rate for all the projects taken up so far in our journey.

Key Strengths

- A Private Limited Company (Reg. No. U72400DL2007PTC159745)
- Short listed firm with NHSRC (National Health Systems Resource Centre) under aegis of Ministry of Health & Family Welfare (Government of India)
- Talented Leadership from leading institutes like
- All India Institute of Medical Sciences (Delhi),
- School of Planning and Architecture (Delhi),
- Tata Institute of Social Sciences, (Mumbai)
- Indian Institute of Health Management and Research (Jaipur)
- Symbiosis Institute of Health Sciences (Pune)
- Jamia Hamdard University (Delhi)
- Great Team with all essential skills
- Dr. Bidhan Das- Member, Technical Committee of NABH for drafting standards
- Dr T. Venkatesh- Member, Technical Committee of NABL for drafting standards
- Dr Bidhan Das has Standards for Primary Healthcare (NABH) to his credit which is on its (likely) first test in State of Gujarat
- Dr. Bidhan Das- First ACHS International Surveyor (Australian Council for Health Standards) in India
- OSPL is SE-Asia Partners for ACHSI
- OSPL has presence in 14 states (including Union Territories)
- We have working offices at 7 different locations across India.

- OSPL has one overseas (International) project to its credit.
- In short span of just 4 years, OSPL has rendered its consulting services to over 30,000 beds within the healthcare sector
- We have provided consulting services to over 100 Hospitals (bed range 30-1500), 07 Teaching Hospital & Medical Colleges, 01 Rehabilitation Hospital, 02 Dental Hospital & Colleges, and 02 AYUSH Hospitals.
- Combined Years of Experience of our Technical Personnel is 68 Man-Years in ISO/ NABL/ NABH/ QMS and Hospital Planning assignments. Our Key Personnel have rich experience of having conducted over 720 Audits/ Assessments and provided consulting services to 497 client organizations for establishing QMS.
- Our mission is "To become the Leader in Healthcare Consulting in India by providing value for money, effective, efficient solutions and hands on support".
- We are one stop solution company for healthcare sector.

Part – 2

DISSERTATION REPORT

Overview of Relevant Departments of Speciality Hospital, Gurgaon

EXTERIORS:-

The exteriors of the building are well maintained. There are navigation boards for the hospital. There are two entries to the hospital one is main entry to the hospital other is the entry to the emergency. Both the entries are properly guarded. The road outside the hospital is a single lane road. Area covered by the building on the land is within the permissible limit.

Parking – All the permissible area have been covered by the construction of building, therefore no parking area have been marked or defined for either patients or staff vehicle. Ambulance parking area also not defined. On the back side of the hospital the boundary wall of the hospital is very close to the building wall.

Setback Area - It is the area left outside the hospital building for the free movement of the trolley. No such area is left outside the building.

BMW Temporary storage – BMW temporary storage is a pre fabricated structure made up of iron & aluminium with dimension of 8x10 feet. It is on the façade of the building. It is location have been temporarily made. The BMW is collected twice a day once in morning at 8 o'clock and another in evening at the same time. Waste is transported by trolleys. Documentation of amount of BMW generated is not done.

Generator and Transformer - Generators of the hospital is kept at a distance of approximately at a distance of 150 meters. The LT panel is also located next to it. Changing of power from direct to generator is automatic.

INFRASTRUCTURE:-

The hospital is divided into three floors and 16 departments including clinical and non clinical both. Hospital has got enough waiting area for patients but lesser circulation area for movement of traffic inside the hospital. Beds are manually operated and have side rails to

prevent patient falls. Floors are not slippery but few signages are displayed. Disaster plan inside the hospital have not been prepared.

ENGINEERING:-

Electrical Engineering department present in the basement at the left end of the building.

Electricity

Total Load Sanctioned = 400 KW

Actual consumption = 650 – 770 KW

Alternate source of electricity

DG: - 3 but only 2 are in use

1 X 625 KW

1 X 320 KW

1 X 200 KW (not in use)

Transformer :- 2

Capacity: - 2 X 1000 KW

Water

Total storage: - 80,000 lit

Sources of water: - 2 storage tanks of 30,000 lit and 50,000 lit on top floor

Fire storage: - 3, 00,000 lit; 3 tanks of capacity 1, 50,000 lit, 1, 00,000 lit and 50,000 lit

Air Conditioning

Central AC

2 Chillers Plants

Capacity: - 80 TR

Split AC: - 42

Fire hydrant:-Same overhead tank of 10,000 lit capacities is used as a fire hydrant.

GAS MANIFOLD:-

The area for gas manifold is 831.6 sq ft. it is located in the basement. Two manifolds (12 X 12 Oxygen cylinders) are present in the room and there are two machine rooms containing 2 Vacuum pumps and 2 Air compressors each. Also, there are 24 big cylinders and 26 small cylinders of oxygen, 11 nitrous oxide cylinders and 5 carbon dioxide cylinders. Refilling is on the daily basis. There is also a liquid gas plant which is being filled on every 15th day.

STATUTORY REQUIREMENT:-

Licenses	Available
1. Building Permit (From the Municipality).	YES
2. No objection certificate from the Chief Fire officer.	YES
3. License under Bio- medical Management and handling Rules, 1998.	Yes
4. No objection certificate under Pollution Control Act.	NO
5. Excise permit to store Spirit.	NA
6. Income tax PAN.	Yes
7. Permit to operate lifts under the Lifts and escalators Act.	Yes
8. Narcotics and Psychotropic substances Act and License.	No
9. Sales Tax Registration certificate.	Yes
10. Vehicle registration certificates for Ambulances.	Yes
11. Retail drug license (Pharmacy).	Yes
12. Air (prevention and control of pollution) Act, 1981 and License	No
13. PNDT Certificate	Yes
14.Radiation Protection Certificate in respect of X-Ray equipments from AERB	yes
15.Atomic Energy Regulatory Body approvals	No

AMBULANCE SERVICES (PRE-HOSPITAL CARE):-

The hospital has got two ambulances which has got BLS system. No ACLS facilitated ambulance present.

KITCHEN:-

Kitchen is outsourced and located on the top floor.

SECURITY AND KEY MANAGEMENT:-

Security Management is outsourced in the Hospital. There are only 20 security guards and considers the location at the main gate, emergency, ICCU, Nursery, and CCU.

INTRODUCTION:-

Occupational hazard can be defined as the risk to the employees of an organisation or hospital while working and will always differ as per the work area and department. We can also say that it refer to the work place, material, substance and the situation that may cause any accidents or disease at work place.

Occupation hazard is a working condition that can lead to illness or death. Often, people in jobs which pose a high level of risk are paid more than similar but less risky jobs to compensate for the danger involved. There are danger to health, limb, or life that is inherent in, or is associated with, a particular occupation, industry or work environment. Occupational hazards include risk of accident and of contracting occupational diseases.

According to ILO & WHO "Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and to summarize, the adaptation of work to man and of each man to his job.

"The main focus in occupational health is on three different objectives:

(i) The maintenance and promotion of workers' health and working capacity;

(ii) The improvement of working environment and work to become conducive to safety and health &

(iii) Development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings. **(1), (2)**

The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."

Occupational hazards can be of 5 types:-

1. Physical Hazards
2. Chemical Hazards
3. Biological Hazards

4. Mechanical Hazards
5. Psychosocial Hazards

PHYSICAL HAZARDS:-

1. Heat and Cold

In India, the most common physical hazard is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue and enhanced accident rates. High temperatures are also found in mines.

Important hazards associated with cold work are chilblains, erythrocyanosis, immersion foot, and frostbite as a result of cutaneous vasoconstriction. General hypothermia is not unusual.

2. Light

The workers may be exposed to the risk of poor illumination or excessive brightness. The acute effects of poor illumination are eye strain, headache, eye pain, and lachrymation, congestion around the cornea and eye fatigue.

3. Noise

Noise is a health hazard in many industries. The effects of noise are of two types:

(i) Auditory effects - which consist of temporary or permanent hearing loss

(ii) Non-auditory effects – which consist of nervousness, fatigue, interference with communication by speech, decreased efficiency and annoyance.

The degree of injury from exposure to noise depends upon a number of factors such as intensity and frequency range, duration of exposure and individual susceptibility.

4. Vibration

Vibration, especially in the frequency range 10 to 500 Hz. May be encountered in work with pneumatic tools such as drills and hammers. Vibration usually affects the hands and arms. After some months or years of exposure, the fine blood vessels of the fingers may become increasingly sensitive to spasm (white fingers).

5. Ultraviolet Radiation

Occupational exposure to ultraviolet radiation occurs mainly in arc welding. Such radiation occurs mainly affects the eyes, causing intense conjunctivitis and keratitis (welder's flash). Symptoms are redness of the eyes and pain; these usually disappear in a few days with no permanent effect on the vision or on the deeper structures of the eye.

6. Ionizing Radiation

Ionizing radiation is finding increasing application in medicine and industry, e.g. x-rays and radioactive isotopes. Certain tissues such as bone marrow are more sensitive than others and from a genetic standpoint; there are special hazards when the gonads are exposed.

