Internship Training at Park Hospital

Gurgaon

By

Dr.Sneha tyagi

PGDHM

2012-2014

International Institute of Health Management Research

Internship Training
At
Park Hospital

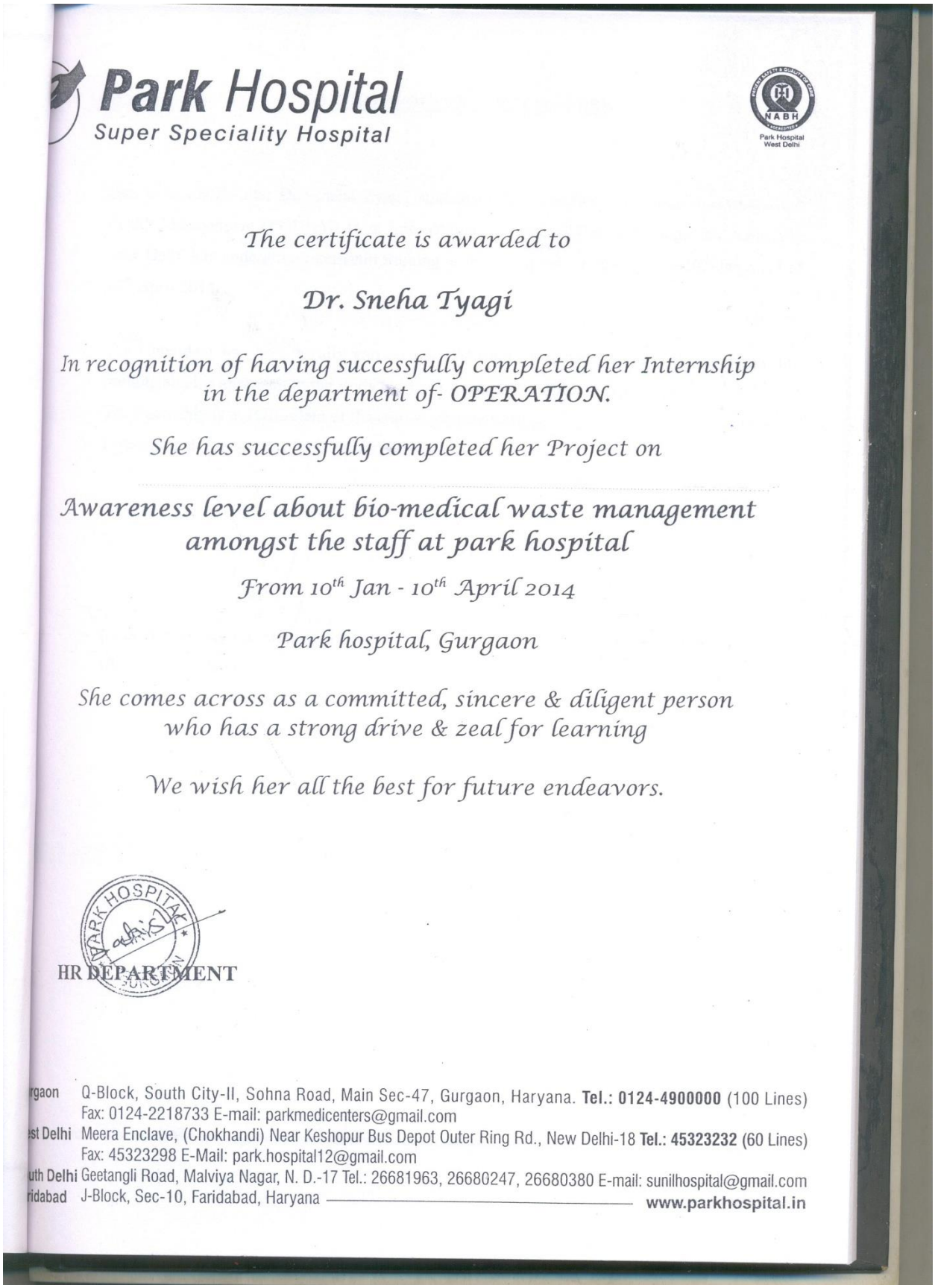
AWARENESS LEVEL ABOUT BIO-MEDICAL WASTE MANAGEMENT AMONGST THE STAFF AT PARK HOSPITAL

By
Dr.Sneha Tyagi
Under the guidance of
Ms. Suparna pal

Post Graduate Diploma in Hospital and Health Management
2012-2014

International Institute of Health Management Research

New Delhi



Park Hospital
Super Speciality Hospital

NABH
Park Hospital
West Delhi

The certificate is awarded to

Dr. Sneha Tyagi

*In recognition of having successfully completed her Internship in the department of- **OPERATION.***

She has successfully completed her Project on

Awareness level about bio-medical waste management amongst the staff at park hospital

From 10th Jan - 10th April 2014

Park hospital, Gurgaon

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish her all the best for future endeavors.

PARK HOSPITAL GURGAON

HR DEPARTMENT

rgaon Q-Block, South City-II, Sohna Road, Main Sec-47, Gurgaon, Haryana. **Tel.: 0124-4900000** (100 Lines)
Fax: 0124-2218733 E-mail: parkmedicenters@gmail.com
st Delhi Meera Enclave, (Chokhandi) Near Keshopur Bus Depot Outer Ring Rd., New Delhi-18 **Tel.: 45323232** (60 Lines)
Fax: 45323298 E-Mail: park.hospital12@gmail.com
uth Delhi Geetangli Road, Malviya Nagar, N. D.-17 Tel.: 26681963, 26680247, 26680380 E-mail: sunilhospital@gmail.com
ridabad J-Block, Sec-10, Faridabad, Haryana **www.parkhospital.in**

TO WHOMSOEVER MAY CONCERN

This is to certify that Dr. Sneha Tyagi, 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 Park hospital, Gurgaon from 10th Jan 2014 to 10th April 2014.

The Candidate has successfully carried out the study designated to him 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 his future endeavors.

6/5/14

Dean, Academics and Student Affairs
IIHMR, New Delhi

Professor
IIHMR,New Delhi

Park Hospital
Super Speciality Hospital

Park Hospital West Delhi

Certificate from Dissertation Advisory Committee

This is to certify that **Dr.Sneha Tyagi** 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 "**Awareness level about bio-medical waste management amongst the staff at park hospital Gurgaon**" at "**Park Hospital Gurgaon**" 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.

