

**Summer Training at
Max Super Specialty Hospital, Saket, New Delhi
(April 3 to June 2, 2017)**

Chemical Hazards and Safety Compliance in the Hospital

**By
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**Under the guidance of
Dr. Ashok Kumar Peepaliwal**

**MBA Hospital & Health Management
2016-2018**


**Institute of Health Management Research
The IIHMR University, Jaipur
2017**

CERTIFICATE

This is to certify that Ms. **Sagrika Singh** has undergone summer training in **Max Super Specialty Hospital, Saket, New Delhi** from 3rd April to 2nd June 2017.

The candidate herself completed the project assign to her during summer training. Her approach to the project was sincere and proactive. This summer training is in partial fulfillment of the course requirement recommended for the award of MBA in Hospital and Health Management.

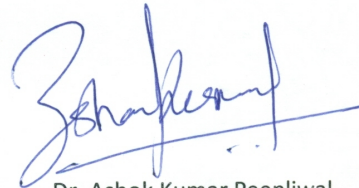
I wish her success in all her future endeavors.



Col. (Dr.) Ashok Kaushik

Dean (Academic & Student Affair)

The IIHMR University, Jaipur



Dr. Ashok Kumar Peepliwal

Associate Professor

The IIHMR University



CERTIFICATE OF COMPLETION



This is to certify that

Sagrika Singh

has been associated as an

INTERN

with the department of

MEDICAL ADMINISTRATION

for a period of

3rd April 2017 to 2nd June 2017

at

Max Super Specialty Hospital,
Saket

"The Internship/Observership course is a Max certified course not affiliated to any National/International society".

Head of the Department

Dr. Shubnum Singh

Dean - Nursing, Allied Health, & Wellness Programs
Max Healthcare, New Delhi

Ms. Brigitte Wuethrich

General Manager
Max Institute of Medical Excellence
Max Healthcare

CERTIFICATE

This is to certify that **Ms Sagrika Singh**, student of IIHMR university, has done this summer training programme project entitled “chemical hazards and safety compliance in the hospital” under the supervision and guidance of Dr. Sandeep Mor at Max Super Specialty Hospital(Saket), New Delhi, India.

Dr. Sandeep Mor
(Supervisor)
DMS
Max Super Specialty Hospital

DECLARATION

The work embodied in this project entitled “**chemical hazards and safety compliance in the hospital**” has been carried out at Max Super Specialty hospital, Saket, New Delhi. The work is original and has not been submitted in part or on full to this or any other university for any degree or diploma.

Dr.SandeepMor

Dr.Devesh Tiwari

(Supervisor)Senior Quality Manager

DMS

Max Super Specialty Hospital

Max Super Specialty Hospital

Acknowledgement

I take this opportunity to extend my thanks to Max Super Specialty hospital for allowing me to do this project in their healthcare institute.

With pleasure and deep sense of gratitude, I express my heartfelt thanks and indebtedness to my respected supervisor **Dr. Sandeep Mor**, DMS at Max super specialty hospital for providing excellent guidance and encouragement throughout the project. He was always available when I needed his guidance. I thank him for providing me the privilege of working under his expert supervision. His simplicity and integrity shall always be the lighthouse and motivation to guide me through the journey of life.

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Special thanks also go to my family for supporting me and guiding me throughout my project.

Sagrika Singh

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Introduction

What are hazardous chemicals?

A **highly hazardous chemical** is the substance classified by the American objects that is both toxic and reactive and whose potential for human injury is high if released. Highly hazardous chemicals may cause, injury, cancer, birth defects, induce genetic damage, cause miscarriage, and death from relatively small exposures.

A hazardous chemical is defined by **OSHA** as any chemical that is a health hazard or a physical hazard.

Health Hazard

OSHA defines a **health hazard** as a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. Chemicals covered by this definition include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, nephrotoxins, hepatotoxins, neurotoxins, sensitizers, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes.

Physical Hazard

OSHA defines a physical hazard as a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water-reactive.