CHEMICAL HAZARDS:-

There is hardly any industry which does not make use of chemicals. The chemical hazards are on the increase with the introduction of newer and complex chemicals. Chemical agents act in three ways: local action, inhalation and ingestion. The ill-effects produced depend upon the duration of exposure, the quantum of exposure and individual susceptibility.

BIOLOGICAL HAZARDS:-

Workers may be exposed to infective and parasitic agents at the place of work. The occupational diseases in this category are brucellosis, leptospirosis, anthrax, hydatidosis, psittacosis, tetanus, encephalitis, fungal infections, schistosomiasis and a host of others. Persons working among animal products (e.g. hair, wool, hides) and agricultural workers are specially exposed to biological hazards.

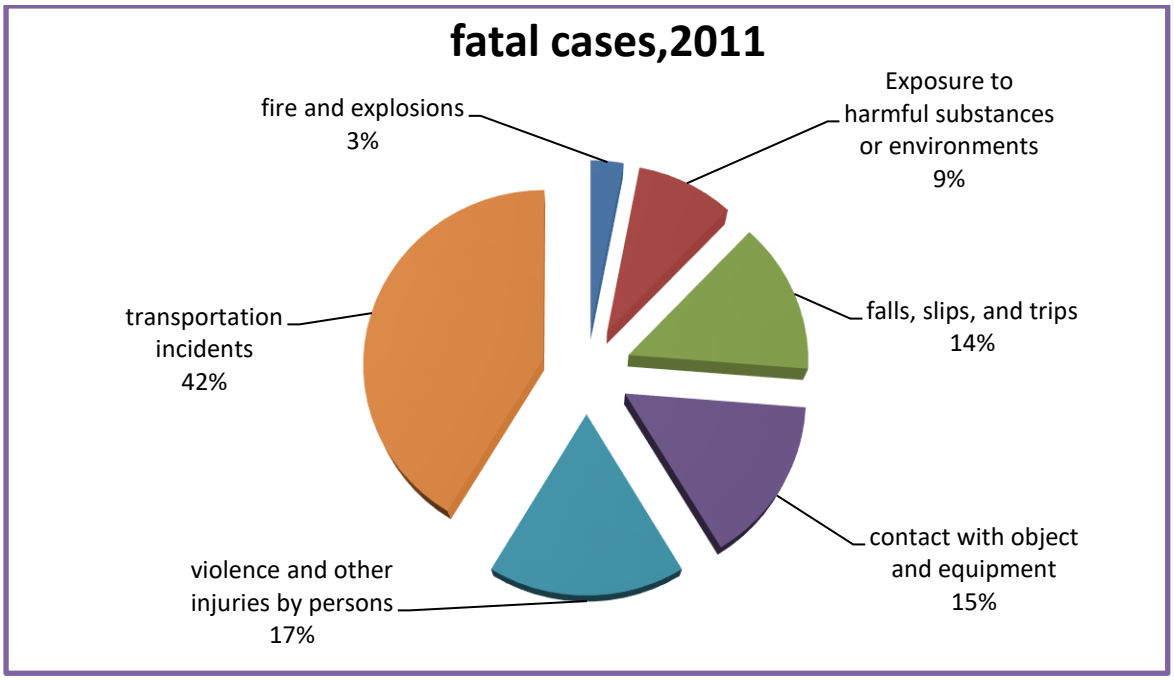
MECHANICAL HAZARDS:-

The mechanical hazards in industry centre round machinery, protruding and moving parts and the like. About 10% of accidents in industry are said to be due to mechanical causes.

PSYCHOSOCIAL HAZARDS:-

The psychosocial hazards arise from the workers' failure to adapt to an alien psychosocial environment. Frustration, lack of job satisfaction, insecurity, poor human relationships, and emotional tension is some of the psychosocial factors which may undermine both physical and mental health of the workers. The capacity to adapt to different working environments is influenced by many factors such as education, cultural background, family life, social habits and what the worker expects from employment. [3]

In India it is a big issue, as the emerging occupation health problem is to be tackled along with the existing traditional public health problem like communicable diseases, malnutrition, poor environmental sanitation and inadequate medical care. According to the census report it has been noted that the male female working population ratio in 1991 was 78:22 and in 2001 it was 68:32. This increase working female population leads to certain concerns. For example women often suffer from musculoskeletal disorder because neither the tasks nor the equipments they use, which is normally designed for men, are adapted to their built and physiology. And they also have specific stress related disorders, a double burden of work and sexual harassment. In 1966, National Institute of Occupational health was established. [4] Some numbers are there about occupational injuries.



Source: - U.S. Bureau of Labour Statistics U.S. Department of Labour 2012

In the 10th five year plan also it has been recommended by an expert to take some measures to improve occupational health. [3] So we can interpret that occupation health is also a part which needed to be improved as much as possible.

If we talk about a hospital, there the occupation hazard is an important issue that cannot be overlooked. In a hospital there are many places where occupation hazard can take place depending upon the department and work area. The average risk of transmission of HIV to a health care worker after percutaneous exposure to HIV-infected blood has been estimated as 3 in 1000. A study done by WHO has concluded that the annual estimated proportions of HCW exposed to blood-borne pathogens globally were 2.6% for HCV, 5.9% for HBV, and 0.5% for HIV, corresponding to about 16,000 HCV infections and 66,000 HBV infections in HCW worldwide. [5]

One another study was also there which says that the annual rate for FTE employees was 1.4 infections / 1,000 for public health laboratory and 3.5/1000 for hospital laboratories. For employees who worked directly with infectious agents, the annual rates were 2.7/1000 and 4.0/1000 for public health and hospital laboratory, respectively. The major type of injury seen in hospital laboratories was needle sticks, which accounted for 63 per cent of all reported injuries, while cuts and scrapes were the second most prevalent (21 per cent). [6]

The CDC estimated that more than 380,000 needle stick injuries occur in U.S. hospitals each year. Approximately 61 per cent of these injuries are caused by hollow-bore devices. Although the number of needle sticks injuries that occur in non hospital settings, where 60 per cent of the numbers of the health care labours force is employed, is not known, it is probably large. In a retrospective study, the CDC found that the risk of transmission of HIV to health care worker was increased when the device causing the injury was visibly contaminated with blood, when the device had been used for insertion into a vein or artery, when the device caused a deep injury, or when the source patient died within two months after the exposure. In 1989, the OSHA estimated that the risk of seroconversion following a needle stick exposure to HIV –infected blood was between 3.5 and 4.7 infections per 1000 exposures, with 95% upper confidence limits of 9 and 14 infections per 1000 exposures, respectively. [7]

Routes of exposure associated with laboratory work

Route	Microbiological practice
Ingestion	Mouth pipetting Splashes of infectious material into mouth Contaminated articles or fingers placed in mouth Consumption of food in workplace
Inoculation	Needle stick accidents Cuts from sharps objects Animal and insect bites and scratches
Contamination of skin and Mucous membranes	Spills or splashes into eyes, mouth, nose Spills or splashes on intact or no intact skin Contaminated surfaces, equipment, articles
Inhalation	Numerous procedures that produce aerosols

Awareness of the risk of occupational exposure to infectious agents in laboratory and the common routes of infection (e.g., inhalation, ingestion, mucous membrane contact, direct inoculation, and contact with animals and insect vectors) has led to the development, modification, and use of equipment and procedures that minimize the risk associated with working with infectious microorganisms. [8]

OCCUPATIONAL HAZARDS IN LABORATORY:-

Occupational health hazards in laboratory are very common in any hospital. It is the hospital's responsibility to give safety measures to the staff so that they can be safe from the different occupational hazards. In a laboratory there is much kind of hazards which can be happened any time during work. And for reducing the hazards we have to keep the safety. There are many area in laboratory that needed to be covered from safety point of view for example to know about all the hazards in the laboratory we must know about all the hazards and all the safety measures used for overcome those hazards.

These different areas given below -

I. **Hazard Area –**

a. Electrical Hazards
b. Chemical hazards
c. Biological hazards
d. Physical hazards
e. Fire hazards

II. **Safety measures –**

f. General safety standards (PPE)
g. House keeping
h. Hand washing
i. Eye washing
j. MSDS

ELECTRICAL HAZARDS:-

In a laboratory electrical hazards or any injury due to electric shock may be happen. The laboratory staffs have to be use protection while working with any kind of electrical instruments. A rubber mat must be provided to the staff. All the electrical wires should be covered. And the plugs also should not be over loaded. If there are any electrical panel so danger sign should be labelled there. In case of any electrical injury the lab staffs have to report to their senior.

CHEMICAL HAZARDS:-

Chemicals play an important role in a laboratory. All the work will depend upon the samples and the different chemicals. And these chemicals are very dangerous for any one. The lab staffs have to do their work carefully. Because there may be any burn will happen to anyone or any other injury to their body so they have to be so careful while doing work with chemicals. Don't hold the chemicals bottle/container from the top during transportation. They have to do the safe transportation. Hold the container from both hands and from top to

bottom. And first of all check that is the container is leak proof or not. Then put it in the box then take it to another place where it needed. Always keep the chemicals in safe place. It should be below the eye level and ideally the chemicals should be stored on the sandpit. But if sandpit is not provided by the hospital then the chemicals should be separately stored on the floor. Label all reagents with their chemical names and appropriate hazard warnings provided from their MSDS. MSDS should be prepared and accessible to HCWs

Keep MSDS for all chemicals either in the laboratory or in the office nearby. The work surface has to be cleaned. The equipments should be decontaminated with sodium hypochlorite. So these some points we have to remember so that we can overcome the chemicals hazards.