Ms Suparna Pal
Assistant Professor
IIHMR, New Delhi

Dr Nandita Goswami
Asst. Medical Superintendent
Park Hospital, Gurgaon

PARK HOSPITAL GURGAON

gaon Q-Block, South City-II, Sohna Road, Main Sec-47, Gurgaon, Haryana. **Tel.: 0124-4900000** (100 Lines)
Fax: 0124-2218733 E-mail: parkmedicenters@gmail.com
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idabad J-Block, Sec-10, Faridabad, Haryana **www.parkhospital.in**

Certificate of Approval

The following dissertation titled **"Awareness level about bio-medical waste management amongst the staff at park hospital"** at **"Park Hospital Gurgaon"** 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.

Name	Signature
Dr. A.K. Agarwal	
Dr. Ramteke	
Ms. Anupama Sharma	

Park Hospital
Super Speciality Hospital

Park Hospital
West Delhi

FEEDBACK FORM

Name of the Student: Dr. Sneha Tyagi

Dissertation Organisation: Park Hospital

Area of Dissertation: Operations

Attendance: 98 %

Objectives achieved: Awareness level about bio-medical waste management.

Deliverables: —

Strengths: Good Communication
Zeal to learn

Suggestions for Improvement: Keep up the good quality in you.

PARK HOSPITAL GURGAON HRY

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

Date: 6/5/2014
Place: Gurgaon

rgaon Q-Block, South City-II, Sohna Road, Main Sec-47, Gurgaon, Haryana. **Tel.: 0124-4900000** (100 Lines)
Fax: 0124-2218733 E-mail: parkmedicenters@gmail.com
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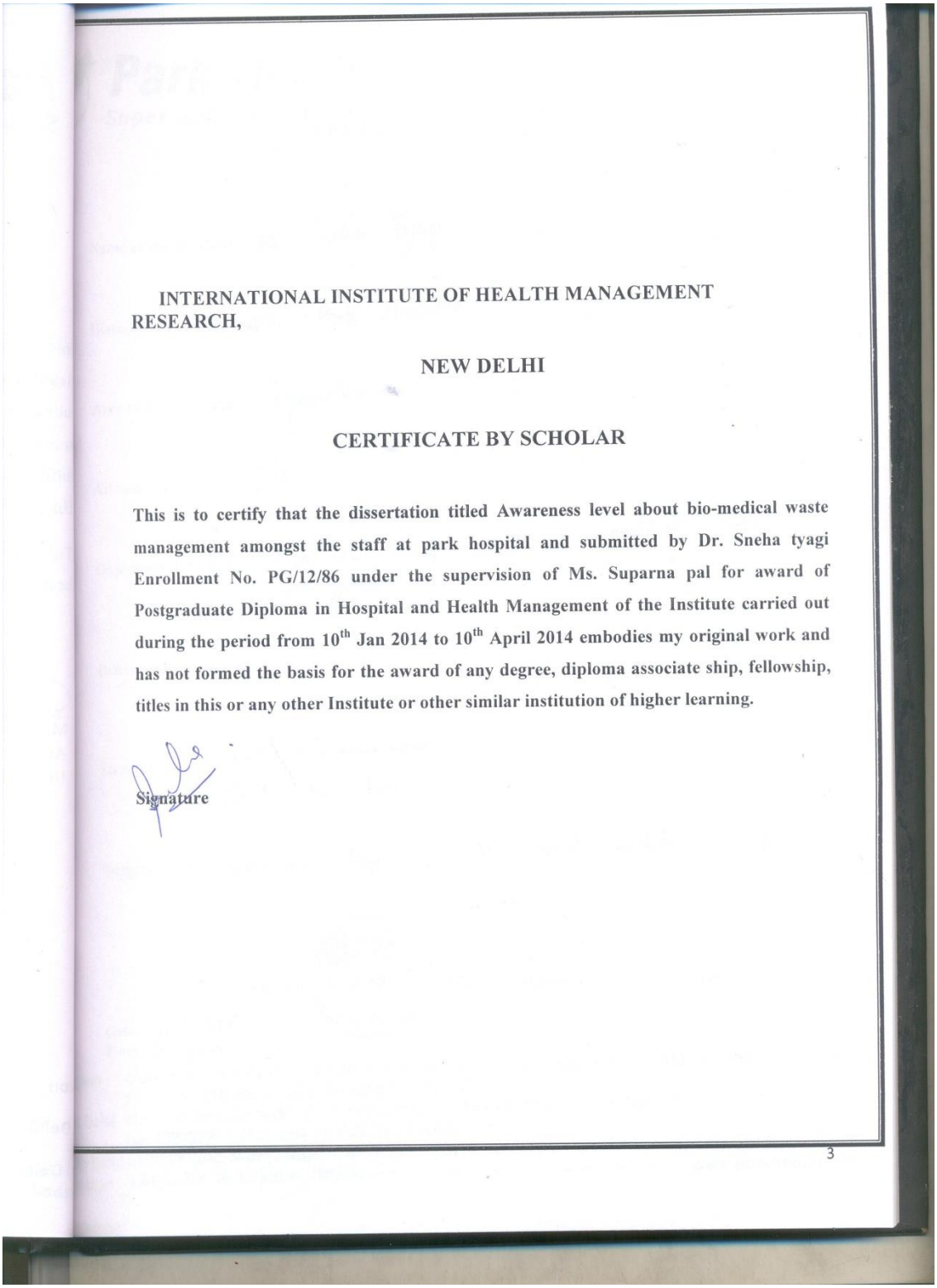

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH,

NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled Awareness level about bio-medical waste management amongst the staff at park hospital and submitted by Dr. Sneha tyagi Enrollment No. PG/12/86 under the supervision of Ms. Suparna pal for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 10th Jan 2014 to 10th April 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.

Signature

3

Organization Profile

Park Hospital was founded by Dr. Ajit Gupta who believes in taking up challenging assignment where he can continue to apply his Social, Administrative & Hospital management skills in a wide exposure of medical services keeping a positive and committed & targeted attitude.

