Internship Training

On

"Bio-medical Waste Management (Compliance and Awareness Study)"

At

Park Hospital, Faridabad

Submitted by

DR.SUKHDEEP KAUR

Of

Post-Graduate Diploma in Hospital & Health Management
PGDHM 2012-14 Batch

as a partial fulfillment of the Dissertation Training Program requirement
of PGDHM Program

(10th January, 2014 to 10th April, 2014)

International Institute of Health Management Research

Park Hospital

A Multi Super Speciality Hospital

PARK HOSPITAL WEST DELHI

To whomsoever it may concern

This to certify that **Dr. Sukhdeep Kaur** student of **International Institute of Health Management Research, New Delhi** has successfully completed her dissertation in **Operations Department** starting from **10th January 2014 to 10th April 2014**.

During her dissertation, we found her to be hardworking, honest and sincere. Her conduct was good during this period.

We wish her all the very best in her future endeavors.

Mr. Sajay Sikdar

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TO WHOMSOEVER MAY CONCERN

This is to certify that **Dr. Sukhdeep Kaur (PT)** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at National Health Mission, Haryana from 10/01/2014- 10/04/2014

The Candidate has successfully carried out the study designated to her during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all her future endeavors.

08/5/14

Dr. A.K. Agarwal
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Certificate Of Approval

The following dissertation titled **"BIOMEDICAL WASTE MANAGEMENT – AWARENESS AND COMPLIANCE STUDY"** at **"PARK HOSPITAL, FARIDABAD** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily 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.

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Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Sukhdeep Kaur** a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. He/ She is submitting this dissertation titled **"Biomedical Waste Management – Awareness and Compliance Study"** at "Park Hospital, Faridabad" in partial fulfillment 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.

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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled ....BIOMEDICAL WASTE MANAGEMENT – AWARENESS AND COMPLIANCE STUDY..... and submitted by (Name) ...Dr. Sukudeep Kaur(P.....

..... Enrollment No. ...PGH/12/89.....

under the supervision of ...Dr. B. S. Singh.....

for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from ...January 10, 2014 to April 10, 2014.

embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Sukudeep

Signature

FEEDBACK FORM

Name of the Student: Dr. Sukhdeep Kaur (PT)

Dissertation Organization: Park Hospital Faridabad

Area of Dissertation: Operations & Quality.

Attendance: 100%

Objectives achieved: Fully met objectives.

Deliverables: Submitted the presentations with excel sheets. Provided practical and feasible recommendations.

Strengths: Meticulous, Hardworking, Positive learning attitude with good communications skills and have good command on analytical skills.

Suggestions for Improvement: Keep your emotions in control. Keep it up.

11/4/14

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PARK HOSPITAL HRY FARIDABAD

Date: 11th April 2014

Place: Faridabad

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ABBREVATIONS

1	GDA	Ground Duty assistant
2	ICU	Intensive Care Unit
3	MICU	Medical Intensive Care Unit
4	SICU	Surgical Intensive Care Unit
5	OT	Operation Theatre
6	CCU	Coronary Care Unit
7	NICU	Neonatal Intensive Care Unit
8	CTVS	Cardio- Thoracic Venous Surgery
9	BMW	Bio- Medical Waste
10	WHO	World Health Organization

EXECUTIVE SUMMARY

This study was conducted to assess and analyze the knowledge, attitude and practices of doctors, nurses, GDA and housekeeping regarding biomedical waste management and analyze the compliance of Biomedical waste management in various departments in Park Hospital, Faridabad. This study was conducted over a period of 1 month in Park Hospital, Faridabad. The study was split up into 2 parts, 1)To assess the level of awareness and knowledge among different categories of hospital staff (by interview schedule), regarding bio-medical waste management.2)Toassess the compliance to bio-medical waste management rules (Observation method).

This descriptive cross sectional study showed that the level of awareness regarding the bio-medical waste management and handling was found to be the highest among the nurses (90%) while the doctors had the least awareness (63%). Also, the housekeeping and other assistants also scored well. It may be pointed out here that all the other staff received training regarding the bio-medical waste management except the doctors, whose attitude regarding it was found to be rather careless. The main problem areas were found to be the identification of the symbols for cyto-toxic waste, radiological hazard etc. The overall compliance to the bio-medical waste management and handling was found to be good. All the 12 departments under study scored more than 90% average compliance levels. The best compliance was seen in five departments out of the 12 studied, these included NICU, CCU, CTVS, OTs and nuclear medicine. Dialysis had the lowest compliance levels (90.5%). More training to the doctors needs to be given.Training to Doctors should be provided at time of induction, on Biomedical Waste Management as the level of awareness regarding the later was found to be the lowest. Nurses should be trained while breaking the ampoules, as while breaking, the broken pieces of ampoules spill around the sharp container, which can harm anyone in contact.
Signages/ symbols should be taught to all the healthcare people which includes General Duty Assistant (G.D.A), Housekeeping, Nurses and Doctors.Encourage all the health care providers to wear personal equipments (gloves, mask, cap, gum boots and aprons) as much as possible. Insist on hand washing to all the providers before and after waste disposal.

1. INTRODUCTION

'*Let the wastes of the sick not contaminate the lives of the healthy*'

(Park K 2004)

Healthcare personnel including doctors, nurses and paramedical staffs are the guardians of the community. It is the duty of the entire healthcare establishments to ensure speedy recovery of their patients by maintaining clean and infection free surroundings. Basic sanitation and cleanliness have always been mandatory requirements in the healthcare establishments, collection and disposal of biomedical waste, often ignored, are directly responsible for the spread of diseases in the community specifically among healthcare personnel.

The biomedical waste that is originated in hospitals poses numerous potential health and safety hazards. Infectious waste risks the health of not only the hospital staff, patients and their relatives who are visiting or attending them but also the health of the general public animals and birds through the waste bins maintained by municipalities.

The quantity of biomedical waste generated will vary depending on the hospital's policies and the practices and the type of care being provided. According to WHO 85 percentage of hospital waste are actually non hazardous, 10 percentage are non infectious and the remaining 5 percentage are non infectious but hazardous consisting of pharmaceutical, chemical, radioactive materials. In India, 0.5-2 kg per patient per day waste is generated and the percentage of infectious waste is much higher that is 30 – 60 percentage. This is because of improper segregation methods resulting in collection of biomedical waste in a mixed form.

Infectious waste such as syringes, needles and intravenous drip sets are recycled without proper treatment. Used cotton is further sold to people after washing with water. In this business small children are involved who work without any safety measure. Improper practices such as dumping of medical waste in municipal dust bins and open spaces leads to spread of diseases.

Occupational exposure is common in any area of work. This is true with regard to hospitals also. In hospitals, accidental exposure to infectious waste causes serious concern as health workers are great risk of it. Nurses particularly are at higher risk of infection and injury from biomedical waste. The most common accident that takes place in healthcare establishments is needle stick injury.

So, the accumulation of biomedical waste is a serious health hazard that no healthcare institution worth its name can afford to ignore. Proper methods for biomedical waste

disposal are to be evolved. It is with this aim of protecting environment and human health from biomedical waste hazards GOI notified the Management and Handling Rules in 1998.

According to the biomedical waste (Management and Handling) Rules in 1998 all the healthcare institutions in the country have to make adequate arrangements for handling of such waste. Since nurses from the largest segment of health care panel, who deal with biomedical waste, it is clear that without their active participation waste management would be a dream.

1.1 HOSPITAL PROFILE

Park Hospital

The Park Legacy

The Park has a strong legacy of more than 3 decades that redefines healthcare arena in a unique and larger perspective. Since its inception the group has always strived to take the healthcare services to a new level. This journey of healthcare excellence and highest level of patient satisfaction has seen many milestones on its way. Today the group boasts a panel of more than 100 doctors and an array of state-of-the-art healthcare facilities across its hospitals in West Delhi, South Delhi, Gurgaon, Faridabad and Panipat. Patients at Park include common people, corporate, government employees and many who's who of the society. Park envisions of providing latest and affordable services to the people of all social and economic backgrounds. With a passion to surpass patients' expectations and bring about a meaningful change in the lives of people, the Park is on its way to becoming a leading healthcare provider of north India.

Chain of Park Hospital

Park Hospital (Gurgaon)

Park Hospital (West Delhi)

Park Sunil Hospital (South Delhi)

Park Cancer Hospital(West Delhi)

Park Hospital(Faridabad)

Park Hospital(Hodal)

Park Hospital Faridabad

Park Hospital Faridabad is an ambitious initiative from the house of Park. Fully-equipped with all state-of-the-art medical facilities, this hospital, with a capacity of 250 beds, is the beginning of a new era in taking healthcare services to a new level. Park Hospital envisions of providing a comprehensive spectrum of advanced medical & surgical interventions with a perfect mix of inpatient and outpatient services to people of all social and economic backgrounds. It is the onset of a new experience where patients not only get medical services as per international standards but also receive an empathetic and humane treatment by the professionals attending to them. It is about pursuing a dream called 'wellness for all'

The Park has a strong legacy of more than 3 decades that redefines healthcare arena in a unique and larger perspective. Since its inception the group has always strived to take the healthcare services to a new level. This journey of healthcare excellence and highest level of patient satisfaction has seen many milestones on its way. Today the group boasts a panel of more than 100 doctors and an array of state-of-the-art healthcare facilities across its hospitals in West Delhi, South Delhi, Gurgaon, Faridabad and Panipat. Patients at Park include common people, corporate, government employees and many who's who of the society. Park envisions of providing latest and affordable services to the people of all social and economic backgrounds. With a passion to surpass patients' expectations and bring about a meaningful change in the lives of people, the Park is on its way to becoming a leading healthcare provider of north India.

The Park Mission

"To deliver state-of-the-art personalized healthcare services to people of all social and economic background and achieve highest level of patient satisfaction."

The Park Vision

"To be a leading name in the healthcare sector by providing holistic healthcare at affordable cost."

About Logo

P E R S O N A L I S E D

A L L S P E C I A L I T I E S

R E S O N A B L E C O S T

Q U A L I T Y S E R V I C E S

The two hands stand for care &help.Blue color signifies excelence and orange indicates the zeal for care.The logo also assure people that they are in safe and caring hands

Park*Hospital* is committed to meet or exceed customer expectation in quality, delivery and cost. As the level of their expectation increases every year, continuous quality improvement is critical to our success in the competitive marketplace.

"Doing the right thing, the right way,

at the right time, in the right amount,

for the right patient

that does not result in harm to the patient."

Floor directory of Park Hospital, Faridabad.