BIOLOGICAL HAZARDS:-

Bio Medical Waste management is a big task in itself. In the hospitals many issues are related with this. It is necessary to dispose the bio medical waste. There are four colours coding in this those are red, blue, yellow and black. And different categories are lies under these four colour's containers as given below:-

Colour	Container	Category
Blue (Sharp)	Blue plastic bag in plastic bin	Broken Glasses , Needles , Syringes etc
Red (Infectious Non sharp)	Red plastic bag in plastic bin	Soiled Cotton , Gauzes , Catheters , IV tubing etc
Yellow (Organ and tissue waste)	Yellow plastic bag in plastic bin	Human tissues, organs, body parts, placenta, pathological and surgical waste, microbiology and biotechnology waste
Black (General Waste)	Black bag in plastic bin	General paper waste; and also kitchen waste, that is disposed separately.

Now if we are talking about biological hazard in a laboratory so there should be proper labelled container as per the colour coding, provided and it should be covered. And all the

sharps should be disposed after use. For the sharps dispose first of all the used syringe must be destroyed in the sharp cutter then put it in the blue colour's container. Don't overfill a sharp container. Likewise all the waste must be disposed in the right container. All containers should be discarded when 3/4th full. Sharps should not be passes from one worker to another. The person using the equipment should discard it. Never leave a discarded tube or infected material unattended or unlabeled.

Spills management should be done in a right manner because it will harm full to the lab staff. Biological spills may be create any hazards if they didn't use safety or not to clean the spills. To reduce the risk of inhalation exposure in such an accident, occupants should leave the laboratory immediately. The laboratory should not be re-entered to decontaminate or clean up the spill for at least 30 minutes. There is a proper way to decontaminate the lab or to manage the spills. First wear disposable gloves before cleaning. Then soak paper towels in disinfected and place over spill. Place towels in a plastic bag disposal. Then clean up spill area with fresh towels soaked in disinfected. In case of spills on the body, first remove the contaminated clothing then vigorously wash exposed area with soap and water for one minute. Then report the incident to the lab head.

In case of needle stick injury the hospitals are given the PEP. If needle stick injury happen so it is the laboratory head's responsibility to look after the person and ensure that the appropriate treatment has been followed or not. At the time of injury that person should not be panic or put finger in the mouth. Encourage bleeding by squeezing and wash thoroughly with soap and water, followed by alcohol. The lab staffs have to report to their lab head in any kind of injury and have to prepare an incident report.

PHYSICAL HAZARD :-

Occupation hazard means the employees are getting effect or ill during work and physical hazards surely come under this. Physical hazards include all that area which shows that harm to the body. Like if we see in the from the space point of view so it is understood that if the lab is too small so it may be harm full. So the lab should be appropriate according to the services those are provided in it. And the space all should be adequate for the staffs. The lab should not be crowded. There should be enough places for the staffs so that they can do their work in a right manner. Because if the lab is small as compare to the services provided there

so the staffs will not be comfortable with their work and due to this hazards may be happened. Secondly we should see the floor. Is it slippery because it may cause falls. The doors and drawers should be rightly framed and also the furniture. The sharps edges should not be there. So we don't neglect these points.

FIRE HAZARD:-

In case of fire emergency the fire alarms and fire extinguishers should be provided in the lab. And also the staffs should be given the training in the starting that how to use fire extinguishers. There are different types of hazards those can occur through fire in a lab.

Type of hazard	Class of fire	Recommended extinguisher agents
Ordinary Combustibles Wood, Cloth, Paper	A	Water, dry chemical foam, loaded steam.
Flammable Liquids and gases Solvents & greases, natural or manufactured gases.	B	Dry chemical, carbon dioxide, loaded system, halon 1211 or 1301 foam
Electrical equipment Any energized electrical equipment, if electricity is turned off at the source , equipments reverts to a class A to B	C	Dry chemical, Carbon dioxide, halon 1211 or 1301 foam
Combinations of hazards Ordinary combustibles and flammable liquids and gases. Ordinary combustibles and electrical equipment. Flammable liquids and gases and electrical equipment	A & B A & C B & C	Dry chemical, loaded steam, foam. Dry chemical Dry chemical, Carbon dioxide,

Ordinary combustibles and flammable liquids and gases, & electrical equipment,	A,B & C	halon 1211 or 1301 foam Triplex dry chemical.

Each extinguisher is for different types of fire. The fire extinguishers should be located near by the lab with proper labelling. Fire emergency sign should be there. The staffs must be aware about the place where the fire extinguishers are situated.

GENERAL SAFETY STANDARDS:-

In a laboratory there are some standards safety measures given. These are gloves, mask, lab coat and cap. Apron and masks are to be worn during grossing of surgical specimens. When there is likelihood of contact with blood, gloves must be worn and removed after completion of the activity. Wash hands each time gloves are removed. Chlorhexidine /Alcohol based hand rubs are used with gloves during sample collection between 2 different patients. Anytime a lab person is likely to be soiled by the splattering of infectious material, protective clothing is to be worn. These must be removed and discarded properly immediately after use. Personnel dealing with disinfectants, corrosive chemicals and cleaning of the spill are required to use rubber gloves and boots. When leaving the lab, remove the protective clothing.

HOUSE KEEPING:-

In a laboratory decontamination is very important. Because for reducing the risk and for lab safety it is necessary to keep clean the lab. The lab must be cleaned at least twice in a day. Sodium hypochlorite is being used for cleaning. For this the 1% Sodium hypochlorite solution is provided to housekeeping. In case of Sodium hypochlorite is not provided so 10% bleach will be used. And they will prepare the fresh solution. At minimum 2 times the lab should be cleaned with sodium hypochlorite solution. Wipe the work area surface going over each area at least twice and allow to air dry with a minimum contact time of 5-10 min. The house keeping staffs have to regularly fill the decontamination worksheet. Decontamination of the equipments is also required. And same procedure is applied for this. In a lab the

designated clean and contaminated work area should be there. And keep all work area neat and uncluttered. The lab staffs have to see that the food or beverages are not allowed into the lab area.

HAND WASHING:-

Hand washing is very helpful to keep us safe from any hazard or any injury. In a laboratory frequent hand washing after removing gloves, before leaving the laboratory are absolutely essential. And after doing any procedure and seeing any patient. Use antiseptic soap or an alcohol based hand disinfected followed by through hand washing for accidental skin contamination. The lab staffs should be given the hand washing training in the starting. And they have to follow the 6 steps of hand wash while washing their hand.

EYE SHOWER:-

Generally the eye injuries are not happened in a laboratory because it'll depend upon the services provided there. It will base on the work. But some time any chemical or any sharps will create an eye injury. The lab staff must wear goggles or face shield where they found any risk of eye injury. In case of splash to mouth or eyes, rinse thoroughly with plenty of running water, check for and remove contact lenses – Don't use a disinfectant here. And eye shower should be there in case of eye injury. Always keep the chemicals below the eye level and try to keep safe from any kind of risk.

MSDS :-

MSDS (Material Safety Data Sheet) will provide to the lab staffs. It is required for chemicals hygiene. The chemical manufacturer's information as supplied on the MSDS will be used to ascertain whether a certain chemical is hazardous. Each MSDS must provide the product's identity as it appears on the container label, as well as the chemical and common names of its hazardous components. The MSDS also provides physical data on the product, such as boiling point, vapor pressure, and specific gravity, and lists easily recognized characteristics,

such as appearance and odor. Information about hazardous properties is given in detail on the MSDS: This data details fire and explosion hazards and health – related information, including the threshold limit value, exposure limit, and toxicity values. The threshold limit value is the allowable exposure for a given employee during an 8-hour day. The MSDS also notes the effects of over exposure and provides information on first-aid, spill, and disposal procedures and protective personnel gear and equipment requirements. The staffs must check that the MSDS is provided with the chemicals or not.

RATIONAL OF THE STUDY:-

This study is based on the occupational health hazards. And it is a very important area from any hospital or organisation's prospective. In any hospital/organisation occupational health hazards can be done. During work any non-happening may be happen to any employee or to any worker. If we'll see any work area or any department in the hospital so we'll find that rarely the workers are bothered about their safety. Because they all are busy in their work and for take the safety measures first the hospital/organisation have to tell them about it so that they can be aware about all the occupational hazards and the safety measures. It is very essentials for the hospital/organisation to give safety measures to their staffs/ employees. Because these hazards will affect their work, the quality of their work and it'll increase the error in the work or result. And most important occupational hazards will affect the worker's/employee's life. To reduce the risk to employee's life it is needed to do some research on occupational health hazards. From this we'll find all the hazards that can happen during work and we'll also come to know about all the safety measures. And hazards in a laboratory department are also an important issue for any hospital. In a hospital exposure to infection rate is very high. And if we talk about the laboratory department then the risk rate will increased, because there the chances of getting infections are high. In laboratory there are many areas from where the staffs can be easily affected if they are not using safety. In lab they have to work with chemicals, to manage bio hazards, to manage spills & etc. So hazards can be happened in a lab. There must be some safety manual, training regarding safety measures given to the staffs in the starting for reducing the occupational hazards in the laboratory department. There are lots of researches on Gap analysis, Bio Medical Waste,

Inventory Control, Patient Satisfaction but occupational hazards and safety have been chooses rarely. The main motto of this study is to overcome the occupational hazards and also to let them (staffs) know about all the hazards. So that they can know that how their health will be affected by their work and also their life. And also tell them about all the safety provided to them for their well. So that they can use all the facilities provided to them and it'll also help them to improve their work. It's also good for that hospital.