Park Hospital is a Multi super specialty tertiary care hospital which has attained supremacy in the field of health care services. Park hospital is religiously dedicated to provide latest, ultramodern and sophisticated medical care. The Hospital follows its principle of improving Health Care Processes via adopting exclusive equipments and technology in order to enhance the success rate & patient gratification. Park also has a team of highly proficient and veteran doctors & efficacious paramedical staff that link together to provide the most sophisticated & highest standard of care in all penchant of Health in conjunction with super specialties.

Park Hospital Units

1. Park Hospital, West Delhi

Location: Keshopur Mandi, West Delhi

Promoters: Park Group of Hospitals

Total number of beds: 305 beds

Multi-specialty hospital

2. Park Hospital, Gurgaon

Location: Q Block, South City 2, Sec 47

Promoters: Park Group of Hospitals

Total number of beds: 250 beds (Proposed to Make 400)

Multi-Super specialty hospital

3. Park Hospital, Faridabad

Location: Sec.10, opposite court Faridabad

Promoters: Park group of hospitals

Total no. of beds: 250 beds multi specialty hospital

4. Park Hospital, Hodal

Location: Opening shortly 200 bedded hospital

Promoters: Park group of hospitals

Total no. of beds: 200 bedded multispecialty hospital

Upcoming projects

1. Park hospital, Panipat
2. Park medical college, Gwalior

Park hospital, Gurgaon

Park Hospital Gurgaon is an ambitious initiative from the house of Park. Fully-equipped with all state-of-the-art medical facilities, this 250 bed super-specialty hospital is the beginning of a new era in taking healthcare services in Gurgaon to a new level. Park Hospital Gurgaon 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’

Various

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departments in Park hospital

2	**Ophthalmology**
3	**Pediatrics**
4	**General / Minimally invasive surgery**
5	**Blood Bank Services**
6	**Critical Care**
7	**Internal Medicine**
8	**Park Mother`s Nest**
9	**Physiotherapy**
10	**Gastroenterology**
11	**Dental Care**
12	**Cardiology Department**
13	**Nephrology & Urology**
14	**ENT**
15	**Orthopedics**
16	**Neurosciences**
17	**Radio Diagnosis**

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."

VISION

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

QUALITY PARAMETERS

•The hospital has been designed for maximum safety and comfort of the patients and healthcare providers. It complies with national &International standards for hospital accreditation.

•Clinical governance is an integral part of our practice.

•Robust quality and infection control practices are in place.

•Best in class modular OT's and ICU's with HEPA filters, laminar air flow & complete air changes per hour & access control minimize the risk of infection.

•Isolation rooms have been earmarked in the ICU to treat critically ill infectious patients thus preventing threat to other patients

•Green building: The hospital is designed to allow sunlight in most of the ICUs and patient rooms as it minimizes stress on the patients and gives them proper orientation of time.

•Stringent "Biomedical Waste Management" practices for segregation, storage, transport & disposal of hospital waste are in place.

•The hospital has one of the most advanced infrastructures which help in patient & employee safety & reduce the excessive burden on the environment.

•The "Hospital Information System" used is most advanced and user-friendly and helps to reduce medical errors as well as contributes to faster and better patient management.

Duties and responsibilities

- **Area of dissertation**: Operations

- **Duration:** 10th January to 10th April

- **Designation**: Asst. Operations manager

Tasks performed:

During the internship period, I was given the responsibility to coordinate and communicate various tasks like:

- Coordinate workforce management objectives with focus on individual, departmental and hospital wide initiatives and team concepts.
- Focus on patient satisfaction
- Facilitating admission and discharge process
- Supervision of housekeeping staff and looking after inventory management
- Coordinating with Front desk, MRD, Billing, Pharmacy, laundry and other departments.

ABSTRACT

Bio-medical waste is any waste generated in the process of diagnosis, treatment or Immunization of human beings or animals, research activities, production or testing of biological components.

Rationale: It's a known fact that only 15 % of waste from hospital is hazardous so the question arises what is the need of spending so much resources on having a proper BMW protocol, that is because improper management of waste can lead to Injuries from sharps, Nosocomial infection to patients and pollution.

Objectives

General objective

To assess the awareness level of hospital staff regarding Biomedical waste management policies and practices in the hospital before and after the training session**.**

Specific objectives

- To determine the awareness level of Bio-medical waste management rules and practices among the hospital staff.
- To assess the effectiveness of a training program in changing the knowledge and attitude of staff regarding BMW management.
- To recommend possible remedial measures

Methodology

- **Study design** - Cross-sectional and Analytical study
- **Study area** – Park Hospital, Gurgaon
- **Study population** -Doctors, Nurses, Housekeeping, Others
- **Sample size** – 104
- **Sampling method** – Convenience Random Sampling
- **Data collection tool and technique-** Structured questionnaire ,Interview
- **Statistical software used for data analysis**- M S excel

Study Findings:

- The intervention of this study emphasized not only the details of the well-known hazards of hospital waste but also on the sound preventive behavior and the fruitful effect of its application. The results of this study showed that the pre intervention knowledge were limited in many important aspects.
- In the pre test phase, Out of 23 only 14 (58%) Doctors were able to attempt all the questions correctly but in post intervention phase it has been increased to 75%.
- Pre and post intervention finding varies from 17% to 50% in nursing staff, 18% to 50% in technicians, which shows an improvement in knowledge of staff.
- A second major finding was that the attitude of the participant showed a significant improvement especially in class IV employees who were not highly educated but shows an improvement from 0% to 25% while 8 out of 22 gave an average response.
- The knowledge and attitudes between the groups of healthcare personnel varied and was not up to the mark Pre test, but post intervention it was been found to be satisfactory.

Recommendations:

- Personal protection
- Proper training program for staff with special emphasis to housekeeping staff
- Awareness hoardings and stickers
- Proper supervision of BMW management : Waste audits
- Quality audits

Conclusion:

- Proper handling, treatment and disposal of biomedical waste play a vital role in hospital infection control programme.
- Besides training, the staff needs to follow a proper protocol for collection, segregation and disposal of waste.
- The study findings pointed to upgrading staff knowledge and practice in relation to management of health care waste. The results showed a statistically significant improvement in staff knowledge and practice about health care waste management after the awareness session.
- Concluding from the results, the importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

Acknowledgement

Any attempt at any level cannot be satisfactorily completed without the support and guidance of learned people. I owe a great debt to all the professionals at Park hospital, Gurgaon, for sharing generously their knowledge and time, which inspired me to do our best during my summer training.