Ground Floor	1st Floor	2nd Floor	3rd Floor	1st Basement	2nd Basement
RECEPTION EMERGENCY EATERY ATM WAITING LOUNGE	IPD OT LABOUR ROOM NICU GASTRO- LAB	ICU HDU DIALYSIS CCU	ADMINISTRATION OFFICES HUMAN RESOURCE MARKETING ACCOUNTS	IP PHARMACY OPD MORTUARY RADIOLOY PHYSIOTHERA-PY LABORATORY	MRD BIOMEDICAL WING STORE

2. NEED FOR THE STUDY

The use of science and technology has helped in fostering sustainable development but , at the same time, the byproducts have proved highly destructive. Medical science is no exception. Modern medical institutions have succeeded in developing new technologies to save life but in the very process they over looked and failed to develop the technologies that take care of the removal of biomedical waste.

Biomedical waste such as pathological waste, tissues, blood and blood products, surgical dressings, disposable gloves, cotton swabs, soiled dressings from treatment area and waste from operation theatres dumped without safety measures, is posing a threat not only to hospital employees but also to general public and the surrounding environment. Anyone coming into contact with biomedical waste is easily infected with diseases like Hepatitis B, C, HIV/ AIDS, Typhoid and other infectious diseases.Exposure to biomedical waste increases the risk of acquiring infection. Nurses and other health care personnel must be made aware of the risks so that they can improve their practices with regard to biomedical waste management. As now a days nurses are required to practice in expanded roles in variety of settings they have to be very responsible and ecologically sensitive in assessing the environment impact of their services and in providing ways to reduce the hazards. Not only nurses, even doctors and housekeeping staff should be responsible and aware of biomedical waste management.

Awareness is necessary amongst the employees for proper management of biomedical waste. Also, adequate knowledge of healthcare workers of the steps of the management is crucial for the success of any healthcare waste management program.

Hence, there is strong need to conduct a study that can assess the knowledge, attitude and practice of bio- medical waste management among the staff of hospital. The current status of employee's awareness regarding biomedical waste management will help the concerned authorities to manage the biomedical waste effectively and to develop the strategy for improving the situation in future.

3. REVIEW OF LITERATURE

According to Biomedical Waste (Management and Handling) Rules 1998 of India , " Biomedical waste " any waste which is generated during the diagnosis , treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals and including categories mentioned in the table:

CATEGORIES OF BIO-MEDICAL WASTE

Waste Category No.	**Waste Category [Type]**	**Treatment and Disposal [Option]**
Category No.1	Human Anatomical Waste (human tissues, organs, body parts)	Incineration@/deep burial*
Category No.2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses)	Incineration@/deep burial*
Category No.3	Microbiology & Biotechnology Wastes (Wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures)	Local autoclaving/ Microwaving/ Incineration
Category No.4	Waste Sharps (needles, blades, syringes glass etc that may cause puncture and cuts. This include both used and unused sharps)	Disinfection(Chemical treat-ment@01/autoclaving/microwaving /mutilation and shredding
Category No.5	Discarded Medications and Cyto-Toxic Drug (waste comprised of outdated, discarded and contaminated medications	Incineration and destruct ion and dispose in secured landfill
Category No.6	Solid Waste Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines beddings, other material contaminated with blood	Incineration @ autoclaving/microwaving
Category	Solid Waste	Disinfection by chemical

No.7	(wastes generated from disposable items other than the waste 1[sharps] such as tubings, catheters, intravenous sets etc	treatment@@ autoclaving/ microwaving and mutilation/shredding
Category No.8	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities	Disinfection by chemical treatment @@ and discharge into the drains.
Category No.9	Incineration Ash (ash from incineration of any biomedical waste	Disposal in municipal landfill
Category No.10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides etc	Chemical treatment @@ and discharge into drains for liquids and secured landfill for solids.

As per W.H.O the Biomedical Waste is categorized on the basis of the type of waste and risk transmission of infectious material. The various categories include general waste (domestic), pathological waste, radioactive waste, chemical waste, infectious waste, pharmaceutical waste, sharps and pressurized container.

1. General waste:
   Waste containing domestic and household items. For eg: kitchen waste, packaging waste, paper waste, water from the laundries.

2. Pathological Waste:
   Waste containing human tissues or fluids. For eg: body parts, organs, tissues, human fetus and animal carcasses.

3. Radioactive waste:
   It includes solid, liquid or gases waste that is contaminated with radio nuclides generated in vitro analysis of body, tissues or fluids, in vivo body organ imaging and tumour localization and therapeutic procedure. For e.g.: unused liquids from radiotherapy or laboratory research , contaminated glassware, packages or absorbent paper, urine or excreta from patients treated or tested with unsealed radio nuclides, etc.

4. Chemical waste:
   Discarded solid, liquid or gaseous chemicals. For e.g.: chemicals from diagnostic and experimental work, developer, laboratory reagents, cleaning,housekeeping, disinfecting procedures etc.

5. Infectious waste:
   It contains those wastes which contain pathogens in sufficient concentration or quantity so that exposure to it could cause disease. For e.g.: laboratory cultures, waste from isolation ward, swabs, materials or equipments that have been in contact with patient or excreta.

6. Sharp waste:
   It refers to waste, which can cause injury to the person handling it.
   For eg: needles, syringes, saws , blades, broken glass, slides, nails, etc. the sharps are disinfected at source is by 2% hypochlorite solution. Ideal method of disposal of sharps is deep burial.

7. Pharmaceutical waste:
   It contains pharmaceutical products. For eg: drugs and chemicals that have been returned from wards or have been or are outdated (expired) or are to be discarded because they are no longer required.

8. Pressurized containers
   It includes containers, which are used for demonstration or instructional purpose, contain innocuous or inert gas and aerosol cans that may explode if incinerated or accidentally punctured.

According to Central Pollution Control Board Regulation and based on convenient disposable method the recommended segregation and colour coding is as follows:

Color Coding and the Type of Container for Disposal of Bio-medical Wastes

Colour coding	**Type of container**	**Waste category**	**Treatment options as per schedule 1**
Yellow	Plastic bag	Cat 1, Cat 2 , Cat 3 and Cat 6	Incineration/ Deep burial
Red	Disinfected container/plastic bag	Cat 3 , Cat 6 and Cat 7	Autoclaving/ Microwaving/Chemical treatment
Blue/White translucent	Plastic bag / puncture proof container	Cat 4 and Cat 7	Autoclaving/ Microwaving/Chemical treatment and Destruction/Shredding

Black	Plastic Bag	Cat 5, Cat 9 and Cat 10(solid)	Disposal in secured landfill

YELLOW BAG	RED BAG	BLUE BAG	BLACK BAG	WHITE CONTAINER
ANATOMICAL WASTE •TISSUE •ORGAN •BODY PARTS	**SOILED WASTE AND SOLID WASTE** •BLOOD AND BODY FLUID STAINED DRESSINGS,SWABS, COTTON etc. •SOLID PLASTER CAST. •LAB CULTURES	**PLASTIC WASTE** •IV SETS AND TUBINGS •CATHETERS •SYRINGES •VACUTAINERS (without medications) •URINE BAG •BLOOD BAGS AND TUBINGS HIGHLY CONTAMINATED •DISPOSABLE ITEMS OTHER THAN SHARPS	•UNBROKEN GLASS BOTTLES 100 ml OR MORE THAN 100 ml (in a separate bag for easy disposal). •CYTOTOXIC DRUG TO BE DISCARDED IN SEPARATE BIN (the bin needs to be labeled with a cyto-toxic sticker). •GENERAL MEDICATIONS •GENERAL WASTE (papers and plastic).	• PUNCUTRE PROOF & TAMPER RESISTANT CONTAINERS. •NEEDLES •SCALPELS •LANCETS •BLADES •BROKEN AMPULES •GLASS PIECES AND BROKEN VIAL < 100 ml • SYRINGES WITH NEEDLES COMING IN CONTACT WITH BODY FLUIDS.

Alok Sharma, Varsha Sharma and Swati Sharma conducted a cross- sectional study to determine the following among the workforce of the Jaipur Dental College, India: the awareness regarding biomedical waste management and their awareness regarding needle stick injury and its prevalence among different categories of healthcare providers. The study revealed that there was poor level of knowledge and awareness of biomedical waste generation hazards , legislation and management among healthcare personnel. It was surprising that 36% of the nurses had extremely poor knowledge of biomedical waste generation and legislation and just 15% of the class 1V employees had an excellent awareness of biomedical waste management practice.

Dr. RizwanMomin did a cross sectional study in KLEs Dr. PrabhakarKore Charitable Hospital, Belgaum over a period of 4 months from October 2009 to January 2009. This study concluded that the people with higher education i.e Consultants and Residents have more knowledge about the quantity of waste generated per day , waste management plan, waste management responsibility and the ruled. Nursing staff , Residents and Consultants have good percentage of people with good knowledge ,

attitude and practice. Auxillarystaffs though have very poor knowledge about the biomedical waste Act and rules, but a good percentage of this category has positive attitude and practice habits.

Veena R. conducted a study to evaluate the effectiveness of planned teaching programme on biomedical waste management by conducting post test in selected colleges at Mangalore. This study revealed that 90.8% of samples had average knowledge , 8.34 % had poor knowledge and only one (0.83%)had good knowledge. Item wise analysis of pre test in the area of" biomedical waste generation, health hazards and legislation" showed that 57.50 % of the nursing students knew that ' biomedical waste means waste generated during treatment of patients and 'international symbol for infectious waste is Bio Hazard'. In relation to the area of " Biomedical Waste Management " 57.67 % of students knew that ' after use the gloves should be chemically disinfected and disposed'. With regard to the area of " Safety practices of nurses " highest (49%) percentage of respondents knew that the nursing personnel can get hepatitis infection through needle stick injury.'

The project was conducted to investigate and review the existing management practices of biomedical waste management at public hospitals within the Caribbean and its contribution to environmental health risks. There were common challenges faced by Caribbean islands in effective management of biomedical waste within the public health sector. For smaller islands (less than 1,000,000 populations) the challenges were greater due to less infrastructural development and weaker economy and hence less financial support from government for the public healthcare sector. Healthcare services were provided free of cost and in others instances at minimal costs and hence lead to unavailability of required suppliers for effective infection control and prevention program. This lack of and inadequacy of financial resources had resulted in poor quality services and lack of effective management system for medical waste. Without adequate funding it was very difficult to provide quality healthcare service (personnel, equipment, supplies) and management of health, safety and environmental risks associated with healthcare services. Secondly, the lack of government/regional, laws, regulations and comprehensive operating standards for the healthcare industry and was another barrier to the effective biomedical waste management. The third barrier was the lack of a comprehensive environment health and safety management system that drived the disease prevention and infection prevention control program within the region. Poor infrastructure and provision of general public utilities had contributed to health and environmental risks of biomedical waste management.

Fourthly, there was a lack of formal EHS risks and impact assessment and evaluations for biomedical waste management within the public healthcare sector. There was inadequate data to track and measure injuries and illnesses for healthcare workers due to poor and lack of EHS management systems.