OBJECTIVES:-

General objective:-

- To know about the occupational hazards in laboratory & to access the availability, practices and knowledge of laboratory safety measures.

Specific objective:-

- To know about the safety measures available and used in the laboratory department.
- To evaluate the staff's knowledge about safety measures in laboratory department.

METHODOLOGY:-

Study area: - Multispecialty hospital, Gurgaon

Study population: - Staffs working in the laboratory department.

Sample size: - 7 staffs in laboratory.

Study design: - This is a descriptive study which includes the observations, facts & findings. A checklist has been used to know about the potential hazards and its corresponding safety

measure adopted in the laboratory. A questioner has been used for evaluating the knowledge level of the laboratory staff about the hazards and its safety measures. The analysis will be qualitative.

This study has been done in the Multispecialty hospital, Gurgaon. The sample is being taken from the laboratory department. Mainly through the observations we'll find our results.

Data collection tools: - Checklist and Close ended questioner

Methods of data analysis: - The data analysis will be done in M-Excel. To know about the occupational hazard we'll do the observation. From checklist we see that what hazards can happen there and what safety measures are provided to them and from this we'll do our discussion and give our recommendation. Pie charts will be used for defined the knowledge level of the staffs.

Type and source of data: - Primary data collected through the checklist and questioners. We also use secondary data in the form of documents, quality manual and safety manual of hospital.

LIMITATIONS:-

1. The major constraint of this study is that the staffs are not cooperative. As while sample collection they are not willing to response to us. They are not well trained about the safety measures so they are not aware about many safety measures.

2. Time constraint

RESULTS AND FINDINGS:-

In the methodology it has been mentioned that checklist and one knowledge questioner is being used for the sample collection. This study was being done in the laboratory department.

The reason behind using checklist is to know about the different occupation hazards of laboratory and to know about the safety measures. Checklist is very much helpful to know about the gaps in the laboratory. What safety measured ideally should be in the laboratory. What kind of hazards may be happened while working and also many other major outcomes are there. These points are fulfilled from the checklist. Questioner is for evaluating the staff's knowledge about the occupation hazards and safety measures in laboratory. Questioner is being helpful to measure the staff's knowledge regarding the hazards and the safety measures.

CHECKLIST:-

The laboratory checklist is divided in 5 parts. The checklist is being divided hazard wise. The hazards and their safety measures are clearly mentioned. The checklist is very much helpful to get the outcome and findings. But without observations checklist has no use. During the 10 visits over there many points have been observed as per the checklist is prepared.

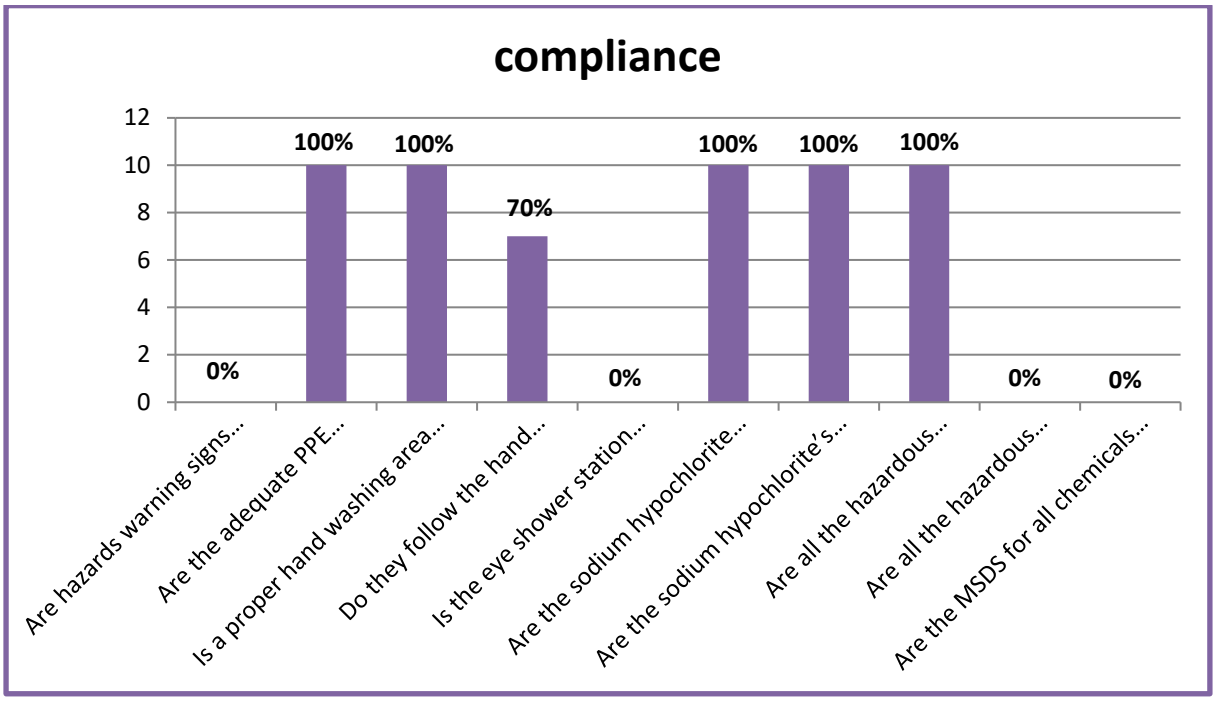
There are many gaps in the laboratory and occupational hazard can easily occur while working. The entire outcome is given below.

CHEMICAL HAZARDS:-

20 checkpoints are there in the checklist. Each point is related with the chemical hazard and safety measures. There are checkpoints regarding occupational hazard and from that it can interpret that what hazards will occur in the laboratory and what safety measures have to be followed for prevent those hazards. Every hospital has provided some facilities and safety measures to prevent the occupational hazards. And some guidelines are also there for this because it is mandatory. But if in any case those safety measures are not there so that hospital is responsible for this. Likewise some findings are there which are found in XYZ hospital after filling the checklist.

The below graph has been shown the compliance regarding chemical hazards. Here the compliance of 10 points is given

Figure 1:

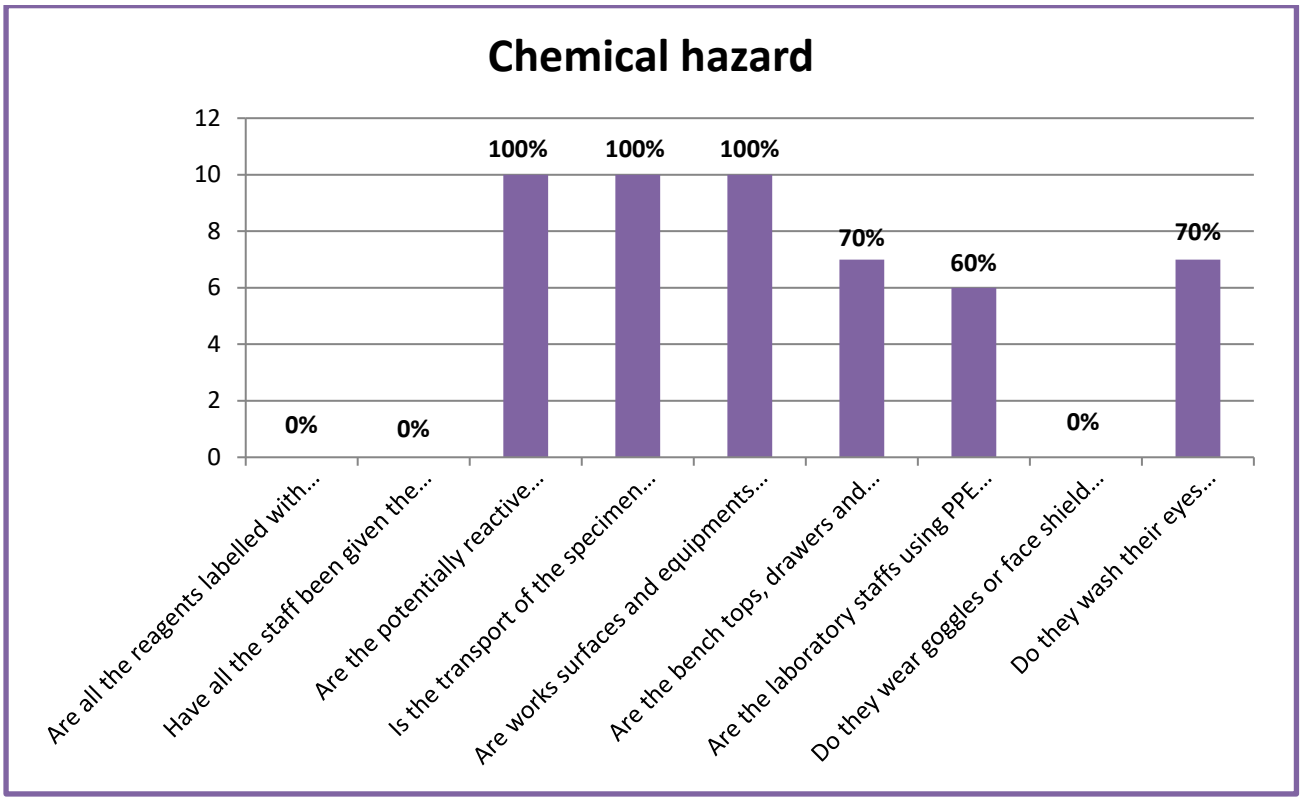


- As it can be observed from the graph that no hazards signs were displayed in the laboratory.
- The graph represents 100% compliance w.r.t provision of personnel protective equipments like gloves, mask, lab coats etc to the lab staffs.
- Although a hand washing area has been demarcated in the lab, the same basin is also been used for washing of the slides been used in the lab work .Because of which the basin is stained and is inadequately maintained in terms of cleanliness. (Photograph given below).
- In 7 out of 10 visits made, it has been observed that the lab technicians don't follow the hand hygiene practices. Therefore, a compliance rate of 70% has been observed with respect to the hand washing practices.

- No eye shower station has been provided to the lab staffs.
- Sodium hypochlorite was there and it also kept in a safe place, below the eye level. It has been observed that all the chemicals stored below the eye level.
- No MSDS provided to the lab staffs with the chemicals. Even sandpit was also not there. All the chemicals were stored on the floor.

The below graph has been shown the other 9 points about chemical hazards.

Figure 2:

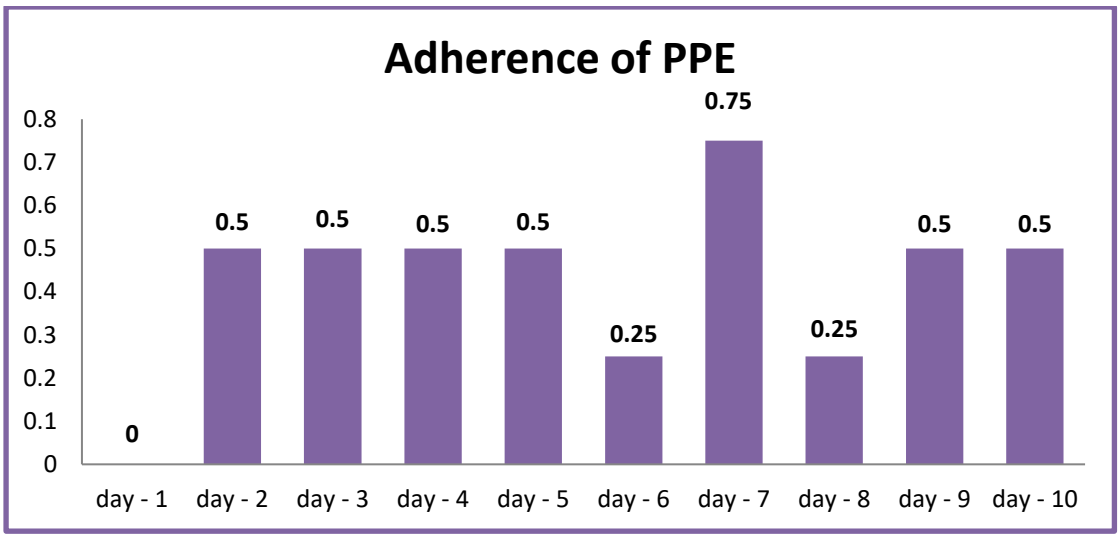


- It has been observed that MSDS is not provided to them. The chemicals were also not labelled according to the MSDS. The staffs were not aware about the MSDS as they didn't given the training in the starting.
- The potential reactive chemicals were stored separately.
- The specimen's transportation has been done in a leak proof container.
- It has been observed that the bench tops, drawers and sinks were clean and well maintained. And the compliance is 70%.
- The compliance of using PPE is 70%. But adherence of PPE is also there.
- They didn't get goggles for eye protection if required. In that case they didn't wear any eye protection.
- In case of eye shower 70% compliance were there. They use hand washing area for taking eye shower.

As the PPE is being provided to the lab staff but during the 10 visits there it has been observed that their adherence of PPE is not so good. Gloves mask and lab coat is must while working in laboratory. But they don't use PPE so it is useless. Total 7 staffs are working in the laboratory. They all are working shift wise. At one shift 4 people are working.

The below graph has been shown the adherence of PPE. During 10 visits their adherence level has been observed. It found that the employees are not using PPE 100%.

Figure: 3



The format of checking their adherence is given below.

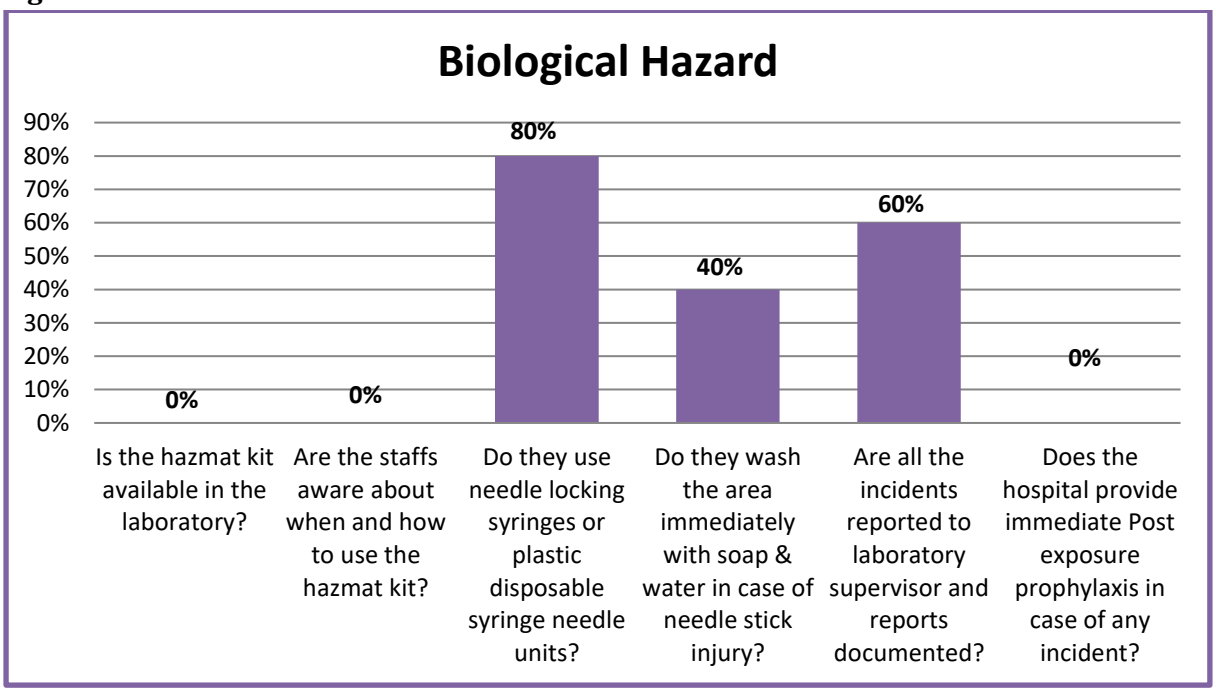
Employee	Gloves	Lab-coat	Mask	Cap	Goggles/ face shields
E - 1					
E - 2					
E - 3					
E - 4					

At one shift 4 employees are working. Gloves, lab Coat & mask are mandatory. But cap & goggles are not required if there is no need. In this ranking is given for as per the use of PPE. Those employee are wearing required PPE will get 1 & if not using so they will get 0. One employee will get 1 mark if he/she is wearing all PPE. On these bases the above graph is made. Day 1 is shown 0 % because no one is wearing all required PPE that's why they didn't get 1 mark. From 2nd day to 5th we found 50% practices. On 9th & 10th day also 50% adherence is there. The highest is 75% on 7th day.

BIOLOGICAL HAZARDS:-

In biological hazards there are 7 points which included in the checklist. In the below graph has been shown the compliance of 7 points.