I would like to express my immense gratitude to Dr. V.S Bhalla , Medical Superintendent and Dr. Namrata, Assistant Medical Superintendent, Mr. Ashok Bedwal, Chief of Operations Park Hospital, Gurgaon for providing support and guidance for my learning in the hospital and for directing my thoughts and objectives towards the attitude that drives to achieve and other aspects that one as novice needs to be acquainted with. It has been a privilege to work under their dynamic supervision at the hospital.

I am glad to acknowledge Dr. L.P.Singh, Director, Dr. Rajesh Bhalla, Dean, Academic and Students' Affairs, and Ms Suparna pal (Mentor), IIHMR for incorporating right attitude into me towards learning and for helping and supporting whenever required. I am grateful to them for giving me an opportunity to learn administrative tricks and styles, so that I come to know how a hospital caters their patients successfully and how a hospital gives quality treatment to patients.

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List of abbreviations

BMW	Biomedical waste management
ICU	Intensive care unit
OPD	Outer patient department
OT	Operation theatre
PPE	Personal protective equipment
FIG	Figure
LT	Lab technician
HK	Housekeeping

Appendices

1. Questionnaire for interviewing the health personnel (in Hindi and English)

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Introduction

Hospital is the place, which is frequently accessed by the people irrespective of age, sex, caste, religion, region and even nationality. To take care of its aim of reducing health problems, eliminating potential risk, treating sick people; the healthcare service unavoidably produce waste which itself hazardous to health (Mathur et al., 2009**). (1)**

The biomedical waste is defined as the waste 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 including categories mentioned in the schedule-I of Biomedical Waste(Management and Handling) Rules 1998,Government of India (Radha, 2012). The improper management of biomedical waste poses significant hazardous risk to the patients, healthcare workers, the community and environments (WHO, 2007).

In accordance with these Rules, it is the duty of every "occupier" i.e. a person who has the control over the institution and or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment**.(1)**

Health care waste refers to all the waste generated by a health care establishment. It is estimated that 10-25% of health care waste is hazardous, with the potential for creating a variety of health problems. Bio-medical waste (BMW) collection and proper disposal has become a significant concern for both the medical and the general community. Since the implementation of the Biomedical Waste Management and Handling Rules (1998),every concerned health personnel is expected to have proper knowledge, practice, and capacity to guide others for waste collection and management, and proper handling techniques.

The inappropriate healthcare waste management caused 21 million hepatitis B virus (HBV) infections (32% of all new infections); 2 million hepatitis C virus (HCV) infections (40% of all new cases); 260,000 HIV infections (5% of all new cases) in 2000.

Epidemiological studies indicate that a person who experiences one needle stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively of becoming infected with HBV, HCV and HIV (WHO, 2011).(**2)**

These includes infectious waste (15-25%) of total health waste among which are sharp waste (1%), body part (1%),chemical or pharmaceutical waste (3%),radioactive and cytotoxic waste or broken thermometers (less than 1%).BMW generated in the hospitals falls under two major categories – Non hazardous and Bio hazardous .

Constituents of nonhazardous waste are non infected plastic, cardboard, paper etc.

Biohazardous waste again falls into 2 types:

a) Infectious waste – Sharp, non sharps, plastic disposables, liquid waste etc.

b) Non infectious waste – Radioactive waste, discarded waste, chemical waste, cytotoxic waste, incinerated waste, etc.(**3)**

Handling, segregation, mutilation, disinfection, storage, transportation and final disposal are the vital steps for safe and scientific management of BMW. (**3)**

Thus health care waste, if not managed properly will be a cause in ushering of “disasters in making” by causing air, water, soil pollutions and helping in emergence of antibiotic resistant strains of microbial ingress of pollutants in the food chain and thus becoming a part of human consumption.

Biomedical Waste Management Rules(4)

The Government of India as contemplated under Section 6, 8 and 25 of the Environment (Protection) Act, 1986, has made the Biomedical Wastes (Management and Handling) Rules, 1998 which was amended in 2003 and 2011.

The rules are applicable to every institution generating biomedical waste which includes hospitals, nursing homes, clinic, dispensary, veterinary institutions, animal houses, pathological lab, blood bank; the rules are applicable to even handlers.

Categories of waste

The biomedical wastes are categorized into ten according to its characteristics taking into account treatment and disposal. The different categories of waste as per the rule are given in Table 1:

Table 1: Categories of Biomedical Waste (4)

Waste Category	Type of waste	Treatment And Disposal Option
Category Number 1	Human Anatomical Waste (Human tissues, organs, body parts)	Incineration/deep burial
Category Number 2	Animal Waste (Animal tissues, organs, body parts, carcasses, Bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals and colleges, discharge from hospitals, animal houses)	Incineration/ deep burial
Category Number 3	Microbiology and Biotechnology Waste (Wastes from laboratory cultures,	Local autoclaving/ microwaving / Incineration

	stocks or specimen of live micro organisms or attenuated vaccines, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins and devices used for transfer of cultures)	
Category Number 4	Waste Sharps (Needles, syringes, scalpels, blades, glass,	Disinfecting (chemical treatment / autoclaving / microwaving and mutilation / shredding
Category Number 5	Discarded Medicine and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines)	Incineration / destruction and drugs disposal in secured landfills
Category Number 6	Soiled Waste (Items contaminated with body fluids including cotton, dressings, soiled plaster casts, lines, bedding and other materials contaminated with blood.)	Incineration / autoclaving / Microwaving
Category Number 7	Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, Intravenous sets, etc.)	Disinfecting by chemical treatment/ autoclaving / microwaving and mutilation / shredding
Category Number 8	Liquid Waste (Waste generated from the laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfecting by chemical Treatment and discharge into drains
Category Number 9	Incineration Ash (Ash from	Disposal in secured landfill

	incineration of any biomedical waste)	
Category Number 10	Chemical Waste (Chemicals used in production of biological, chemicals used in disinfecting, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids.