One of study was conducted tofind out the problems associated with biomedical waste generation and disposal in Y. C. M Hospital ,Pimpri – Chinchawad , Pune and to evaluate biomedical waste handling process.

4. OBJECTIVES

GENERAL OBJECTIVE-

- To assess and analyze the knowledge, attitude and practices of doctors, nurses, GDA and housekeeping regarding Biomedical waste management and analyze the compliance of Biomedical waste management in various departments in Park Hospital, Faridabad.

SPECIFIC OBJECTIVES:

- To analyze the problems at all level in Biomedical waste management.
- To analyze the compliance of Biomedical waste management in various departments
- To provide possible recommendations

5. METHODOLOGY

This study was conducted over a period of 1 month in Park Hospital, Faridabad.

The study was split up into 2 parts, viz

1. To assess the level of awareness and knowledge among different categories of hospital staff (by interview schedule), regarding bio-medical waste management.
2. To assess the compliance to bio-medical waste management rules (Observation method).

This is a descriptive, cross sectional type of study.

For assessing the level of knowledge and awareness among the different categories of hospital staff, a total sample size of 160 was taken.

It was split as

1. Doctors ---------- 25
2. Nursing Staff ---------- 50
3. G.D.A ---------- 54
4. Housekeeping Staff -------- 31

The interview schedule used in this study was pre-tested prior to the actual interview.5-6 people of different categories of hospital staff were interviewed, to pre-test the questionnaire.Changes required were duly incorporated.

For the second part of the project, that is to assess the compliance to the bio-medical waste management and handling rules, a check-list was prepared, which covered all the relevant points to be considered for waste management.12departments were observed over a period of 3 weeks.Observation check-list was made and all the data was collected accordingly. 3 categories were considered – total compliance, partial compliance and no compliance.For total compliance 10 points, partial compliance 5 and 0 points fornon compliance.

6.BIO-MEDICAL WASTE MANAGEMENT- ASSESSMENT OF COMPLIANCE AND AWARENESS

According to Biomedical Waste (Management and Handling) Rules, 1998 of India,bio-medical waste can be defined as "Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biological".

6.1 Analysis

6.1 Assessment of Awareness of Bio-medical Waste Management among Different Groups of Hospital Staff

To assess the level of awareness among the different categories of hospital staff at park hospital, Faridabad.the staff was categorized into 4 categories, namely, doctors, nurses, general duty assistants(GDA's) and housekeeping. Interviews were conducted with the help of interview schedule. These interviews were conducted over a period of 1 month.

It was found that the highest level of awareness was found among the nurses (90%), followed by the general duty assistants (85%). The category with the lowest level of awareness regarding bio-medical waste management was doctors (63%).This is depicted in figure 3.1

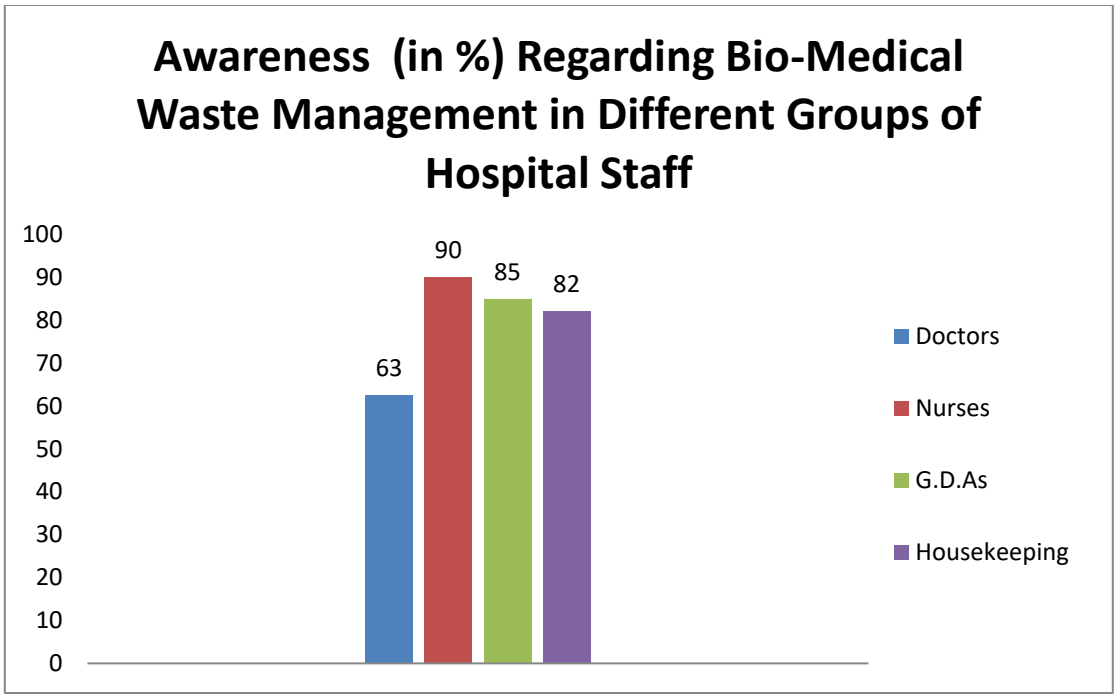

Figure 3.1 – *Graph depicting the level of awareness regarding the bio-medical waste management among the different categories of hospital staff. Highest level of awareness wasfound among the nurses (90%) and the lowest level of awareness was seen among the doctors (63%).*

Nursing staff

Among the nurses, all those interviewed had complete knowledge (100% awareness) regarding the 3 main questions, namely, different colors of the bins, what type of waste goes in the blue container and identification of the symbol for cyto-toxic waste.

Poorest awareness (40%) was seen regarding question 19 i.e. identification of symbol for radiation hazard. 70% awareness was seen regarding question 7 i.e. identification of the symbol for bio-hazard. It was commonly confused with the radiation hazard symbol.Overall average level of awareness was the highest among the nursing staff (90%).

Doctors

Overall, the poorest level of awareness (62.5%)was seen in this category The poorest response (8%) was found in response to the query regarding the contact number for housekeeping staff. This is necessary especially in case of a chemical/blood spill. The level of awareness was also low (40%) for the questions regarding the identification of symbols (for bio-hazard, cyto-toxic waste and radiation hazard).Other areas of concern include the knowledge regarding the protocol for blood/chemical spill management, the time frame till when the biomedical waste can be stored etc.

General Duty Assistant (G.D.A)

Overall, this category was very aware regarding the bio-medical waste management (85%). The main problem areas were the identification of the symbols for bio-hazard (48%) and radiation hazard (17%).

House-keeping Staff

Overall, there was 82% awareness in this category. Themain problem area was the inability to identify the symbol for radiation hazard. All were aware about the PPE's (Personal Protection Equipments) and about the symbol for the cyto-toxic waste (100% awareness).

It was seen that, response to the question 8 (identification of the symbol for Cyto-toxic waste) was excellent(100%) in all the categories except doctors (32%).All the categories had very low awareness regarding the symbol for the radiation hazard (less than 50%). These are the potential areas of improvement. The relevance and importance of these symbols is profound especially in the context of bio-medical waste handling and management.

6.2 Assessment of the Compliance to Bio-medical Waste (Handling and Management) Rules in Park Hospital , Faridabad.

As per W.H.O the Biomedical Waste is categorized on the basis of the type of waste and risk transmission of infectious material. The various categories include general waste (domestic), pathological waste, radioactive waste, chemical waste, infectious waste, pharmaceutical waste, sharpsand pressurized container.

Current Legislation Covering Waste Management

It includes the waste management act 1996, waste management (movements of hazardous waste) regulations 1998, waste management (collection permit) regulations, transport regulations ie CDGR & ADR, health & safety regulations and segregation, packing and storage guidelines for healthcare risk waste

Special Waste Regulations

Since the introduction of the Special Waste Regulations 1996, some laboratory wastes such as Prescription Only Medicines and hazardous chemicals, are classed as Special Waste. When these wastes are transported on public roads their movement must comply with these and the Transport of Dangerous Goods Regulations.

Management and Handling Rules

It has six schedules.

a) Schedule I- Classification of biomedical waste in various categories.
b) Schedule II- Color coding and type of containers to be used for each category of biomedical wastes.
c) Schedule III Performa of the label to be used on container/bag.
d) Schedule IV-Performa of label for transport of waste container/bag
e) Schedule V- Standards for treatment and disposal of waste.
f) Schedule VI- Deadlines for creation of waste treatment facilities.
g) Form I- Format of application for authorization
h) Form II-Format of annual report
i) Form III-Format of accident reporting

The Bio-medical Waste (Management & Handling) Rules, 1998 and amendments thereof were notified under the Environment (Protection) Act, 1986 by the Ministry of Environment &Forest. The BMW Rules are comprehensive and set duty of occupier/every bio-medical waste generator to segregate, transportation, and store, treat and dispose these wastes as per the laid down provisions.

If a container is transported from the premises where bio-medical waste is generated to any waste treatment facility outside the premises, the container shall, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV. Figure 3.2 depicts the steps in the bio-medical waste management.

In Park Hospital, Faridabad ,only 5 steps of management are performed and treatment of waste is outsourced. The biomedical waste is treated by rainbow environments and general waste is treated by Sunshine Company.