Figure: 4

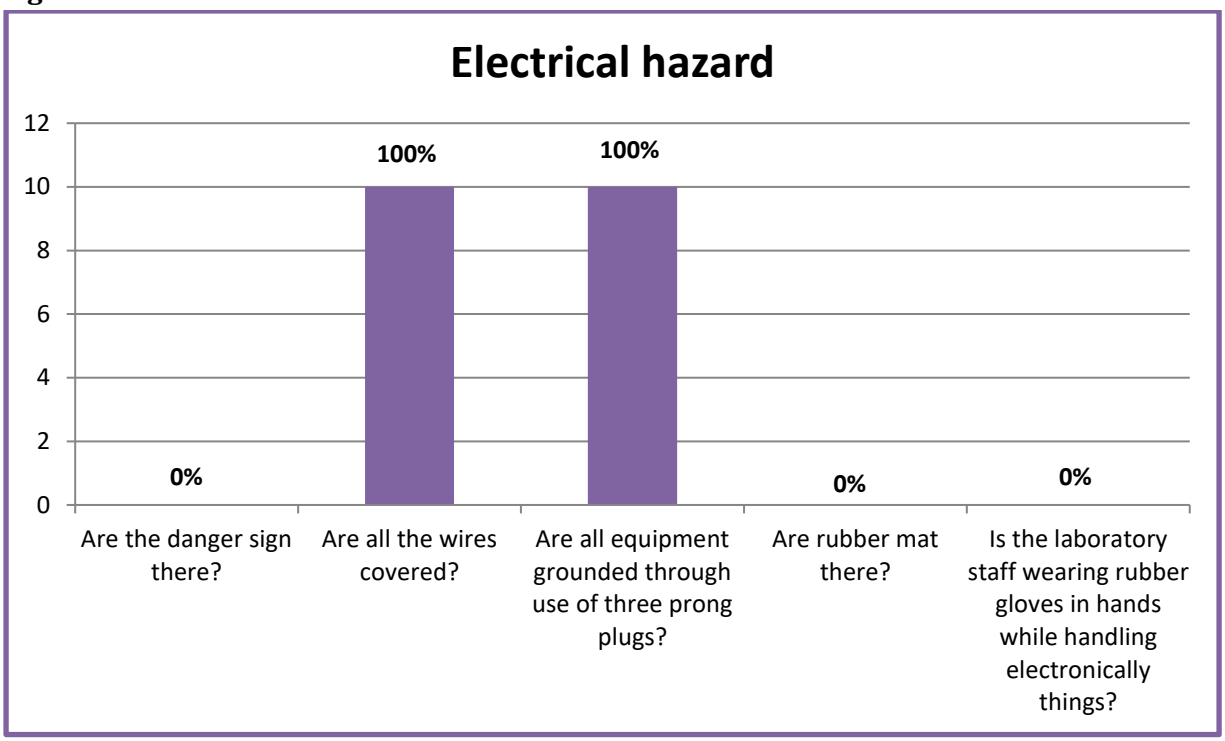


- Hazmat kit was not given to the lab staffs.
- The staffs have no idea about the hazmat kit that what is it and how to use it.
- They use disposable syringes and this was observed 8 times.
- It has been observed that they dispose the syringes in the puncture proof container.
- In case of needle stick injury the compliance was 40%.
- It has been observed that 4 times they wash their hand with water & soap after needle stick injury.
- The hospitals have to provide the post exposure prophylaxis in needle stick injury. But here the compliance was only 30%.
- The reporting after any incident was 60%. That means the lab staffs didn't complete their incident reporting.

ELECTRICAL HAZARDS:-

In electrical hazards 6 points were there in the checklist. But in this the compliance was not so good.

Figure: 5

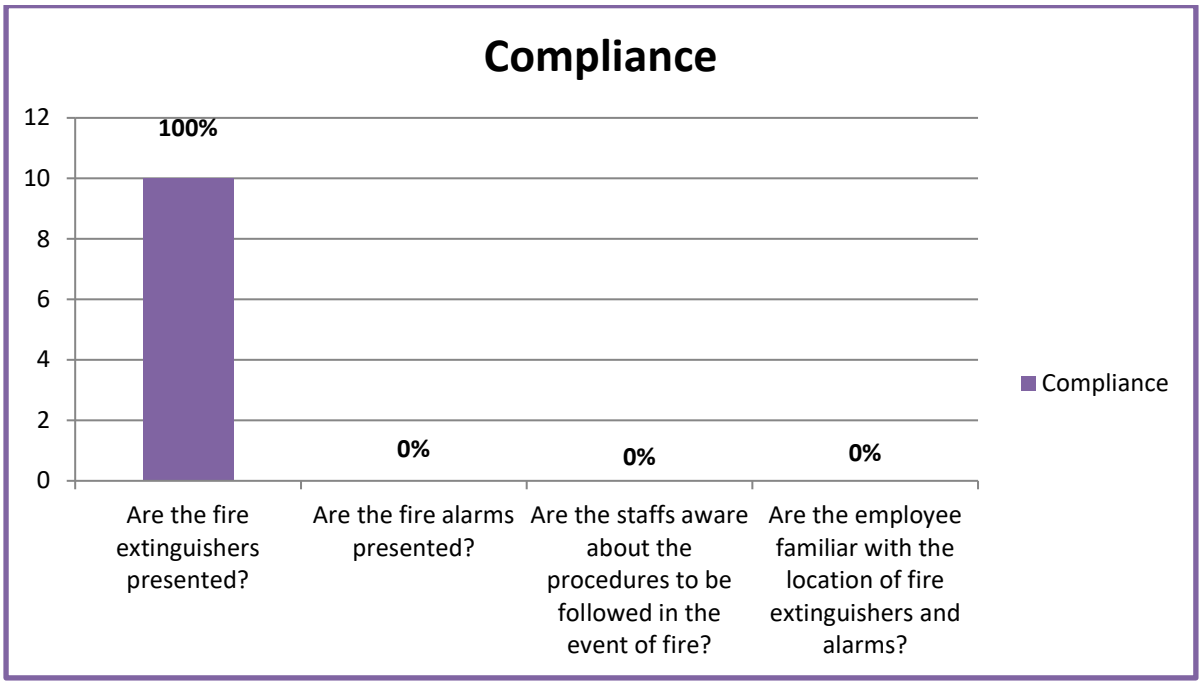


- The above graph has been shown that the danger signs were not displayed over there in the laboratory.
- It has been observed that the wires were covered.
- They also use the three prong plugs.
- Rubber mat was not there.
- The compliance for over loading was 0%. That means there the risk of occurring any electrical hazards from over loading was less.
- As they didn't get the rubber gloves for safety, the compliance was 0% for this.

FIRE HAZARDS:-

In fire hazards the compliance over there was not good. Total 4 points were there in the checklist for measuring the fire hazard.

Figure: 6

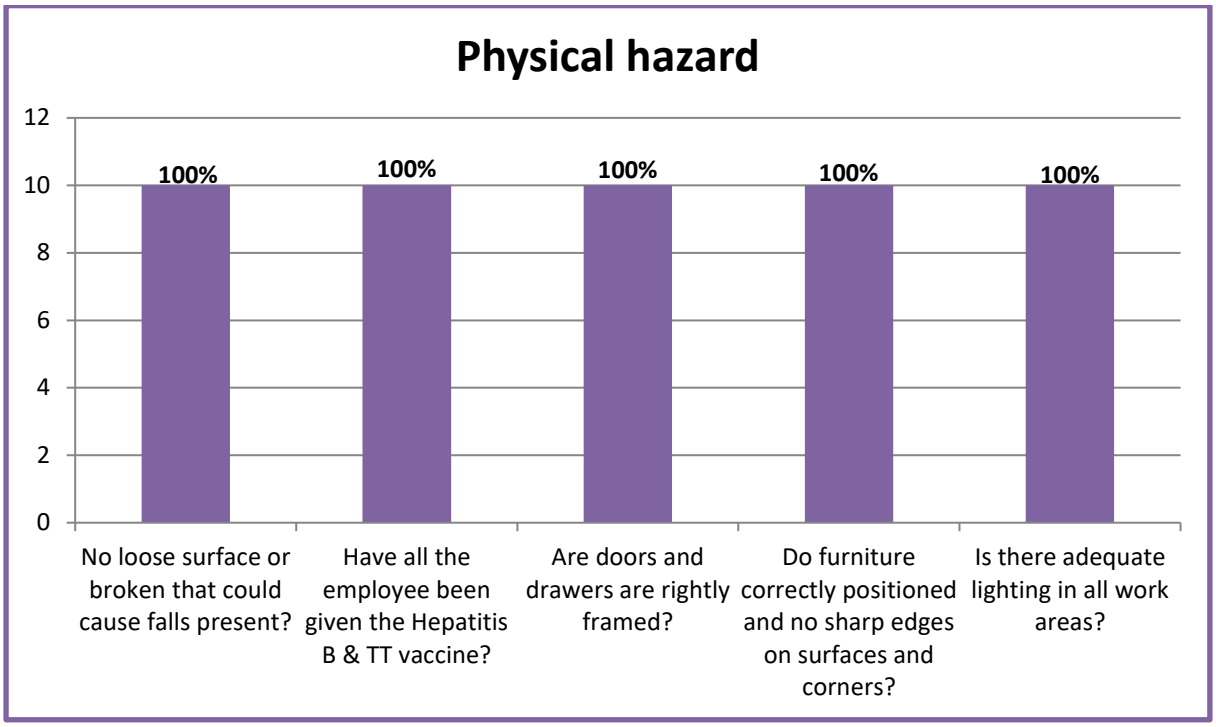


- The graph has been shown that the fire extinguishers were there outside the lab.
- The staffs have told that they didn't get the training for this. They are not aware about it. They don't know that how to use the fire extinguishers in case of fire emergency.
- They also don't know that where the fire extinguishers. The fire extinguishers were located outside the lab and the lab staffs were not aware about it.
- It has been observed that no fire alarms were there.