SEGREGATION OF BIOMEDICAL WASTE

Table 2

Color Coding and Type of Container

Color Coding	**Type of Container**	**Waste Category**	**Treatment options (Schedule I)**
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/Micro waving/ Chemical treatment
Blue/White Translucent	Plastic bag/ puncture proof Container	Cat.4 and Cat.7	Autoclaving/Micro waving/ Chemical treatment and destruction/ shredding
Black	Plastic bag	Cat.5, Cat.9, and Cat.10 (solid)	Disposal in secured landfill(municipal landfill)

Approach for Hospital waste management (3)

Based on Bio-medical Waste (Management and Handling) Rules 2011, notified under the Environment Protection Act by the Ministry of Environment and Forest (Government of India).

1. Segregation of waste

Segregation is the essence of waste management and should be done at the source of generation of Bio-medical waste e.g. all patient care activity areas, diagnostic services areas, operation theaters, labor rooms, treatment rooms etc. The responsibility of segregation should be with the generator of biomedical waste i.e. doctors, nurses, technicians etc. (medical and paramedical personnel). The biomedical waste should be segregated as per categories mentioned in the rules.

2. Collection of bio-medical waste

Collection of bio-medical waste should be done as per Bio-medical waste (Management and Handling) Rules. At ordinary room temperature the collected waste should not be stored for more than 24 hours.

3. Transportation

Within hospital, waste routes must be designated to avoid the passage of waste through patient care areas. Separate time should be earmarked for transportation of bio-medical waste to reduce chances of its mixing with general waste. Desiccated wheeled containers, trolleys or carts should be used to transport the waste/plastic bags to the site of storage/ treatment.

4. Treatment of hospital waste

a) General waste

The 85% of the waste generated in the hospital belongs to this category. The, safe disposal of this waste is the responsibility of the local authority.

b) Bio-medical waste

15% of hospital waste

1. Deep burial

2. Autoclave and microwave treatment

3. Shredding

4. Secured landfill

5. Incineration

5. Safety measures

a) All the generators of BMW waste should adopt universal precautions and appropriate safety measures while doing therapeutic and diagnostic activities and also while handling the bio-medical waste.

b) It should be ensured that:

1. Drivers, collectors and other handlers are aware of the nature and risk of the waste.

2. Written instructions, provided regarding the procedures to be adopted in the event of spillage/ accidents.

3. Protective gears provided and instructions regarding their use are given.

4. Workers are protected by vaccination against tetanus and hepatitis B

6. Training

1. Each and every hospital must have well planned awareness and training programme for all categories of personnel including administrators (medical, paramedical and administrative).

2. All the medical professionals must be made aware of Bio-medical Waste (Management and Handling) Rules 1998.

3. To institute awards for safe hospital waste management and universal precaution practices.

4. Training should be conducted to all categories of staff in appropriate language/medium and in an acceptable manner.

7. Management and administration

Heads of each hospital will have to take authorization for generation of waste from appropriate authorities as notified by the concerned State/U.T. Government, well in time and to get it renewed as per time schedule laid down in the rules. Each hospital should constitute a hospital waste management committee, chaired by the head of the Institute and having wide representation from all major departments. This committee should be responsible for making Hospital specific action plan for hospital waste management and its supervision, monitoring and implementation. The annual reports, accident reports, as required under BMW rules should be submitted to the concerned authorities as per BMW rules format.

8. Measures for waste minimization

As far as possible, purchase of reusable items made of glass and metal should be encouraged. Select non PVC plastic items. Adopt procedures and policies for proper management of waste generated, the mainstay of which is segregation to reduce the quantity of waste to be treated. Establish effective and sound recycling policy for plastic recycling and get in touch with authorized manufactures

Rationale of hospital waste management

Hospital waste management is a part of hospital hygiene and maintenance activities. In fact only 15% of hospital waste i.e. "Biomedical waste" is hazardous, not the complete. But when hazardous waste is not segregated at the source of generation and mixed with nonhazardous waste, then 100% waste becomes hazardous. The question then arises that what is the need or rationale for spending so much resources in terms of money, man power, material and machine for management of hospital waste. The reasons are:

- Injuries from sharps leading to infection to all categories of hospital personnel and waste handler.
- Risk of infection outside hospital for waste handlers and scavengers and at time general public living in the vicinity of hospitals.
- Risk associated with hazardous chemicals, drugs to persons handling wastes at all levels.
- "Disposable" being repacked and sold by unscrupulous elements without even being washed.
- Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
- Nosocomial infections in patients from poor infection control practices and poor waste management.
- Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.(5)

Health care waste generation

Composition of the hospital wastes is as under:

- 80% of the generated waste comprises of general health-care waste, which may be dealt with by the normal domestic and urban waste management system
- 15% pathological and infectious waste, which require special management
- 1% sharps waste, which requires careful management
- 3% chemical or pharmaceutical waste, which requires special management.
- Less than 1% special waste, such as radioactive or cytostatic waste, pressurized containers, or broken thermometers and used batteries, which require very careful & special management**.(6)**

Literature review

1) Muhlich et al (2003) conducted a research project sponsored by the EC-LIFE programme to compare waste management in five different European hospitals. A comparison of the regulations governing current waste management revealed different strategies for defining infectious hospital waste. The differences in the infrastructure were examined and the consequences for waste segregation and disposal were discussed under economic and ecological aspects.

2) Blenkharn (2006) observed the arrangements for bulk clinical waste handling in 26 UK hospitals. Storage of waste carts in areas freely accessible to the public, and failure to lock individual carts was common. Many clinical waste carts and areas dedicated to their storage were in a poor state of repair. Substantial improvement is required in the management of clinical waste in hospitals in order to eliminate the possibility of acquired infection through unauthorized, inappropriate access to clinical waste and to minimize adverse effects resulting from contact with waste pharmaceuticals; to comply with the Duty of Care imposed by UK Health and Safety legislation; and to satisfy concerns regarding the general standard of hospital hygiene**.(8)**

3) Chandira boss and coworkers (2009) studied the character and quantity of BMW generation in Government General Hospital (GH) Pondicherry. Unhygienic disposal of non segregated BMW in Pondicherry poses a serious health hazard to the population and to scavengers. The current practices of handling, transportation, storage, and disposal of BMW generated at GH need to be strict. Of late, more and more patients from abroad are opting to undergo advanced medical treatment in India, because they can be carried out at a fraction of the cost in India. With this "medical tourism" expanding (Connell 2006, Lee 2007), hospitals need to manage their BMW properly, to minimize risks to the public and to the environment (Mudur2004). After the BMW guidelines were explained, observations indicate that proper management of BMW has improved and that the segregation of BMW is much better than before (Agrawal and Singh 2005). **(6)**