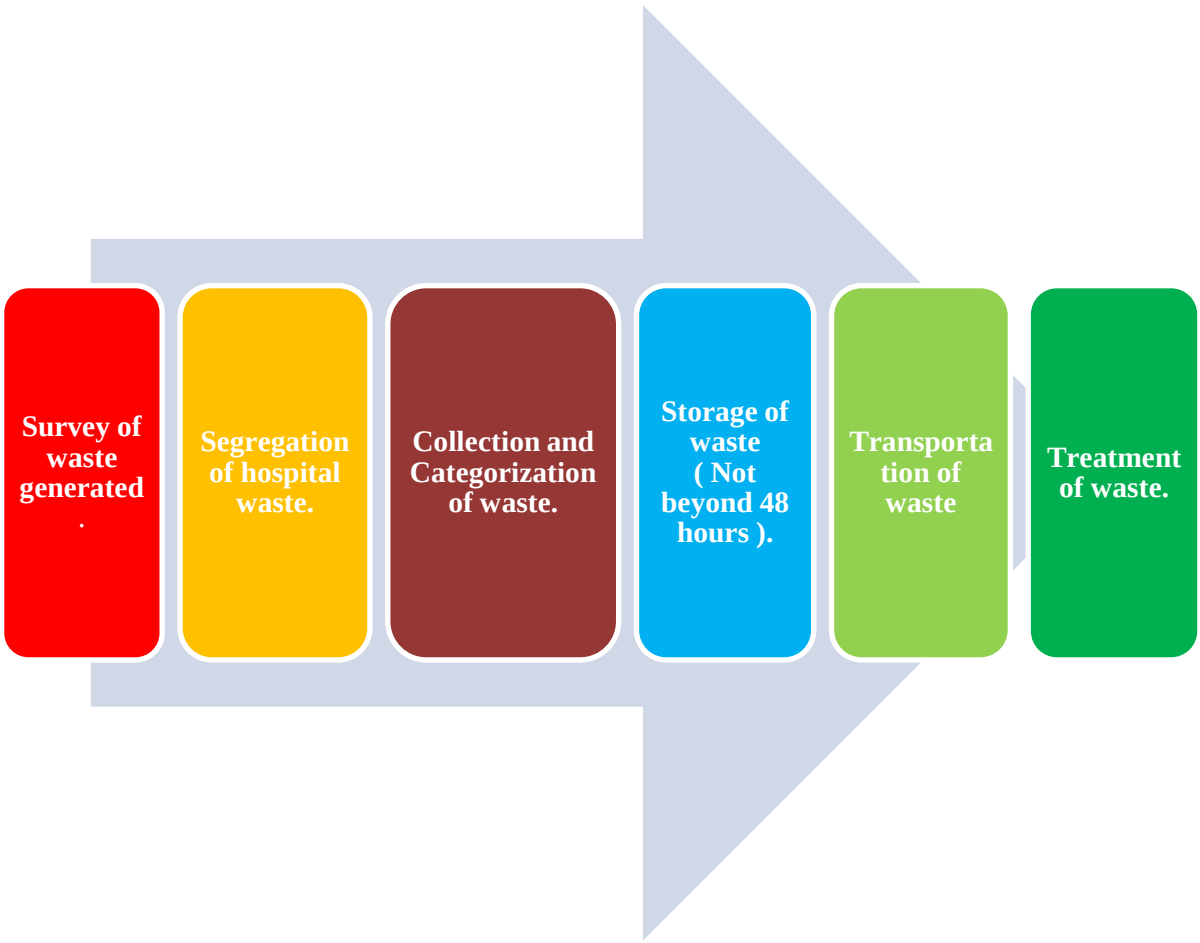

Figure 3.2 – *Steps in bio-medical waste management. (Note- The colors have been solely used for ornamental purposes only)*

SEGREGATION, PACKAGING, TRANSPORTATION and STORAGE

Bio-medical waste shall not be mixed with other wastes.Bio-medical waste shall be segregated into containers/bags at the point of generation in accordance with Schedule II prior to its storage, transportation, treatment and disposal. The containers shall be labeled according to Schedule III.
If a container is transported from the premises where bio-medical waste is generated to any waste treatment facility outside the premises, the container shall, apart from the label prescribed in Schedule III, also carry information prescribed in Schedule IV.
Notwithstanding anything contained in the Motor Vehicles Act, 1988, orrules there-under, untreated bio-medical waste shall be transported only such vehicle as may be authorized for the purpose by the competentauthority as specified by the Government.

No untreated bio-medical waste shall be kept stored beyond a period of 48 hours ,provided that if for any reason it becomes necessary to store the waste beyond such period, the authorized person must take permission of the prescribed authority and take

measures to ensure that the waste does not adversely affect human health and the environment.[The Municipal body of the area shall continue to pick up and transport segregated non bio-medical solid waste generated in hospitals and nursing homes, as well as duly treated bio-medical wastes for disposal at municipal dump site].

SCHEDULE I

CATEGORIES OF BIO-MEDICAL WASTE

Waste Category No.	**Waste Category [Type]**	**Treatment and Disposal [Option]**
Category No.1	Human Anatomical Waste (human tissues, organs, body parts)	Incineration@/deep burial*
Category No.2	Animal Waste (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals, colleges, discharge from hospitals, animal houses)	Incineration@/deep burial*
Category No.3	Microbiology & Biotechnology Wastes (Wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures)	Local autoclaving/ Microwaving/ Incineration
Category No.4	Waste Sharps(needles, blades, syringes glass etc that may cause puncture and cuts. This include both used and unused sharps)	Disinfection(Chemical treat-ment@01/autoclaving/microwaving/mutilation and shredding
Category No.5	Discarded Medications and Cyto-Toxic Drug(waste comprised of outdated, discarded and contaminated medications	Incineration and destruct ion and dispose in secured landfill
Category No.6	Solid Waste Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines beddings, other material contaminated with blood	Incineration @ autoclaving/microwaving
Category No.7	Solid Waste (wastes generated from disposable items other than the waste 1[sharps] such as	Disinfection by chemical treatment@@ autoclaving/ microwaving and

	tubings, catheters, intravenous sets etc	mutilation/shredding
Category No.8	Liquid Waste (waste generated from laboratory and washing, cleaning, house-keeping and disinfecting activities	Disinfection by chemical treatment @@ and discharge intothe drains.
Category No.9	Incineration Ash (ash from incineration of any biomedical waste	Disposal in municipal landfill
Category No.10	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides etc	Chemical treatment @@ and discharge into drains for liquids and secured landfill for solids.

@@- Chemicals treatment using at least 1% hypochlorite solution or any otherequivalent chemical reagent. It must be ensured that chemical treatment ensuresdisinfection.

- Mutilation/shredding must be such so as to prevent unauthorized reuse.
@- There will be no chemical pretreatment before incineration. Chlorinated plastics shall not be incinerated.
* - Deep burial shall be an option available only in towns with population less than five lakhs and in rural areas.

2[+ Options given above are based on available technologies. Occupier/operatorwishing to use other State-of-the-art technologies shall approach the CentralPollution Control Board to get the standards laid down to enable the prescribedauthority to consider grant of authorization.

SCHEDULE II

Color Coding and the Type of Container for Disposal of Bio-medical Wastes

Colour coding	**Type of container**	**Waste category**	**Treatment options as per schedule 1**
Yellow	Plastic bag	Cat 1, Cat 2 , Cat 3 and Cat 6	Incineration/ Deep burial
Red	Disinfected container/plastic bag	Cat 3 , Cat 6 and Cat 7	Autoclaving/ Microwaving/Chemical treatment
Blue/White translucent	Plastic bag / puncture proof container	Cat 4 and Cat 7	Autoclaving/ Microwaving/Chemical treatment and Destruction/Shredding
Black	Plastic Bag	Cat 5, Cat 9 and Cat 10(solid)	Disposal in secured landfill

YELLOW BAG	RED BAG	BLUE BAG	BLACK BAG	WHITE CONTAINER
ANATOMICAL WASTE •TISSUE •ORGAN •BODY PARTS	**SOILED WASTE AND SOLID WASTE** •BLOOD AND BODY FLUID STAINED DRESSINGS,SWABS, COTTON etc. •SOLID PLASTER CAST. •LAB CULTURES	**PLASTIC WASTE** •IV SETS AND TUBINGS •CATHETERS •SYRINGES •VACUTAINERS (without medications) •URINE BAG •BLOOD BAGS AND TUBINGS HIGHLY CONTAMINATED •DISPOSABLE ITEMS OTHER	•UNBROKEN GLASS BOTTLES 100 ml OR MORE THAN 100 ml (in a separate bag for easy disposal). •CYTOTOXIC DRUG TO BE DISCARDED IN SEPARATE BIN (the bin needs to be labeled with a cyto-toxic sticker). •GENERAL MEDICATIONS •GENERAL WASTE (papers and plastic).	• PUNCUTRE PROOF & TAMPER RESISTANT CONTAINERS. •NEEDLES •SCALPELS •LANCETS •BLADES •BROKEN AMPULES •GLASS PIECES AND BROKEN VIAL < 100 ml • SYRINGES WITH NEEDLES COMING IN CONTACT WITH BODY FLUIDS.

Figure 3.3 – *Color coding of the different types of bio-medical waste bins and the type of waste which can go into them***.**

Quantity of biomedical waste generated in a hospital especially in the developed countries is 1 -5 kg/bed/day with variation among countries and in India the amount of waste generation is 1-2 kg/bed/day with variation among Government and Private hospital.

For the second part of the project, that is to assess the compliance to the bio-medical waste management and handling rules, a check-list was prepared, which covered all the relevant points to be considered for waste management. 9 departments were observed over a period of 3 weeks.Observation check-list was made and all the data was collected accordingly. 3 categories were considered – total compliance, partial compliance and no compliance. For total compliance 10 points, partial compliance 5 and 0 points were awarded fornon compliance.

Compliance toBio-medical Waste Management-- Analysis and Discussion

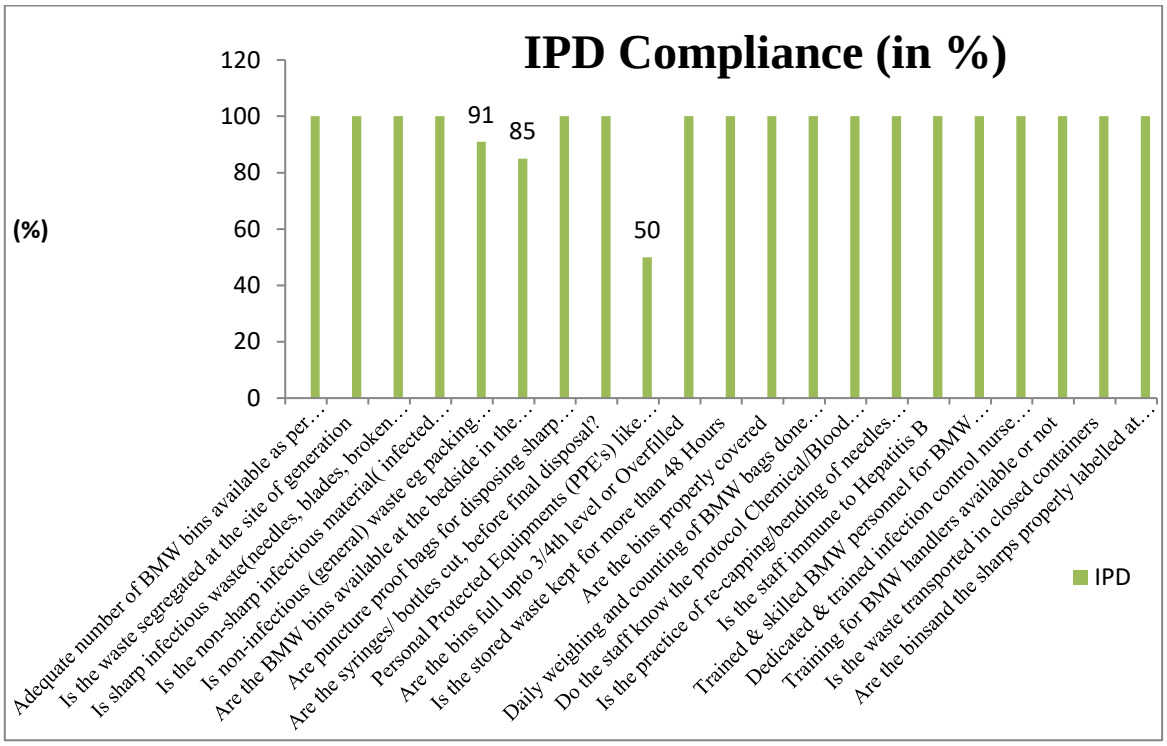

Figure 3.4 – *IPD Compliance to the bio-medical waste management and handling rules***.**

In the in-patient department (IPD), the compliance was low in three out of 12 aspects considered. These three aspects are adherence to personal protection equipments (PPE's) like gloves, masks etc (50%) ,availability of BMW bins at the bedside (85%) and the disposal of non-infectious waste material like packaging materials etc in separate black bins (91%). At the bedside, only sharp container waste bin and black bin for non-infectious waste material were observed.