Additional Hazardous Chemicals

The broad definition OSHA uses to define hazardous chemicals includes not only generic chemicals but also paints, cleaning compounds, inks, dyes, and many other common substances. Chemical manufacturers and importers are required to determine if the chemicals they produce or repackage meet the definition of a hazardous chemical. A chemical mixture may be considered as a whole or by its ingredients to determine its hazards. It may be considered as a whole if it has been tested as a whole and a **Safety Data Sheet (SDS)** has been issued accordingly. Otherwise the mixture must be evaluated by its components. If the mixture contains 1.0 percent or more of a hazardous chemical or 0.1 percent of an ingredient listed as a carcinogen or suspected carcinogen, the whole mixture is assumed to have the same health and/or carcinogenic hazards as its components.

Literature review

Many concentrated chemicals are used in healthcare settings, for a variety of reasons: to clean, disinfect, sterilize surfaces and treat patients (medications and anesthetic agents), and supplies (cleansers/disinfectants); and to kill insects and other pests (pesticides). We often forget, however, that the drugs used to treat patients can have accidental consequences for workers who are exposed to them when they prepare and administer solutions or are exposed to the off-gassing of anesthesia and aerosolized breathing treatments. Indeed, pharmaceuticals can be a hazard to the community at large when they are improperly disposed of. According to two experts on hazardous drugs, “There is no other industry where hazardous chemicals are taken so lightly as the healthcare industry.”

All chemicals are potentially hazardous. The traditional discipline of toxicology has related the dose of a chemical to its toxic potential, but as added information in relation to endocrine disruption becomes well-known the data shows that very small doses of some chemicals, especially during window of physiologic vulnerability, can have a harmful impact on health. Since bacteria and viruses must be restricted to prevent nosocomial (or hospital-acquired) infections and occupational exposure, toxic chemicals are used as disinfectants and for sterility. Applying the industrial hygiene hierarchy of controls (see sidebar) will lead to using the least toxic chemical disinfectant that will get the job done. When less toxic chemicals are not available or not practical, it is important to ensure that the chemicals used are diluted to appropriate concentrations and that exposure-control measures are employed.

The Occupational Health and Safety Administration’s (**OSHA**) **Hazard Communication Standard** (HCS) aligns with the United Nations’ Globally Harmonized System of Classification and Labeling of Chemicals (GHS). The standard requires training of employees as well as requirements for manufacturers to utilize standardized formats for container labeling and for Safety Data Sheets (SDSs), formerly known as, Material Safety Data Sheets (MSDSs).

- ❖ In order to comply with the OSHA Hazard Communication Standard, WCMC has posted the **Chemical Hazard Communication Plan for Non-Laboratories** as well as the **Laboratory Chemical Hygiene Plan**. Information on chemical safety is also provided in the EHS **core safety training programs**. An informational sheet is available to provide an overview of the GHS program.



- ❖ The law requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) (formerly MSDSs or Material Safety Data Sheets) for each hazardous chemical to users to communicate information on these hazards in addition to what is on the label. The information contained in the SDS is required to be presented in a consistent user-friendly, 16-section format. These Sections:

SAMPLE LABEL

CODE _____ Product Name _____ Company Name _____ Street Address _____ City _____ State _____ Postal Code _____ Country _____ Emergency Phone Number _____	Product Identifier Supplier Identification	Hazard Pictograms Signal Word Danger
Keep container tightly closed. Store in a cool, well-ventilated place that is locked. Keep away from heat/sparks/open flame. No smoking. Only use non-sparking tools. Use explosion-proof electrical equipment. Take precautionary measures against static discharge. Ground and bond container and receiving equipment. Do not breathe vapors. Wear protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified. In Case of Fire: use dry chemical (BC) or Carbon Dioxide (CO ₂) fire extinguisher to extinguish. First Aid If exposed call Poison Center. If on skin (or hair): Take off immediately any contaminated clothing. Rinse skin with water.	Precautionary Statements	Highly flammable liquid and vapor. May cause liver and kidney damage. Hazard Statements
		Supplemental Information Directions for Use _____ _____ _____ Fill weight: _____ Lot Number: _____ Gross weight: _____ Fill Date: _____ Expiration Date: _____

- ❖ Identification of the substance and supplier
- ❖ Hazards identification
- ❖ Composition/information on ingredients
- ❖ First aid measures