4) Pandit N B et al,(2005) conducted a cross sectional study on management of biomedical waste : awareness and practice in a district of Gujarath.30 hospitals with minimum 30 beds were randomly selected from Sabarkanth district Gujarath. The doctors and auxiliary staff of those 30 hospitals were the study population. While all the doctors knew about the existence of the law related to biomedical waste. But details were not known. Doctors were aware of risk of HIV and Hepatitis Band C. whereas auxiliary staffs had very poor knowledge about it. There was no effective waste segregation, collection, transportation, and disposal system at any hospitals in the district. The findings suggest that there is an immediate and urgent need to train and educate all doctors and staffs to adopt an effective waste management practices. **(7)**

5) Another study with objective of assessing knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management was conducted among hospitals (bed capacity >100) of Allahabad city including doctors (75), nurses (60), laboratory technicians (78), and sanitary staff (70). Doctors, nurses, and laboratory technicians have better knowledge than sanitary staff regarding biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staff as compared to doctors. The importance of training regarding biomedical waste management needs emphasis. **(7)**

Objective of the study

General objective

- To assess the awareness level of hospital staff regarding Biomedical waste management policies and practices in the hospital before and after the training session.

Specific objectives

- To determine the awareness level of bio-medical waste management rules and practices among the hospital staff.
- To assess the effectiveness of a training program in changing the knowledge and attitudes regarding BMW management.
- To recommend possible remedial measures.

METHODOLOGY

1. **Study area**: Park Hospital, Gurgaon

2. **Study population**: Hospital staff including Doctors, Nursing staff, Lab technician, housekeeping and others.

3. **Study period** : 3months i.e. from 10th January to 10th April 2014

4. **Sample size**: 104

5. **Sampling method** : Convenience sampling

6. **Study design** : Cross-sectional and Quasi experimental study

7. **Data collection tool** : Interview

8. **Data collection technique**: Structured questionnaire, Questionnaire was identical pre- and post-training questionnaire including questions to assess knowledge about the BMW and attitude towards dealing with it with maximum total score of 12.

9. **Type of data** : Primary data

10. **Statistical software used for data analysis**: M S excel 2007

Limitations

Despite the efforts made to make the study as precise and objective as possible, certain limitations were there.

- As the sampling technique used is convenience sampling which can make study results biased.
- Accuracy of the findings depends on the accuracy of the information.
- The study concentrated on issues related to BMW management only. The study could be further expanded by focusing on issues related to hygiene, environment, and sanitation.
- Some of the interviewees were not in favor of filling of the forms and may have filled it in a hurry.

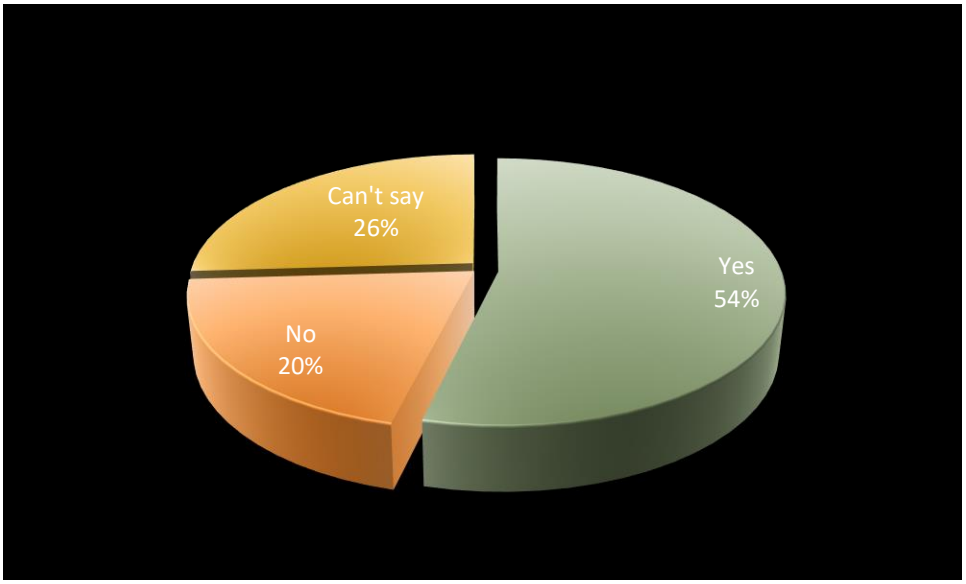
DATA ANALYSIS AND FINDINGS

Analysis and interpretations of the data collected, to assess the awareness of employees about biomedical waste management.

Following are the graphs produced on the basis of data collected from the Hospital staff, which included doctors, nurses, technicians, housekeeping and others.

Data is analyzed using excel software.

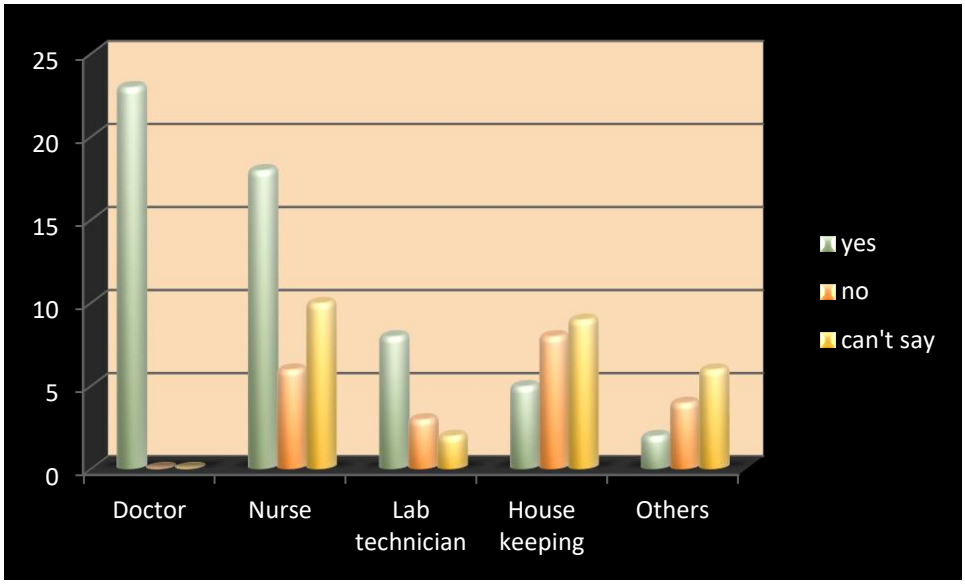
1.1) Overall awareness of staff regarding definition of BM waste management