In onco-day care department, there was no compliance (0%) regarding the cutting of plastic waste before disposal in the yellow bin. Only 50% compliance was observed in one aspecti.e. availability of the BMW bins at the bedside. Moreover, in a few instances, some of the BMW bins were not closed properly, thus the compliance in this regard was less (88%), as is shown in figure 3.5.

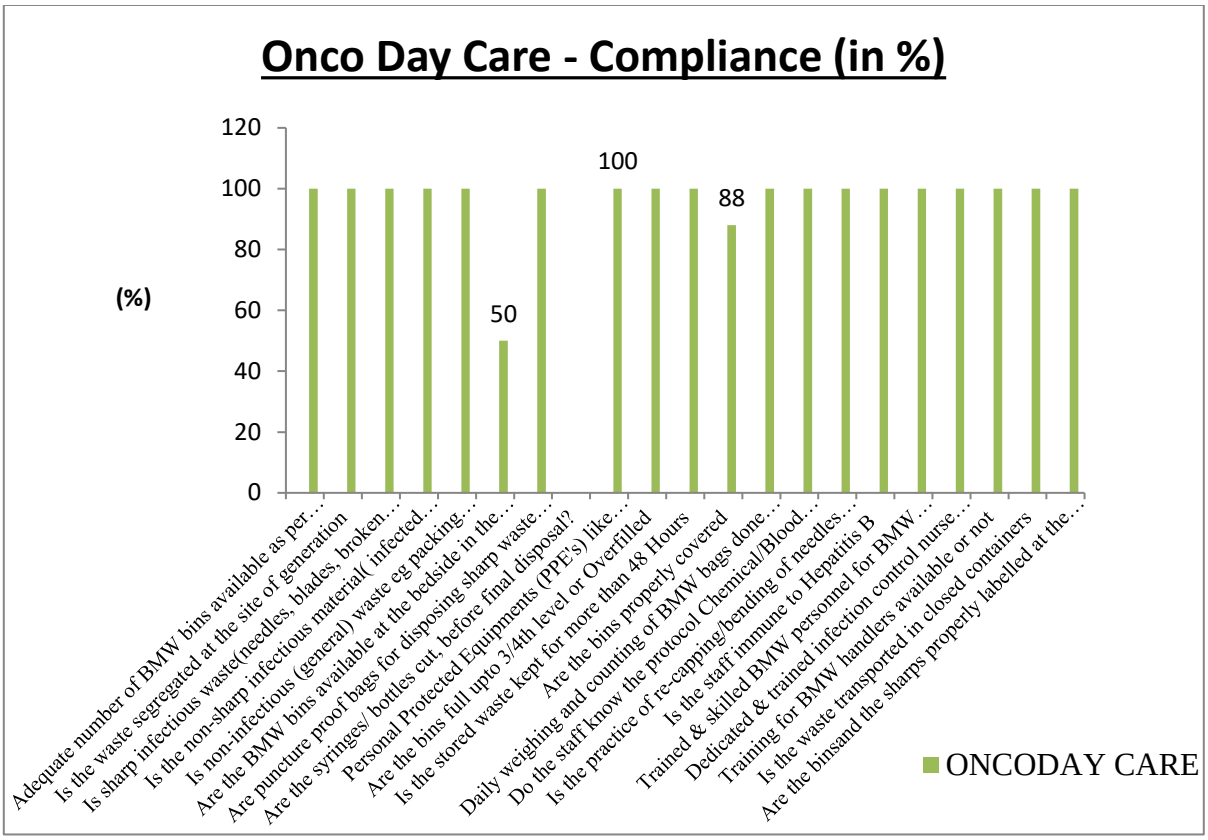

Figure 3.5 – *Compliance to the bio-medical waste management and handling rules, in the onco-daycare department.*

In the medical intensive care unit (MICU), the overall compliance was good except for two areas where it was only 50%.These areas are availability of BMW bins by the patient bedside (only sharp container bin was available) and the use of personal protection equipments like gloves, masks, caps etc, as is seen the figure 3.7.

In the surgical intensive care unit (SICU), the compliance to the bio-medical waste handling and management was found to be good except for one area (use of personal protection equipments like gloves, masks, caps etc) where the compliance was only 50%, as is seen in the figure 3.8.

The departments like neo-natal intensive care unit (NICU), coronary care unit (CCU), cardio-thoracic and vascular surgery (CTVS), operation theatre suite (4 OTs) and nuclear medicine had excellent compliance (100%) on all the parameters studied.

In the blood bank, there were three low compliance areas. Use of the personal protection equipments like masks, gloves etc (50%), bins were observed to un-covered in some instances, indicating less compliance (88%). In some cases, the BMW bins were

overfilled, this led to a low compliance rate in this area (82%), as is seen in the figure 3.12.

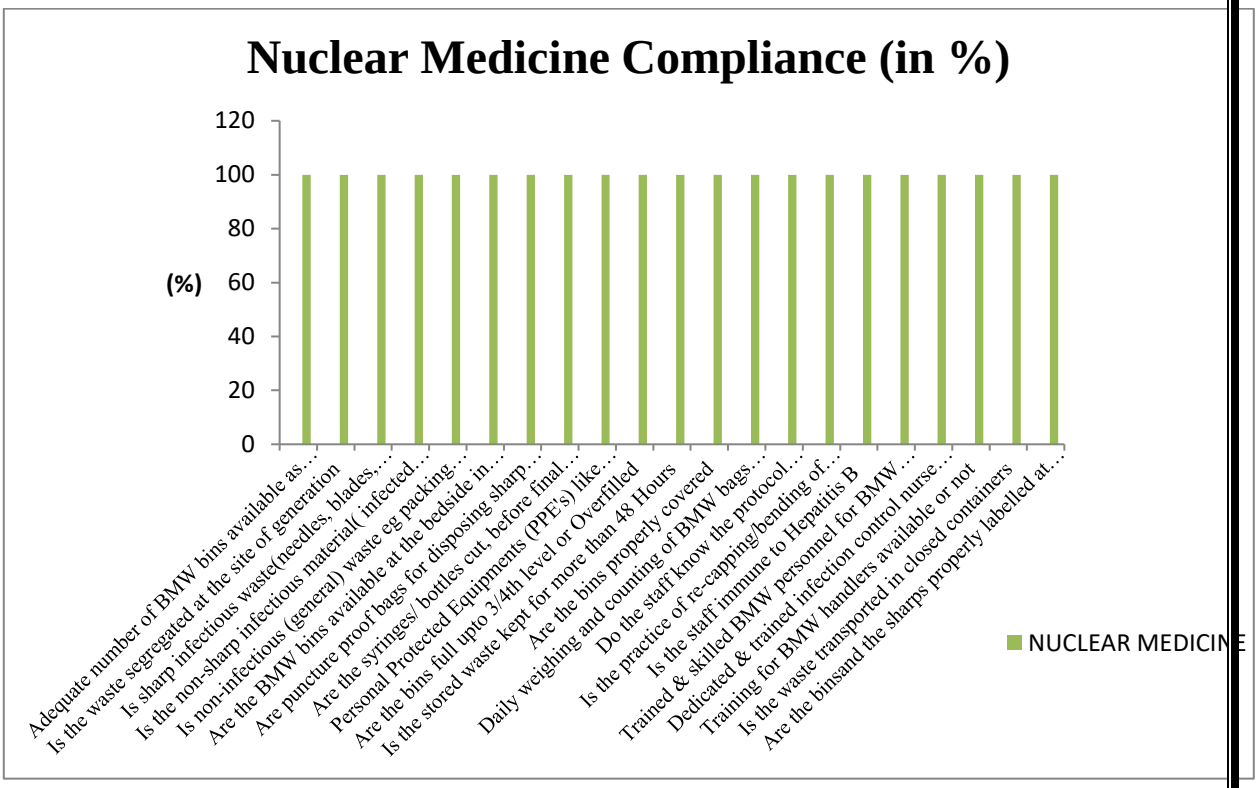

Figure 3.6 – *Compliance to the bio-medical waste management and handling rules, in the nuclear medicine department.It was found to be 100% i.e. complete compliance on all the parameters measured.*

In the laboratory (figure 3.13) the use of personal protection equipments like gloves, masks etc was found to be less, leading to a low compliance (50%). In an instance, the BMW bins were found to be overfilled, which led to a dip in the compliance rating (94%).

In the dialysis unit, there was less compliance in three areas. Firstly, in the use of personal protection equipments like gloves, masks etc (50%). Secondly, in this department the plastic bags etc are not cut before disposal, reason being the presence of blood in the plastic bags, which can pose a risk to the operator. Hence the later was not considered in the overall compliance of the department. Thirdly, only sharp container bin was available at the patient bed-side, which leads to low compliance (50%). See figure 3.15.