- ❖ Firefighting measures
- ❖ Accidental release measures
- ❖ Handling and storage
- ❖ Exposure controls/personal protection
- ❖ Physical and chemical properties
- ❖ Stability and reactivity Information
- ❖ Toxicological Information
- ❖ Ecological information
- ❖ Disposal considerations
- ❖ Transport information
- ❖ Regulatory information
- ❖ Other information
- ❖ Information on the chemicals label is related to what can be found in the SDS. For example, the Precautionary and Hazard Statements on the label will appear in section 2 of the SDS. Section 8 of the SDS will always contain information important to the chemical user on ways to protect themselves such as engineering controls and personal protective equipment that should be used

Training

Training is an important factor of an overall effective environmental health and safety program. Environmental Health and Safety has modernized the safety training programs to provide **core safety training programs** and **specialized safety training programs**.

These customized training sessions will meet all their safety training requirements unless they conduct specialized work activities outlined in the specialized safety training programs. Core safety training programs include

- ❖ Laboratories: Laboratory Safety Training
- ❖ Clinicians: Clinical and General Safety Training
- ❖ Service Department Staff
- ❖ Administrative Staff: Safety Training
- ❖ Visitors and Volunteers: Safety Training

Chemical Waste Disposal

- ❖ Chemical waste inappropriate for drain or trash disposal must be collected and managed as chemical waste. Chemical wastes may present a hazard to human health and the environment and require appropriate management and disposal. All chemical wastes must be
 - ❖ disposed via EHS (unless approved for drain or trash disposal)
 - ❖ placed into compatible and sealable containers
 - ❖ labeled with a yellow hazardous waste label with all constituents listed
 - ❖ closed at all times unless adding or removing chemicals, and
 - ❖ Stored in secondary containment within a designated chemical waste satellite accumulation area labeled with an approved Chemical Waste Satellite Accumulation Area Sign.

Chemical Safety

The goal of the chemical safety program is planned to make available a safe environment to the employees from potential exposure to the chemicals that are used in the hospital. This program provides information and guidelines to address proper use, handling and storage of chemicals which is mandated by the federal, state and local regulations

Chemical Hazard Communication

Hazard Communication is a system for providing chemical users with information about the physical and health hazards of the chemicals they use. This system includes employee training, chemical container labelling and Safety Data Sheets. This page provides an overview of the Hazard Communication Program and other available resources

Manuals and Guides

The manuals and guides provide detailed EHS guidance and compliance programs on proper use, handling and storage of chemicals and emergency response in the event of chemical release in the College. In addition, the guides also provide various topics related to chemical safety

Material Safety Data Sheets (MSDS)

The Material Safety Data Sheet (MSDS) is a detailed fact sheet summarizing information about a chemical's hazardous ingredients; health, physical and fire hazards; emergency procedures and first aid; chemical reactivity and incompatibilities; spill, leak and disposal procedures and protective measures required for safe handling and storage. The objective of an MSDS is to concisely inform you about the hazards of the materials at the work with so that you can protect yourself and respond to emergency situations

High Hazard Operating Procedure

The Occupational Safety and Health Administration's (OSHA) "Occupational Exposures to Hazardous Chemicals in hospital" standard requires that all hospitals that store or use Highly Hazardous Substances (HHSs) must develop and implement a High Hazard Operating Procedure (HHOP) for each substance. Anyone using highly hazardous substances must consult the laboratories HHOP documentation prior to using them

Risk assessment

In its most sophisticated purpose, chemical risk assessment involves knowledge of how much of a particular substance constitutes a hazard and whether there is potential for worker exposure to that chemical to exceed the acceptable level. Where there is evidence of worker exposure to a hazardous chemical or discharge of such a chemical into the atmosphere and the controls are known, the OHS professional may go straight to controlling the exposure. However, there are situation when this simplistic approach is not appropriate. Chemical risk assessment is about more than assigning a rating, as in severity and likelihood table, or comparing a measured exposure level with an exposure standard. The risk of harm or damage from chemical exposure is multifactorial, and is a function of the chemical state, the route of exposure, the dose-response relationship, the level of exposure, the nature of the task or activity involving the chemical, the workplace environment and the individual worker. The sources of information for hazard identification discussed above (i.e. labels, SDS and hazardous chemical databases) also provide information for risk assessment. However, caution and some underpinning knowledge are required when applying information from such sources for risk assessment.