(Fig.1.1)

1.2) Awareness of staff regarding definition of BMW management

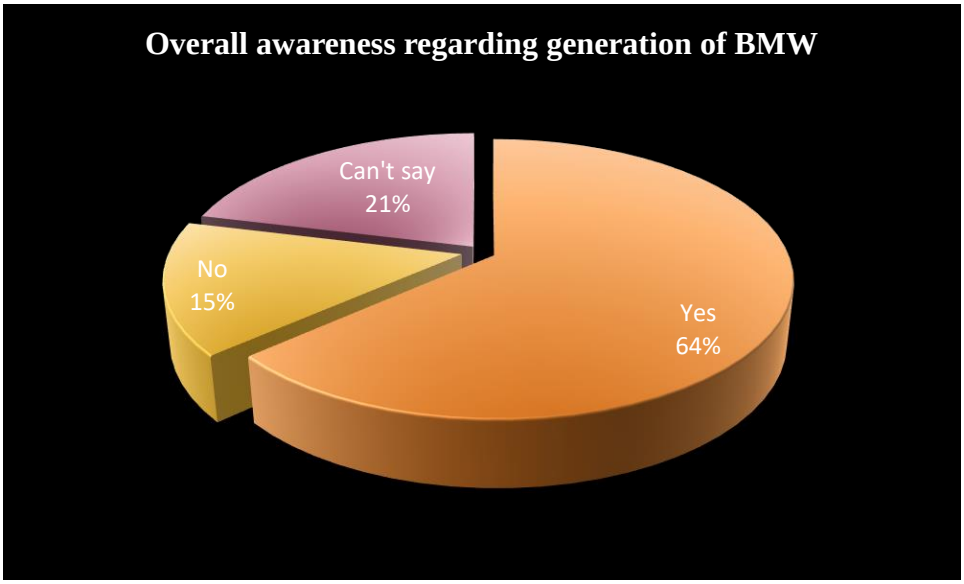
(After categorization)



(Fig 1.2)

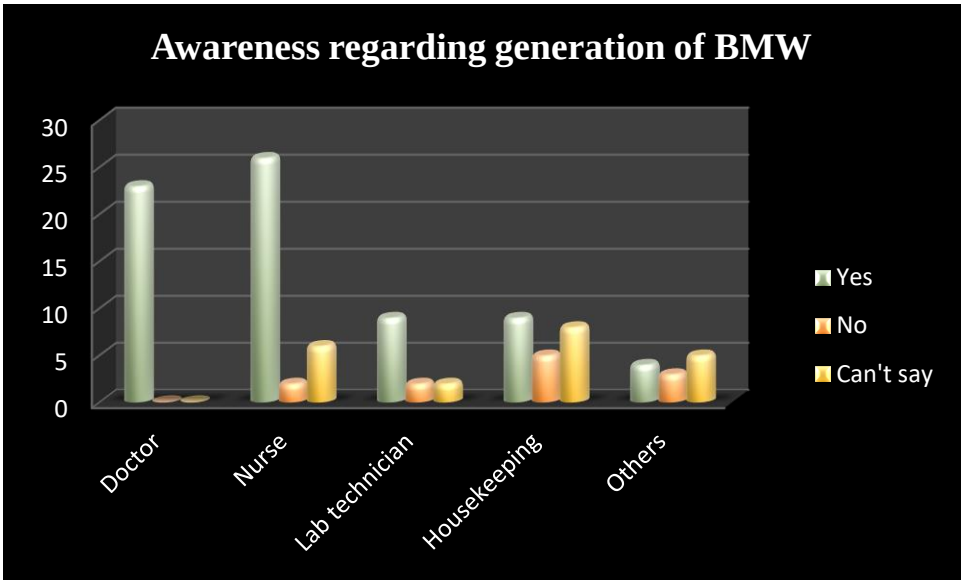
Most of the staff was aware of the definition of BM waste excluding housekeeping and other staff. Doctors and nurses responded well to the question.

2.1) Overall awareness regarding generation of BMW



(Fig 2.1)

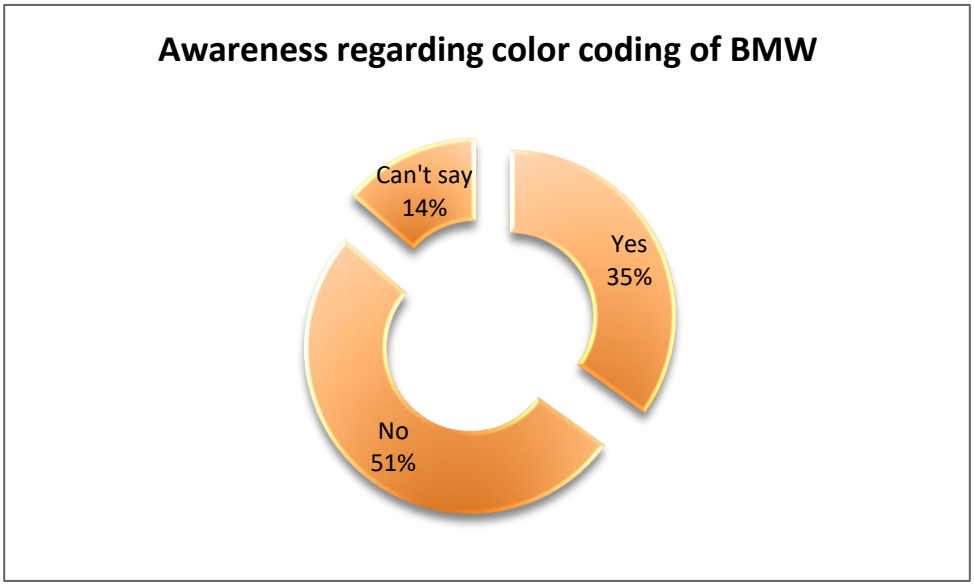
2.2) Awareness after categorization



(Fig 2.2)