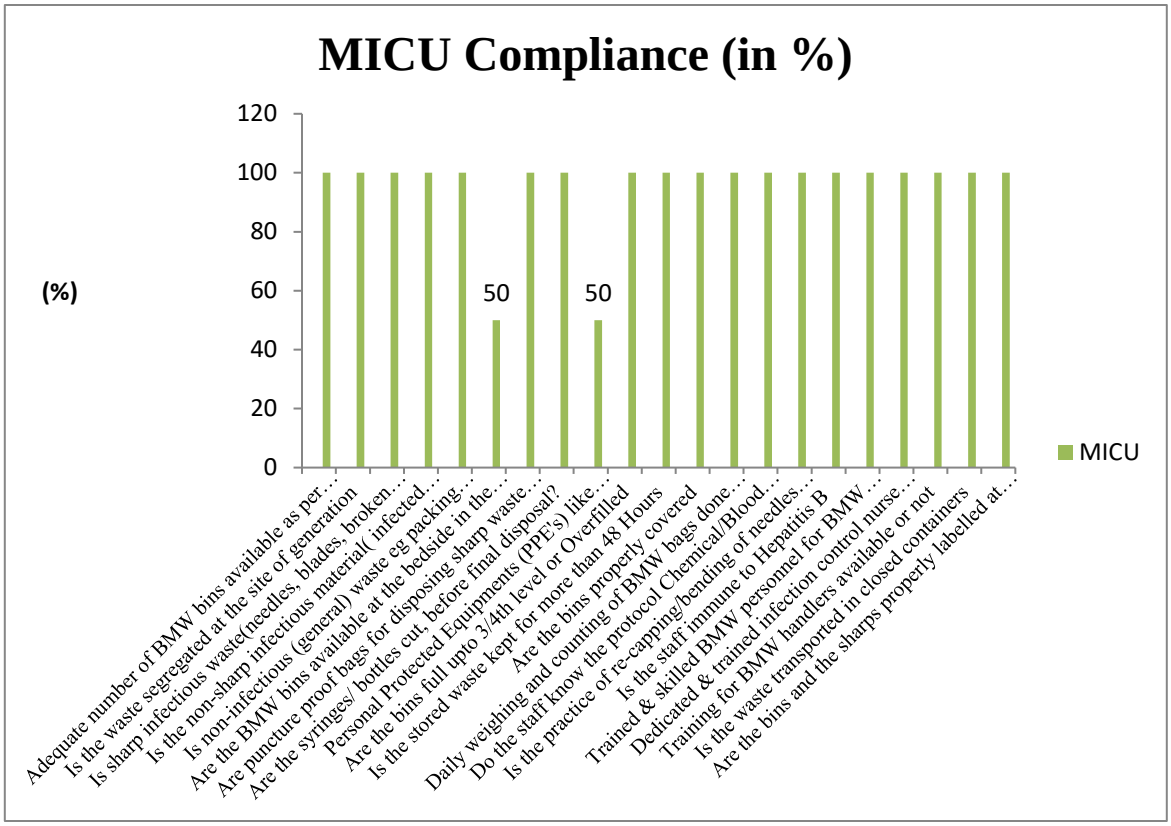

Figure 3.7 – *Compliance to the bio-medical waste management and handling rules, in medical ICU unit*

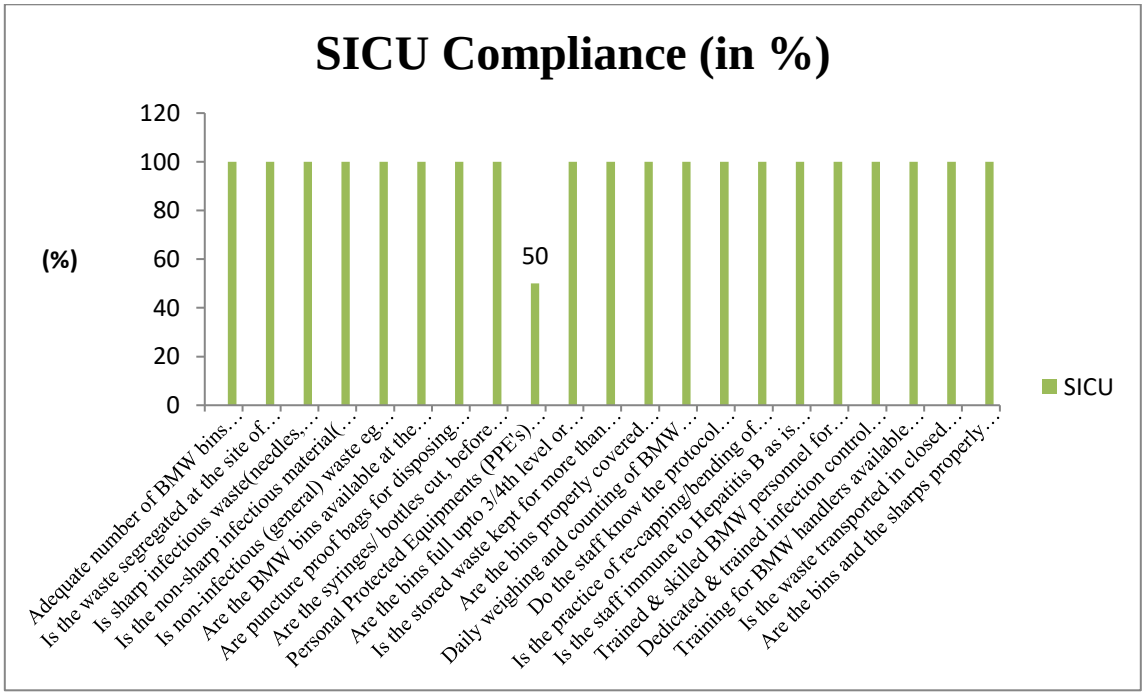

Figure 3.8 – *Compliance to the bio-medical waste management and handling rules, in the Surgical- ICU unit*

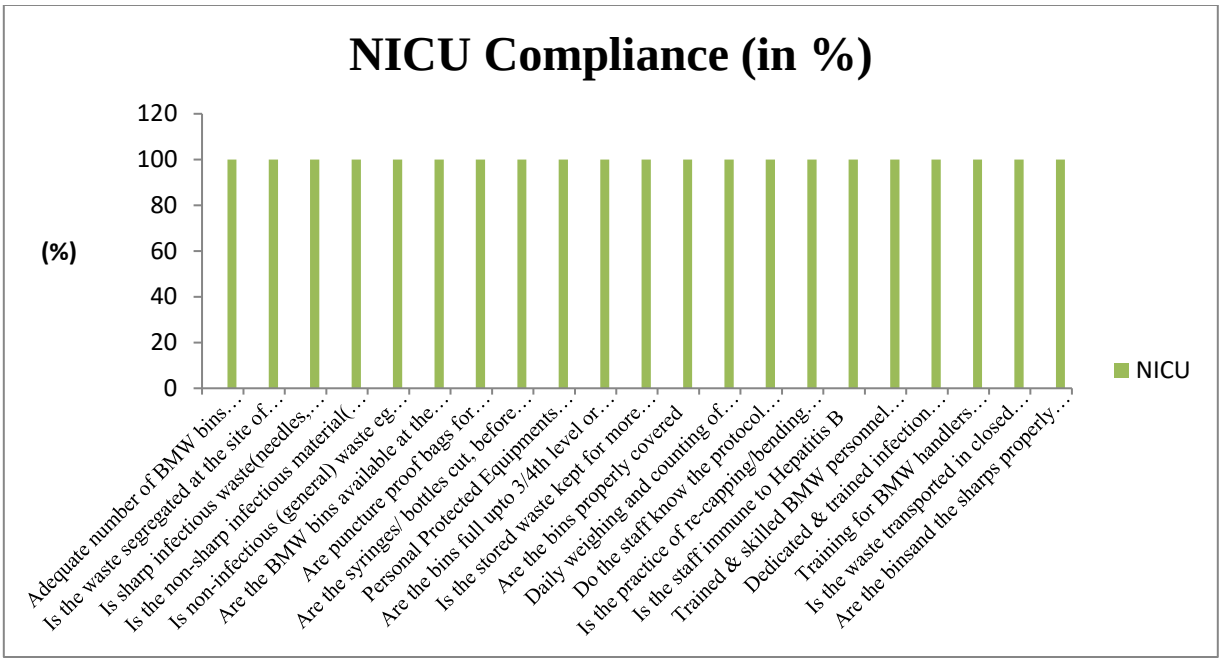

Figure 3.9 – *Compliance to the bio-medical waste management and handling rules, in the Neo-natal ICU unit.It was found to be 100% i.e. complete compliance on all the parameters measured.*

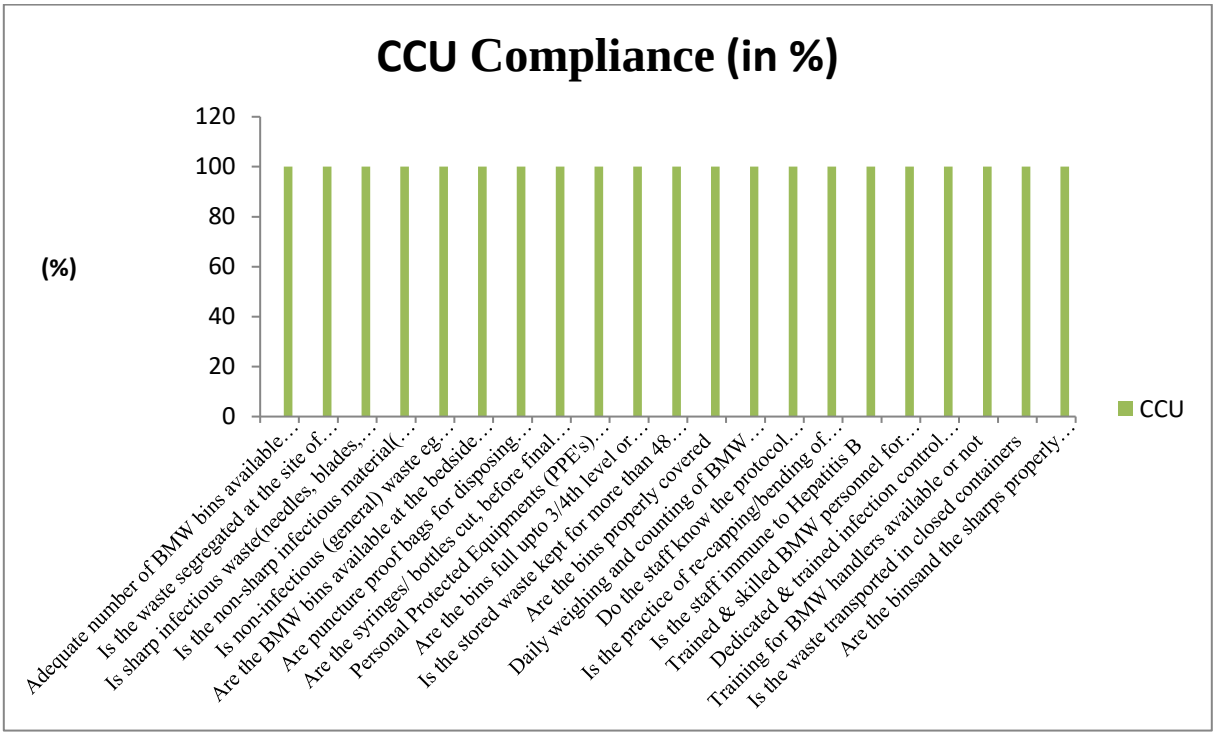

Figure 3.10 – *Compliance to the bio-medical waste management and handling rules, in the coronary care unit (CCU).It was found to be 100% i.e. complete compliance on all the parameters measured.*