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Problem statement

It is contradict-perceptive that the healthcare industry job is the concern of the sick, is itself a "high-hazard" industry for the workers it employs. Every hazard class, with chemical agents in the form of sterilants, pharmaceuticals, and germicidals in frequent use, this industry segment consistently demonstrate poor injury and illness statistics, among the highest in the United States, and in the European Union (EU), 34% higher than the average work-related accident rate. In both the United States and the EU, about 10% of all workers are employed in the healthcare sector, and in developing countries as well, forecasts for the increasing need of healthcare workers suggests a large population at potential risk of health harm. The explosion of technology growth in the healthcare sector, most obvious in pharmaceutical applications, has not been accompany by a step up safety program in hospitals. There is hazard detection the remedies are often voluntary, and often poorly imposed. The wrong assumption that this industry would police itself, given its presumed knowledge base, has also been found wanting. Simple strategies to improve the present state include: (a) recognizing healthcare as a "high-hazard" employment sector; (b) fortifying voluntary safety guidelines to the level of enforceable regulation; (c) "potent" inspections; (d) treating hazardous pharmaceuticals like the chemical toxicants they are; and (e) protecting workers in high-hazard sectors

AIM

Chemical Hazards and Safety Compliance in a Hospital

OBJECTIVE

- ❖ To identify the hazard posed by the chemical substance used, stored, handled or transported within a work place
- ❖ Protection of employees from work place injury and illness(OSHA)

RESEARCH METHODOLOGY

- ❖ **Study Design-** Observational study
- ❖ **Study population-** employees working in different department dealing with chemicals.
- ❖ **Study area-** Max Hospital, Saket (East block and West block)
- ❖ **Duration of study-** 15 days
- ❖ **Research Approach-** Qualitative and Quantitative both.
- ❖ **Sampling Technique-** Simple random sampling
- ❖ **Sample Size-** 10 departments
- ❖ **Data Collection-**
 - ❖ Primary data- checklist
 - ❖ Secondary data- Research papers, Articles, Guidelines.
- ❖ **Data Entry-** Manually
- ❖ **Data Analysis-** Using Pie chart in Microsoft excel.

CHECKLIST

INFRASTRUCTURE YES NO REMARKS

1. Storage area clean and order.			
2. Hazard warning signs are present.			
3. Respirators stored in a convenient, clean and sanitary location where needed for emergency use			
4. Respirators written standard operations available			
5. There a list of hazardous substances used in the workplace.			
6. Wasted disposal system in place.			
7. Hand washing sinks available.			
8. Eyewash/emergency showers functionally present?			

MANPOWER

9 Employees are trained for any hazard.			
10 Dealing Chemicals kept within the acceptable limit.			
11 Standard operating procedure being established and are they being followed when cleaning up chemical spills			

MATERIAL

12 Protective goggles or facials provided and worn where there is danger			
13 Protective gloves, aprons or other means provided against corrosive liquid and chemicals			
14 Chemicals in trolleys are highlighted properly			

PROCESS

15 Corrosive liquids are handled in open container or drawn is adequate means readily available for neutralizing or disposing of spills			
16 All pressure vessels periodically inspected and verified			

OUTCOME

17	All pressure vessels periodically inspected and verified			
18	Hospital investigates work related injuries			
19	Hospital has a safe handling policy			
20	Injury reports reviewed to identify trends related to the largest sources of injury			