PHYSICAL HAZARDS:-

- Now the physical hazards will come. 6 points were there in the checklist for measuring the physical hazards in the laboratory.
- During the 10 visits over there it has been observed that the chances of physical hazards in the lab were less.
- The lab's surface was appropriate means was not broken that can cause any falls injury.

Figure: 7



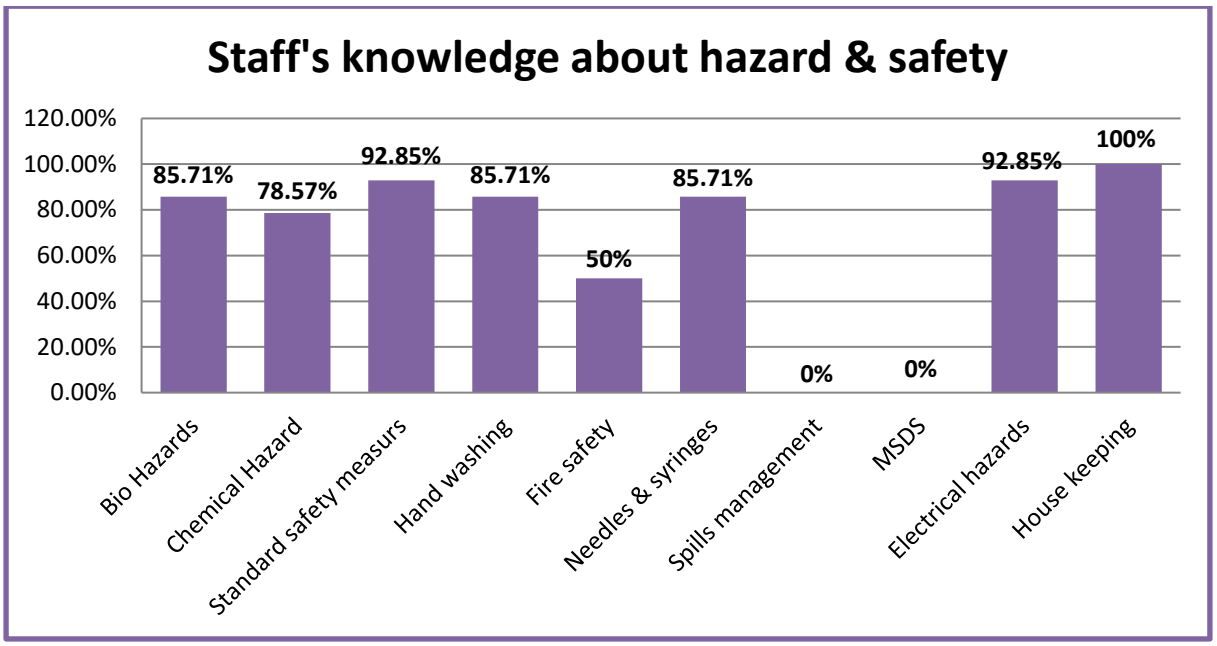
- The lab staffs have told that 3 times they get injury because of falling. According to them this injury was happened because some chemicals were spread on the floor.
- All the staffs have been given the Hepatitis B & TT vaccine.
- It has been observed that the lab's doors, drawers were in right form.
- The furniture was also correctly positioned. That means the lab staffs have no risk of getting physical hazard from the lab's furniture.
- No sharp edges were there on the surfaces and corners.
- Proper lighting was also there for working in the laboratory.

KNOWLEDGE QUESTIONER:-

In the questioner all the questions are related with the hazards those can be happened in laboratory. The questions from Bio hazard, Chemical Hazard, Standard Safety Measures, Hand washing, Fire Safety, Needles syringes, spills management, MSDS and Electrical Hazards, House Keeping. These questions are also cover points regarding safety measures used in laboratory. From these points the outcome which we are getting is the average knowledge of lab staffs and each employee's knowledge about hazards and safety.

- In the following bar graph we have seen that the staffs are having good knowledge about spills management and housekeeping.
- They know very well that how to keep clean the lab.

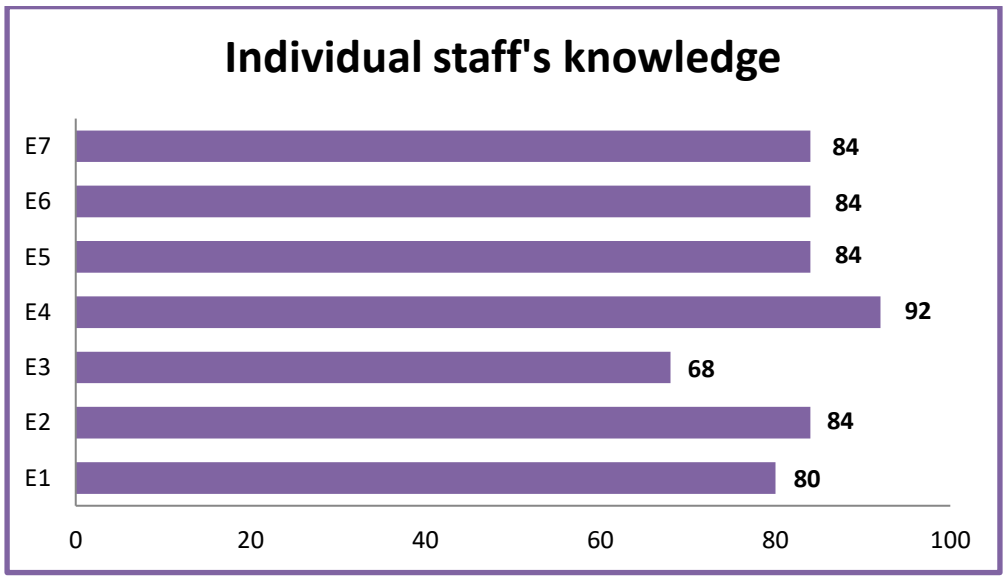
Figure: 8



- The lab staffs are aware about electrical hazards and standards safety measures.
- Standards safety measures are very important in lab. General safety measures should be wearing while working in lab i.e. Mask, gloves and lab coat.
- The graph has been shown that regarding bio hazard, hand washing and needles & syringes average knowledge is same. These are very common in a lab.
- They should know how to wash their hand but out of 100% only 85% are know.
- Same in the case of bio hazards needle & syringes.
- If we want to reduce the occupational hazards so the lab staffs should know that bio hazard is must. Every waste should be disposed in write colour container as per the BMW's rules.
- In case of sharps and needle first the sharps should be disposed in puncture proof container.
- Regarding chemical hazard 78% are aware how to manage the chemical hazards.
- But on the other side only 50% staffs are having knowledge that what to do in case of fire emergency. They are not given the training that how to use fire extinguishers.

- The main finding has been found that none of the staff know about the MSDS which is a very major point. They don't know that what is it and what's the use of it.
- The MSDS is also not given to them with different chemicals. It's the major gap which may be leads to any hazards regarding chemicals.
- So we can recommend them to use MSDS for chemical safety.

Figure: 9



- The above graph has been shown the individual employee's knowledge about the hazard and safety.
- Total 7 employees are interviewed. Only 1 employee has 92% knowledge
- 4 are having 84%. But if we see that overall they have good knowledge.
- Only one employee is there with 68%, minimum.
- 82% average has been calculated for each employee.

RECOMMENDATION:-

In the findings many gaps are being found which needed to be improved. This study is on occupational hazards in laboratory. After completing the checklist it has been observed that there are chances of happen any occupational hazard because the safety measures used for the hazards are being not provided to the lab staffs. Objective of this study is to know about the different hazards happen in the laboratory and what safety measures used to prevent those hazards. It has been that till now there were not so many hazards has been happened. But

safety measures are not there and it increase the rate of occur the hazards. To overcome those hazards some recommendation is being given so that it can be helpful for the lab staffs. The findings are found hazard wise so as the recommendation is give.

CHEMICAL HAZARDS:-

- Hazards signs should be displayed there in the laboratory.
- The hand washing area should be clean & separate.
- In first 2-3 visit it has been found that the lab staffs didn't know about the safe hand washing practices and after that they all are being come to know and do the practices. Training should be given to the lab staffs about the hand washing practices.
- Eye shower station should be there in the laboratory. The lab staffs use the same basin is for taking the eye shower which is being used for hand washing.
- Sandpit should be provided to lab staffs for chemical storage. Because all the chemicals are being stored on the floor.
- MSDS should be given to them. The chemicals should be labelled as per the MSDS.
- Training also should be given to the lab staffs about the use of MSDS.
- Goggles should be given to them for eye protection.
- A monitoring should be done twice in a week for checking the maintenance of the laboratory.
- They also need training for PPE. It is required to tell them the importance of use of PPE. During the 10 visits over there their adherence level has been observed and the average was 42%. Training should be given to the lab staffs for this.

BIOLOGICAL HAZARDS:-

- The lab staffs require knowing about spill management.
- Hazmat kit should be there for the spill management.
- The lab staffs should know that what to do in case of needle stick injury. They have to know that what importance of it. Only 40% compliance was there in the findings.
- The hospital should provide the post exposure prophylaxis in needle stick injury because there was 0% compliance found for this.