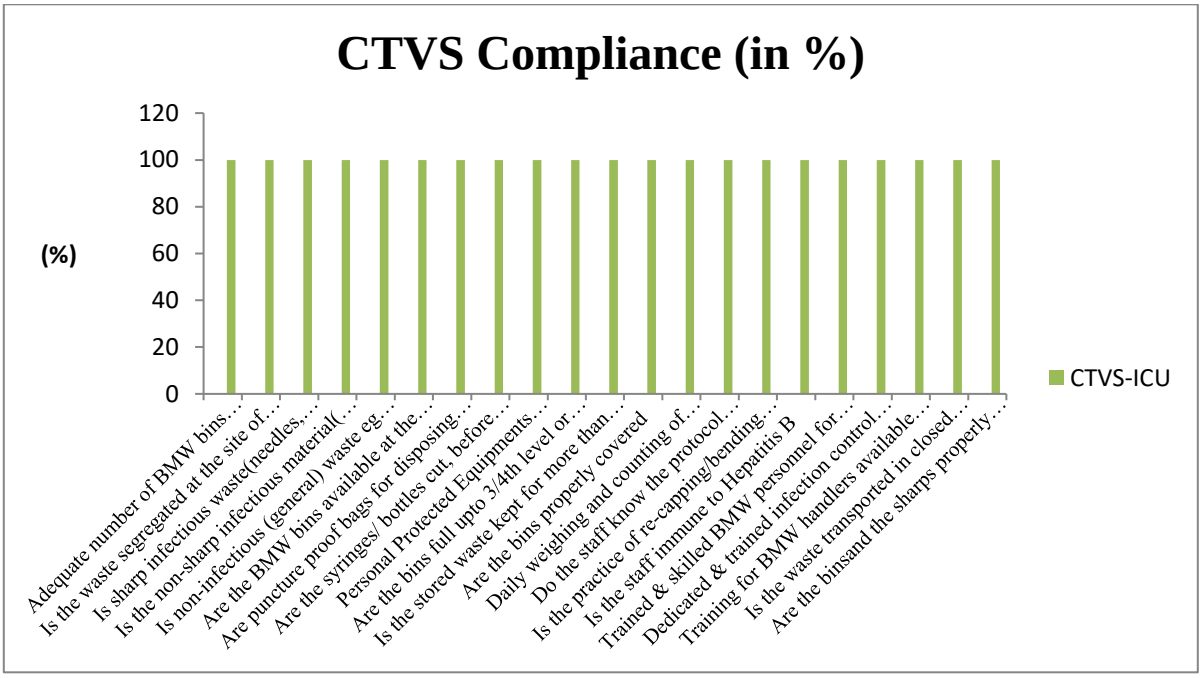

Figure 3.11 – *Compliance to the bio-medical waste management and handling rules, in the Cardio-thoracic and Vascular surgery (CTVS).It was found to be 100% i.e. complete compliance on all the parameters measured.*

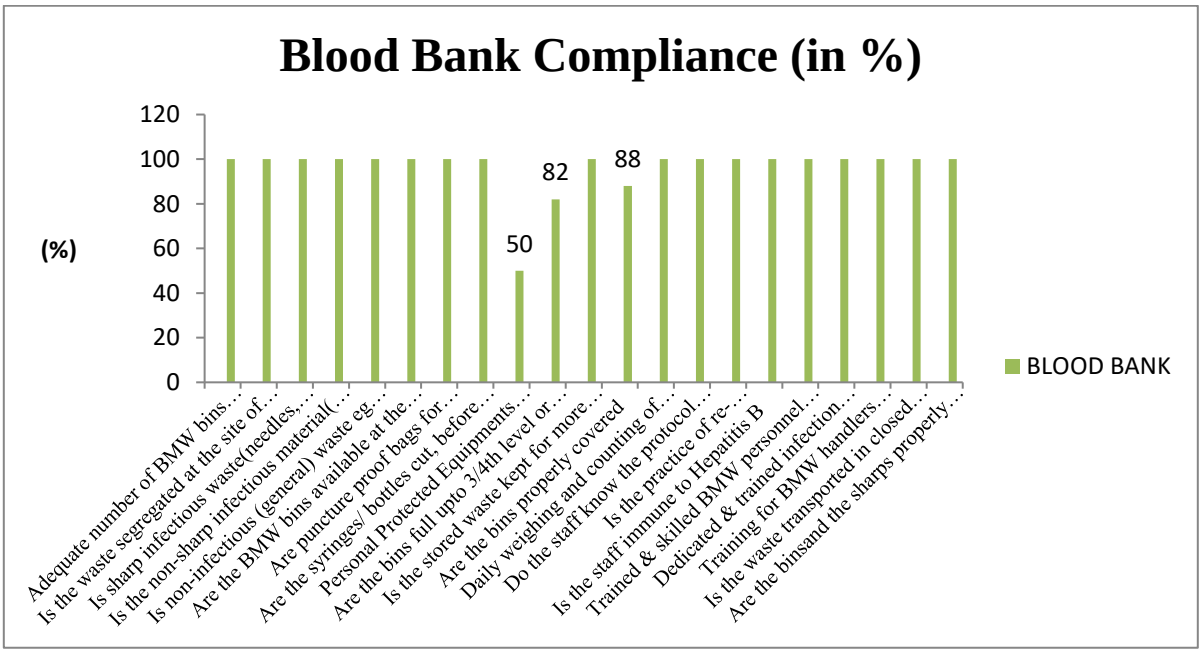

Figure 3.12 – *Compliance to the bio-medical waste management and handling rules, in the blood bank.*

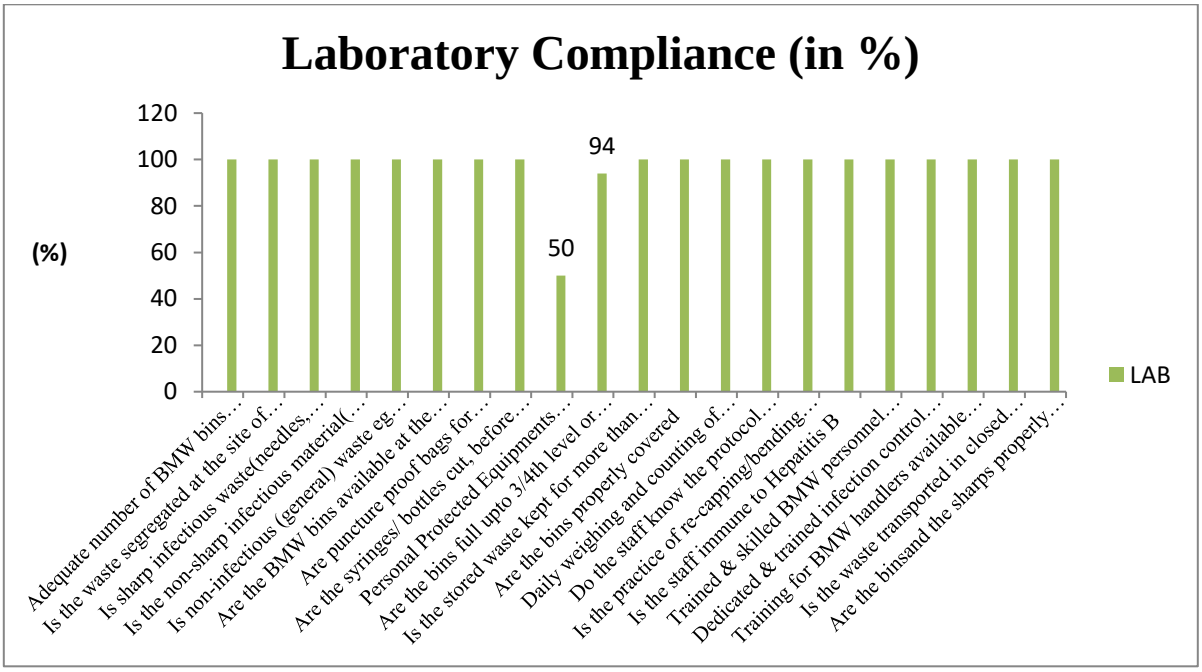

Figure 3.13 – *Compliance to the bio-medical waste management and handling rules, in the laboratory.*

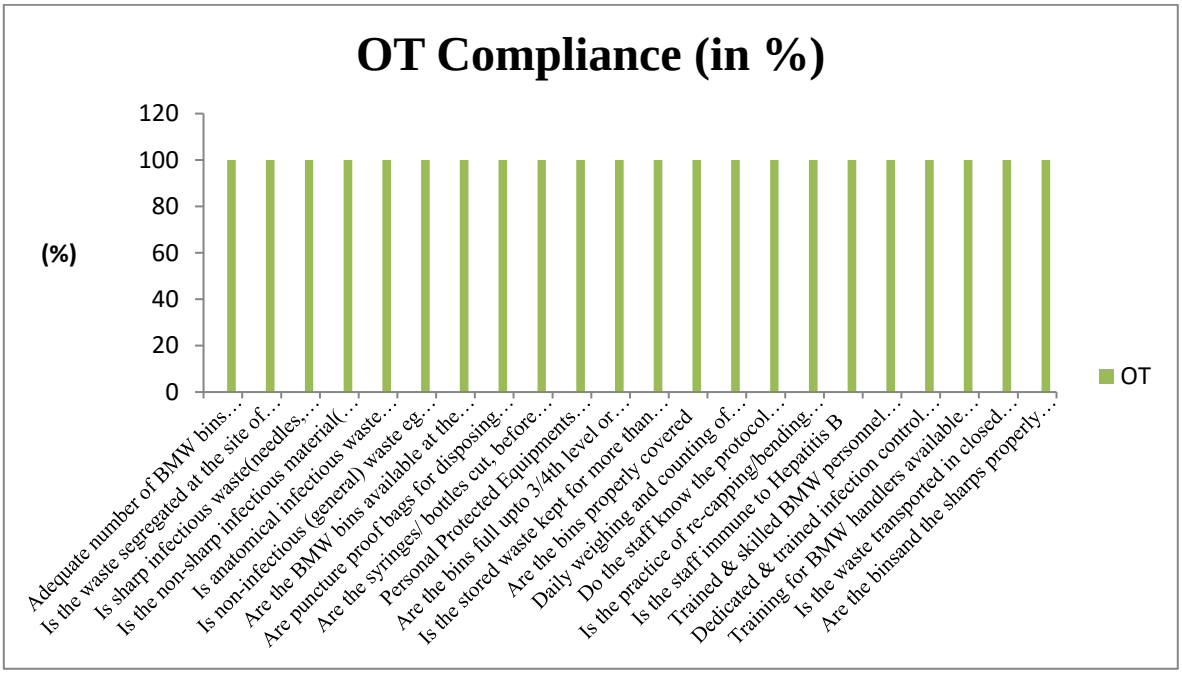

Figure 3.14 – *Compliance to the bio-medical waste management and handling rules, in the operation theatre suite. It was found to be 100% i.e. complete compliance on all the parameters measured.*