MSDS

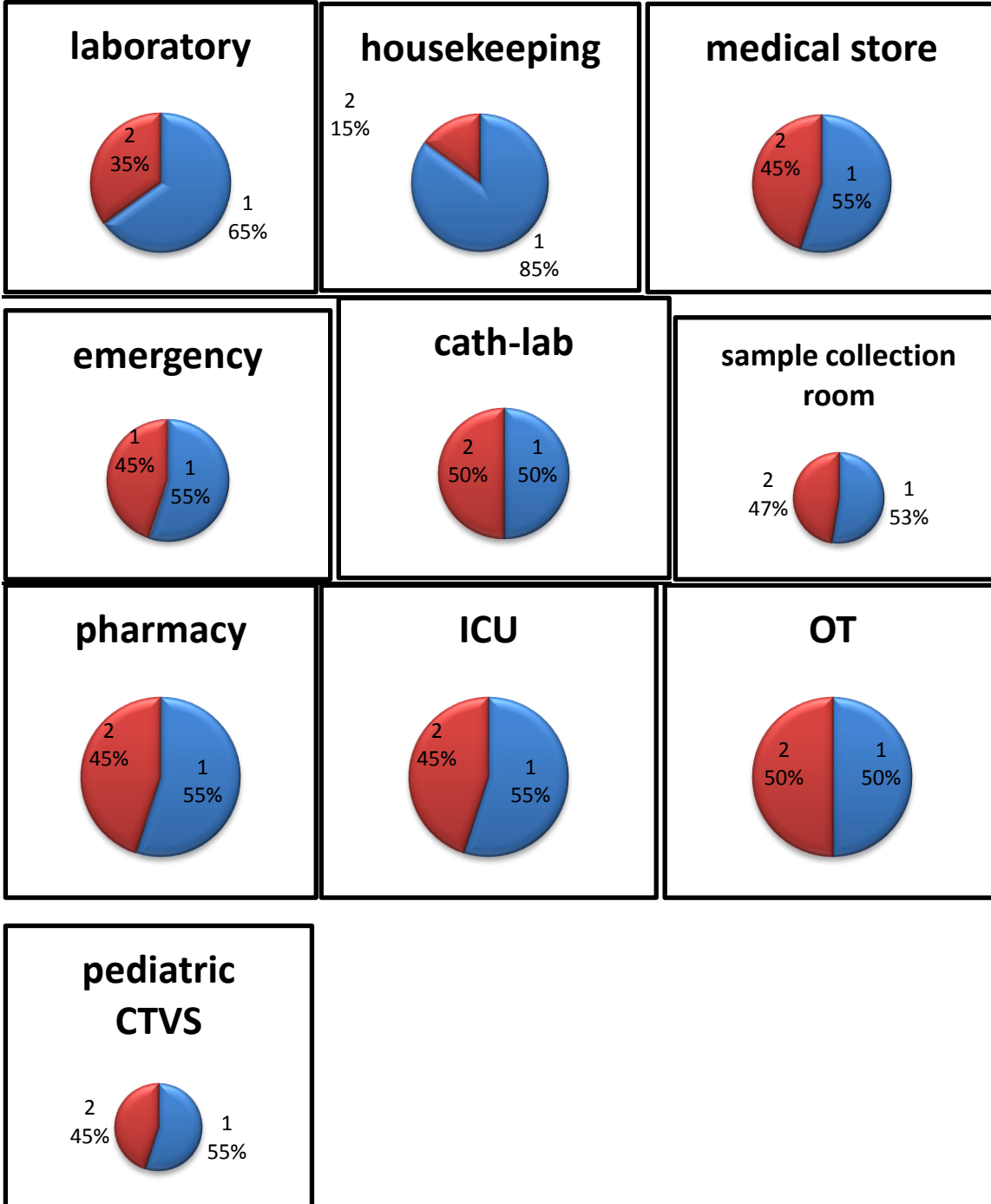
- ❖ Identification of the substance
- ❖ Firefighting measures
- ❖ Hazard identification
- ❖ Composition of the ingredients
- ❖ Toxicological information
- ❖ Accidental release measures
- ❖ Handling and storage
- ❖ Transport information
- ❖ Exposure control
- ❖ Physical and chemical properties
- ❖ Stability and reactivity
- ❖ First aid measures
- ❖ Ecological information
- ❖ Disposal consideration
- ❖ Regulatory information

DEPARTMENTS(visited)

- ❖ Laboratory
- ❖ Housekeeping
- ❖ Medical store
- ❖ Emergency
- ❖ Cath lab
- ❖ Sample collection room
- ❖ Pharmacy
- ❖ ICU
- ❖ OT
- ❖ Pediatric CTVS