ELECTRICAL HAZARDS:-

- Danger signs should be there for electrical safety.
- Rubber mat should provide to the lab staffs.
- Rubber gloves should be there for electrical safety. They are not having rubber gloves.

FIRE HAZARDS:-

- Fire alarms should be there.
- Training should be given to the lab staffs about the use of fire extinguishers. They are not aware about this and don't know that what to do in case fire emergency.
- The lab staffs also need to know that where the extinguishers are being presented.

PHYSICAL HAZARDS:-

In physical hazards no gaps were found according to the checklist. The 100% compliance was found for 4 points in this.

CONCLUSION:-

- After doing this study on occupational health hazards in laboratory it is being understood that if there are any hazard will occur in the lab so the lab staffs have to use the safety measures. Poor working conditions can affect the environment workers live in. Thus, the organisation has a moral and often legal responsibility to protect their workers.
- It can be concluded from the study that the employees are unaware of the hazards associated with their occupation and the safety measures needed to be taken while working in the laboratory.
- Thus a comprehensive health and safety training programme needed to be developed by the management which will help the workers to recognize any early signs/symptoms of potential occupational hazard before they become permanent conditions. Therefore, it is required that the management make changes before any hazardous conditions can develop.

- In this report all the possible hazards with their respective safety measures used in laboratory. It has been found that the hazard rate over there is being not high. In the entire hazards category in lab no hazard has been found.

- In chemical hazards it has been found that no MSDS was given and sandpit also not provided for the chemical storage. It will raise the risk of occupational hazard from chemicals in future.

- In biological hazard 4 times found the needle stick injury was happened and they didn't get the Post exposure prophylaxis from the hospital. The lab staffs also not using PPE all time for safety.

- In electrical hazard no hazard signs were there. No safety provided to them for prevent the electrical hazards. Fire alarms were also not there.

- During the 10 visits over there it has been observed that the staff's average knowledge regarding the different occupational hazards and safety measures was 77%.

- It has been found that from the starting of the hospital there were not so many hazards were happened in the lab. And the hospital is 1 year old. But most of the safety measures were not given to the lab staffs for prevents the occupational hazards. It can be understood that there are risk of occur any occupation hazards in future.

APPENDICES – 1

S. No.	Check points	Yes	No	Remarks
1.	**CHEMICAL HAZARDS**			
1.1	Are hazards warning signs displayed properly?			
1.2	Are the adequate PPE provided to the lab staffs (Gloves, Mask, Lab coat, cap)?			
1.3	Is a proper hand washing area available?			
1.4	Do they know the 6 steps of hand washing?			
1.5	Is the eye shower station available?			
1.6	Are the sodium hypochlorite provided to lab staff for cleaning?			
1.7	Are the sodium hypochlorite's container kept safe, covered and below the eye level?			
1.8	Are all the hazardous chemicals, including chemicals, reagents and dyes stored below the eye level?			
1.9	Are all the hazardous chemicals stored on the sandpit?			
1.10	Are the MSDS for all chemicals present either in the laboratory or in the office nearby?			
1.11	Are all the reagents labelled with their chemical names and appropriate hazard warning according to their MSDS?			
1.12	Have all the staff been given the training for MSDS?			
1.13	Are the potentially reactive chemicals stored separately?			
1.14	Is the transport of the specimen done in a leak proof container?			
1.15	Are works surfaces and equipments decontaminated at least twice daily using			

	appropriate disinfectant (e.g. 1% sodium hypochlorite solution)?			
1.16	Are the bench tops, drawers and sinks clean and well maintained?			
1.17	Are the laboratory staffs using PPE while working in laboratory?			
1.18	Do they wear goggles or face shield when doing work that could involve accidental splashes to the face or eye?			
1.19	Do they follow the hand hygiene practices?			
1.20	Do they wash their eyes immediately after any chemical exposure?			
2.	**BIOLOGICAL HAZARDS**			
2.1	Are all the bio medical waste containers there?			
2.2	Is the segregation of biomedical waste done as per the BMW rules?			
2.3	Are the hazard symbol labelled there?			
2.4	Is all the bio medical waste containers covered?			
2.5	Are the containers 3/4th filled?			
2.6	Are they doing the spill management appropriately?			
2.7	Is the hazmat kit available in the laboratory?			
2.8	Are the staffs aware about when and how to use the hazmat kit?			
2.9	Do they use needle locking syringes or plastic disposable syringe needle units?			
2.10	Do they wash the area immediately with soap & water in case of needle stick injury?			
2.11	Are all the incidents reported to laboratory supervisor and reports documented?			
2.12	Does the hospital provide immediate Post exposure prophylaxis in case of any incident?			

3 .	**ELECTRICAL HAZARDS**			
3.1	Are the danger sign there?			
3.2	Are all the wires covered?			
3.3	Are all equipment grounded through use of three prong plugs?			
3.4	Are rubber mat there?			
3.5	Are the power plug over loaded?			
3.6	Is the laboratory staff wearing rubber gloves in hands while handling electronically things?			
4.	**FIRE HAZARDS**			
4.1	Are the fire extinguishers and fire alarms presented?			
4.2	Are the staffs aware about the procedures to be followed in the event of fire?			
4.3	Is the employee familiar with the location of fire extinguishers and alarms?			
5.	**PHYSICAL HAZARDS**			
5.1	Are there loose surface or broken that could cause falls?			
5.2	Does any injury in the laboratory arise from slipping, tripping or improper lifting?			
5.3	Have all the employee been given the Hepatitis B & TT vaccine?			
5.4	Are doors and drawers are rightly framed?			
5.5	Do furniture correctly positioned and no sharp edges on surfaces and corners?			
5.6	Is there adequate lighting in all work areas?			

APPENDICES – 2

Questionnaire

BIO HAZARDS:-

Q1. How many categories of BMW are there in the hospital?

a. 10 c. 6
b. 8 d. 4

Q2. Which of the below is the symbol for biohazard material?

a. 

c. 
b. 
d. 

Q3. Sharps should be disposed in –

a. Yellow bin c. Puncture proof container
b. Blue bin d. Red bin

Q4. Infectious material should be disposed in –

a. Yellow bin c. Blue bin
b. Black bin d. Red bin

Q5. Black colour bin is for –

a. Plastic wastes c. General waste
b. Anatomical parts d. Sharps

CHEMICAL HAZARDS:-

Q6. What solution should be used for cleaning the chemicals/disinfected in the lab area?

a. Sodium Hypochlorite c. Detergent and water
b. Endozymer d. Endox

Q7. Chemicals containers should be stored in the _____ .

a. Almirahs c. Sandpit
b. Floor d. Table

Q8. What precautions should be taken while storing any chemical –

a. Should be stored separately c. Appropriately labelled
b. Below the eye level d. All of the above

Q9. During chemicals transportation which of the below mentioned step should not be done –

a. Use of leak proof container
b. Bottle held by its neck
c. Wear gloves while transportation
d. None of the above

STANDARDS SAFETY MEASURES:-

Q10. Which of the following is not a PPE ?

a. Aprons
b. Mask
c. Gloves
d. Hand wash

Q11. What PPE must be worn during lab work?

a. Mask
b. Gloves
c. Rubber shoe
d. a & b

HAND WASHING:-

Q12. How many steps are there in hand washing?

a. 2
b. 9
c. 6
d. 5

Q13. Hand wash should be done –

a. Before and after each patient
b. Before and after wearing gloves
c. Before and after any procedure
d. All of the above

FIRE SAFETY:-

Q14. In case of fire which out of the following code is activated?

a. Code blue
b. Code orange
c. Code pink
d. Code red

Q15. State the method which is used for extinguishing the fire –

NEEDLES & SYRINGES:-

Q16. What you should not do in case of a needle stick injury?

a. Wash with soap under running water
b. Fill the reporting form
c. suck at the site of injury and stop bleeding
d. all of the above

Q17. Used needles must not be –

a. Recapped after use
c. Removed from syringes by hand

b. Destroyed immediately after its use d. Both a & c

SPILLS MANAGEMNET:-

Q18. Spills of blood or body fluids should be cleaned with –

a. Water c. Sodium Hypochlorite
b. Phenyl d. None of the above

Q19. Explain how a spill should be handled?

Q20. Any incidents should be immediately reported to –

a. Lab head c. Quality manager
b. Ward coordinator d. None of the above

MSDS :-

Q21. What is MSDS? What does it contain?

ELECTRICAL HAZARDS :-

Q22. While handing any electrical instrument in the lab what should be used?

a. Rubber mat c. Gloves
b. Steal mat d. None of the above

Q23. In order to avoid any electrical hazards what precautions should be taken ?

a. Use three prong plugs c. overloading should not be there
b. Don't handle with wet hands d. all of the above

HOUSE KEEPING :-

Q24. Lab area should be cleaned / disinfected with –

a. Sodium Hypochlorite c. Detergent and water

b. Endozymer d. Endox

Q25. How many time lab area should be cleaned ?

a. At least twice in a day c. Once in two days
b. six time in a week d. None of the above

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