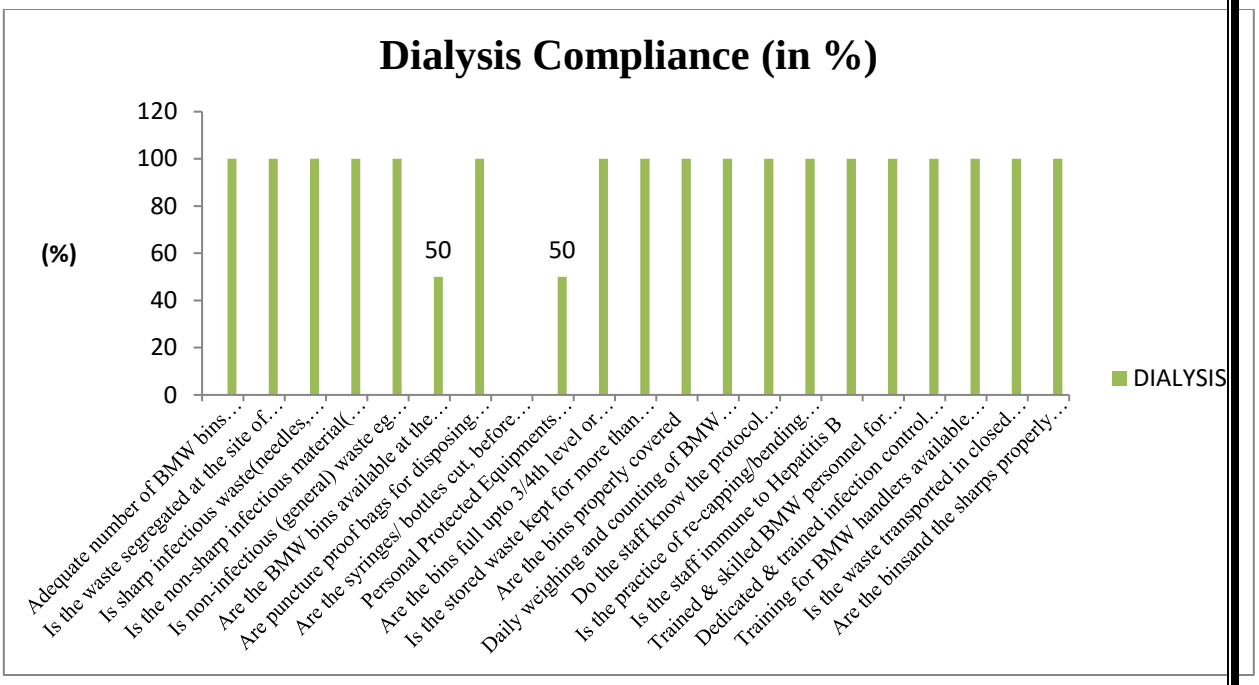

Figure 3.15 – *Compliance to the bio-medical waste management and handling rules, in the dialysis unit.*

The comparative analysis of the compliance to the bio-medical waste management and handling among all the departments reveals a clearer picture as seen in table 3.1.

There are five departments with excellent (100%) compliance on all the parameters studied. These departments include neo-natal intensive care unit (NICU), operation theatre suite (it has 4 OTs), coronary care unit (CCU), cardio-thoracic and vascular surgery unit (CTVS) and the department of nuclear medicine. The department with the lowest compliance to the bio-medical waste management and handling was found to be the dialysis unit, with an overall compliance of 90.5%. The commonest problem areas were found to be the less use of personal protection equipment and the partial availability of the BMW bins near the patient bed side.

7. SUMMARY, CONCLUSION AND RECOMMENDATIONS

The level of awareness regarding the bio-medical waste management and handling was found to be the highest among the nurses (90%) while the doctors had the least awareness (63%). Also, the housekeeping and other assistants also scored well. It may be pointed out here that all the other staff received training regarding the bio-medical waste management except the doctors, whose attitude regarding it was found to be rather careless. The main problem areas were found to be the identification of the symbols for cyto-toxic waste, radiological hazard etc. The overall compliance to the bio-medical waste management and handling was found to be good. All the 12 departments under study scored more than 90% average compliance levels. The best compliance was seen in five departments out of the 12 studied, these included NICU, CCU, CTVS, OTs and nuclear medicine. Dialysis had the lowest compliance levels (90.5%). More training to the doctors needs to be given.

Training to Doctors should be provided at time of induction, on Biomedical Waste Management as the level of awareness regarding the later was found to be the lowest. Nurses should be trained while breaking the ampoules, as while breaking, the broken pieces of ampoules spill around the sharp container, which can harm anyone in contact.

Signages/ symbols should be taught to all the healthcare people which includes General Duty Assistant (G.D.A), Housekeeping, Nurses and Doctors.Encourage all the health care providers to wear personal equipments (gloves, mask, cap, gum boots and aprons) as much as possible. Insist on hand washing to all the providers before and after waste disposal.

8. REFERENCES

1) **Naylor, H**., Woloschuk, D., Fitch, P., & Miller, S. (2011). Retrospective audit of medication order turnaround time after implementation of standardized definitions. *Canadian Journal of Hospital Pharmacy*, 64(5):346-353.

2) **Sikri, S**., Sansgiry, S., Sanborn, M., &Flinn, M. (2006). Effect of a remote order scanning system on processing medication orders. *Am J Health-Syst Pharm*, 63:1438-41.

3) **Alsharif S.**,Evaluation of Medication Turnaround Time Following Implementation of Scanning Digital Prescriber Order Technology.

4) **Glenn, Mc.R&Garwa**l, R. Clinical waste in Developing Countries. An analysis with a Case Study of India, and a Critique of the BasleTWG Guidelines (1999)

5) **BekirOnursal**, Health Care Waste Management in India. The World Bank (2003).

6) **Mandal S. K. and Dutta J**. , Integrated Bio-Medical Waste Management Plan for Patna City, Institute of Town Planners, India Journal 6-2: 01-25 (2009).

7) **Singh V. P., Biswas G., and Sharma, J. J**., Biomedical Waste Management - An Emerging Concern in Indian Hospitals Indian, Journal of Forensic Medicine & Toxicology, Vol. 1, No. 1. (2007-12).

8) **Mathur P, Patan S, Shobhawat S**. Need of Biomedical Waste Management System in Hospitals - An Emerging issue - A Review. Curr World Environ 2012;7(1):117-124.

9) www.cwejournal.org

10) **Nagaraju B, Padmavathi GV, Puranik DS, Shantharaj MP, Sampulatha SP**. A study to assess the knowledge and practice on bio-medical waste management among the health care providers working in PHCs of BagepalliTaluk with the view to prepare informationalbooklet. Int J Med Biomed Res 2013;2(1):28-35

11) **BhagyaBhaskar ,HemaNidugala , Ramakrishna Avadhani**.Biomedical waste management – knowledge and practices among healthcare providers in Mangalore.NUJHS Vol. 2, No.1, March 2012, ISSN 2249-7110

12) Savan Sara Mathew, A. I. Benjamin, ParamitaSengupta.Assessment of biomedical waste management practices in a tertiary care teaching hospital in Ludhiana.Healthline ISSN 2229-337X Volume 2 Issue 2 July-December 2011.

13) Cornella Mahler, ElskeAmmenwerth, Andreas Wagner, Angelika Tautz, TorstenHappek, Bettina Hoppe , Ronald E. Effects of a computer based nursing documentation system on the quality of nursing documentation.J Med Syst (2007) 31:274-282.

14) E. Ammenwerth, R. Eichstädter, R. Haux, U. Pohl, S. Rebel, S. Ziegler. A Randomized Evaluation of a Computer-Based Nursing Documentation System.Method Inform Med 2001; 40: 61–8

9. ANNEXURE

OBSERVATION CHECKLIST

S.No	Check-Points
1	**Adequate number of BMW bins** available as per BMW guideline (Red, Yellow,Blue, Black)
2	Is the **waste segregated at the site of generation**
3	Is **sharp infectious waste(needles, blades, broken glass** etc) disposed in **white/blue puncture proof bags**
4	Is the **non-sharp infectious material**(infected plastics, syringes,dressing,gloves,masks,blood bags & urine bags)disposed in**red plastic bins/bags**
5	Is **anatomical infectious waste** (placenta,body parts) disposed in **yellow plastic bins/bags**
6	Is **non-infectious (general) waste** eg packing materials, cartons, fruits, vegetables, syringe/needle wrappers, medicine covers to be disposed in **black plastic bins/bags**
7	Are the **BMW bins available at the bedside in the ICU's**
8	Are **puncture proof bags for disposing sharp waste like needles etc. available** or not?
9	Are the **syringes/ bottles cut, before final disposal?**

10	**Personal Protected Equipments (PPE's)** like gloves,caps, masks, apron& gumboots etc as per BMW guidelines
11	Are the bins **full upto 3/4th level or Overfilled**
12	Is the **stored waste kept for less than 48 Hours**
13	Are the **bins properly covered**
14	**Daily weighing and counting of BMW bags** done or not?
15	**Do the staff know the protocol of Chemical/Blood Spill Management Kits available or not?**
16	Is the practice of **re-capping/bending of needles** being done or not?
17	Is the **staff immune to Hepatitis B**
18	**Trained & skilled BMW personnel for BMW collection & transportation**
19	Dedicated & trained **infection control nurse available** or not
20	**Training for BMW handlers available** or not
21	Is the **waste transported in closed containers**
22	Are the bins and the sharp containers properly labelled at the time of collection

QUESSTIONNAIRE:

S.No	Questions
1	What are the different colours of the bins (kept for BMW)
2	Blue bin is used to collect which type of waste ?
3	Red bin is used to collect which type of waste ?
4	Black bin is used to collect which type of waste ?
5	Yellow bin is used to collect which type of waste ?
6	Puncture proof bag is used to collect which type of waste ?
7	Able to identify BIO-HAZARD symbol?
8	Able to identify CYTO-TOXIC WASTE symbol?
9	Able to identify RADIATION HAZARD symbol?
10	Vaccinated or not? (Specifically against Hepatitus B)
11	Whether Personal Protection Equipments (PPE's) are used ?
12	Broken glass bottles are discarded in which bin?
13	Whether any training has been provided for Bio-medical waste management?
14	Waste bins should not be more than ___ full, before they are emptied?
15	Do you know unpto what time can the bio-medical waste be stored ?
16	Do you know the protocol in case of a chemical/blood spill?
17	Do you cut the plastic waste before disposing it off?
18	Do you know the contact number for house-keeping staff ?
19	Do you know what all infections can happen due to mis-management of BMW ?