RESULT

S.NO	Lab	Housekeeping	Medical store	Emergency	Cath lab	Sample collection	Pharmacy	ICU	OT	Pediatric CTVS
1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	No	No	No	No	No	No	No	No	No	No
4	No	No	No	No	No	No	No	No	No	No
5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
7	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
8	Yes	Yes	No	No	No	No	No	No	No	No
9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	Yes	Yes	No	No	No	No	No	No	No	No
11	Yes	Yes	Yes	No	No	No	No	No	No	No
12	No	Yes	No	No	No	No	No	No	No	No
13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
15	Yes	Yes	No	No	No	No	No	No	No	No
16	No	Yes	No	No	No	No	No	No	No	No
17	No	Yes	No	No	No	No	No	No	No	No
18	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
20	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes



1: YES

2:NO



DISCUSSION

LABORATORY:

In the hospital laboratory all the chemicals are stored properly and neatly.

They stored chemicals in 3 zones: hot, cool, freezer.

All areas are well labeled with hazmat signs

All staff members follow proper safety rules.



HOUSEKEEPING DEPARTMENT

In the housekeeping department they stored the hazardous chemicals separately which is a good practice (e.g. sodium hypochlorite).

All the staff follows proper safety measures while cleaning and collection of the waste.

They separate the waste material in 5 different colour dustbins:

COLOUR	WASTE DESCRIPTION
YELLOW*	Human tissues, organs, body parts, items contaminated by blood/body fluids, soiled cotton & dressing, soiled plaster casts etc.
RED*	Catheters, tubes, cannulae, syringes, plastic IV bottles & sets, used gloves, infected plastics, specimen containers, lab waste, microbiology cultures, used or discarded bags of blood/blood products, vaccines etc.
BLUE*	Glass items, needles, syringes, scalpels, blades, used and unused sharps etc.
BLACK*	Discarded medicines, discarded cytotoxic drugs etc.
GREEN	General waste, non-infected plastic materials & papers, disposables, cardboards, metal containers, office waste, food waste etc.

The waste is disposed off properly on a daily basis with proper documentation.

The hospital put a strong investigation on the weight of the disposed off materials.



MEDICAL STORE DEPARTMENT

All the medicines are stored properly with the labels at their stored area with proper guidance in case of any hazard.

The staff members are well trained about any chemical related hazards.

The department follows proper medicines stored guidelines.





RECOMMENDATIONS

- ❖ The hospital should have a proper investigation team for the chemical related injury other than the needle stick injury and should follow and review them monthly so as to decrease the chemical related injury at the work area.
- ❖ Respirators should also be used in the laboratory, housekeeping wherever dealing with chemicals whether they are in need or not just to avoid any chemical related injuries due to inhalation.
- ❖ The eyewash is in pathology lab, according to the guidelines it should be present within the lab at a proper reaching area.
- ❖ The hospital should inspect chemical related injuries monthly and should review the major areas of injuries.
- ❖ The department should follow a strict and proper medicine expiration as some medicines can turn into hazardous chemicals after their expiration



CONCLUSION

- ❖ Overall the hospital maintains a good safety regulations against chemical hazards, the reasons of NO in the result is just due to no applicability or no need of all those equipments or precautions in that particular department.
- ❖ In other department like OT , ICU, Cath lab there is no such dealing with the chemicals on a daily basis ,the workers over there are much aware about the hazardous chemicals and how to use them(if required).
- ❖ All the departments are well labeled with yellow color hazmat sign board.
- ❖ All the hospitals employees are well trained before their beginning to the hospital about the chemicals hazard and its safety.
- ❖ All the OSHA guidelines are being followed properly.
- ❖ Though hazards chemicals are stored in safe manner in most of the areas but while using it complete precautions are not taken i.e. Appropriate PPE is missed some times.
- ❖ Though chemicals are identified in storage areas but when kept in trolley hazardous and precautions are not displayed.
- ❖ During the interviews it revealed that most of the health care workers are aware about Chemical hazards and MSDS but awareness is lacking among doctors who continuously come in contact with flammable chemicals.

REFERENCES

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