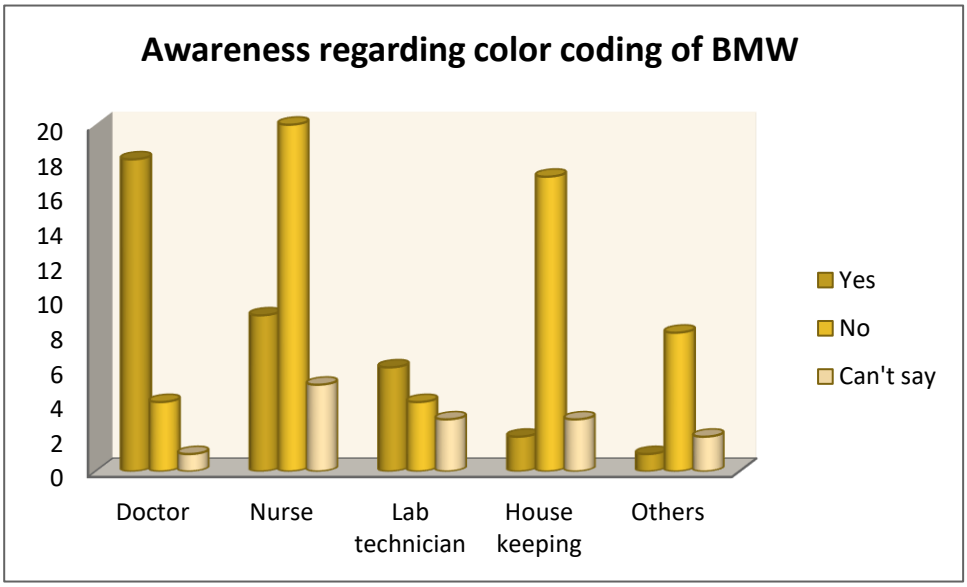
Figure shows that Doctors, nursing staff and technicians were quiet aware of biomedical waste generation while housekeeping and other staff had a poor knowledge regarding generation of BM waste.

3.1) Overall awareness regarding color coding of BM waste



(Fig 3.1)

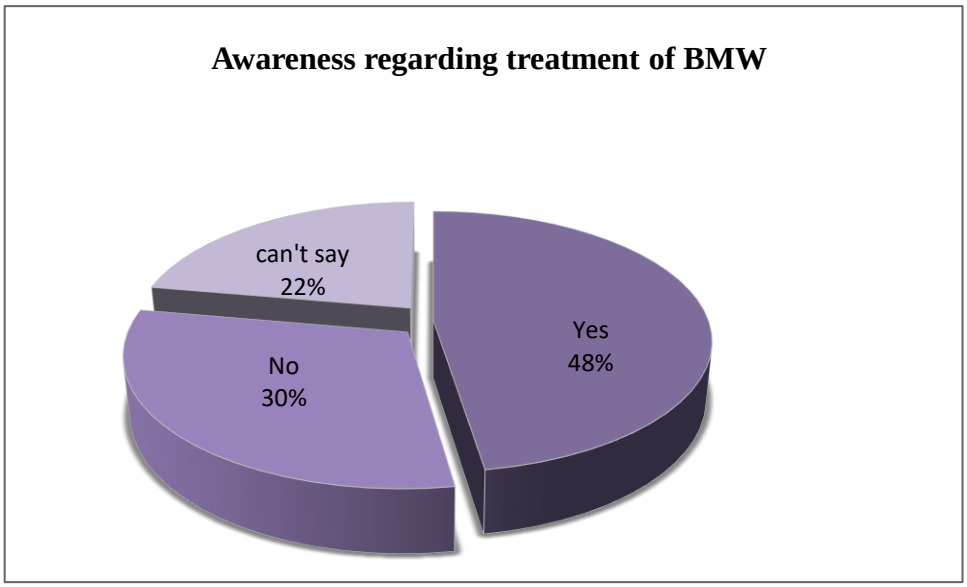
3.2) Awareness after categorization



(Fig 3.2)

Mostly doctors are aware of the color coding of biomedical waste but other staff (Nursing, LT, housekeeping, others) gave mixed response regarding color coding of BM waste management.

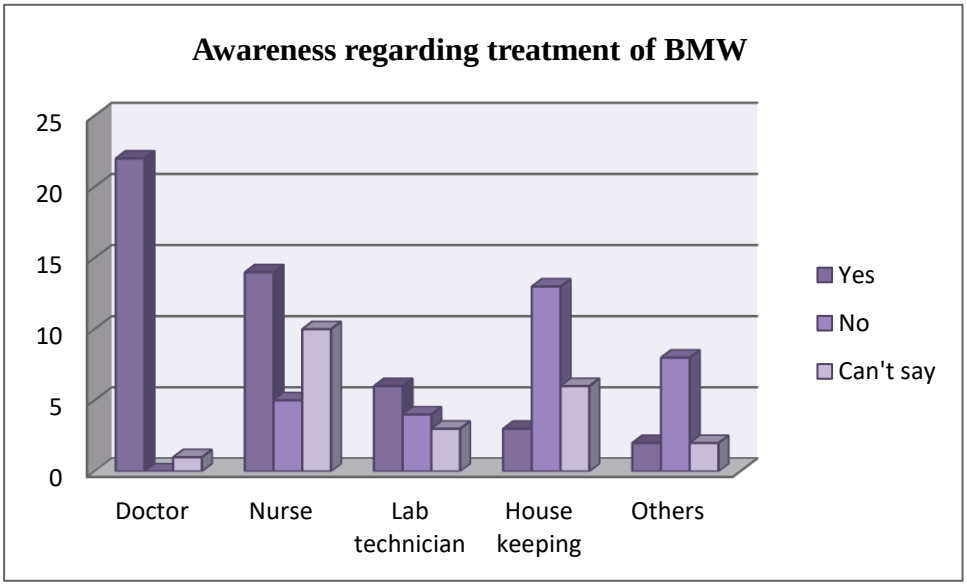
4.1) Overall awareness regarding treatment of BM waste



(Fig 4.1)

4.2) Awareness regarding treatment of BM waste

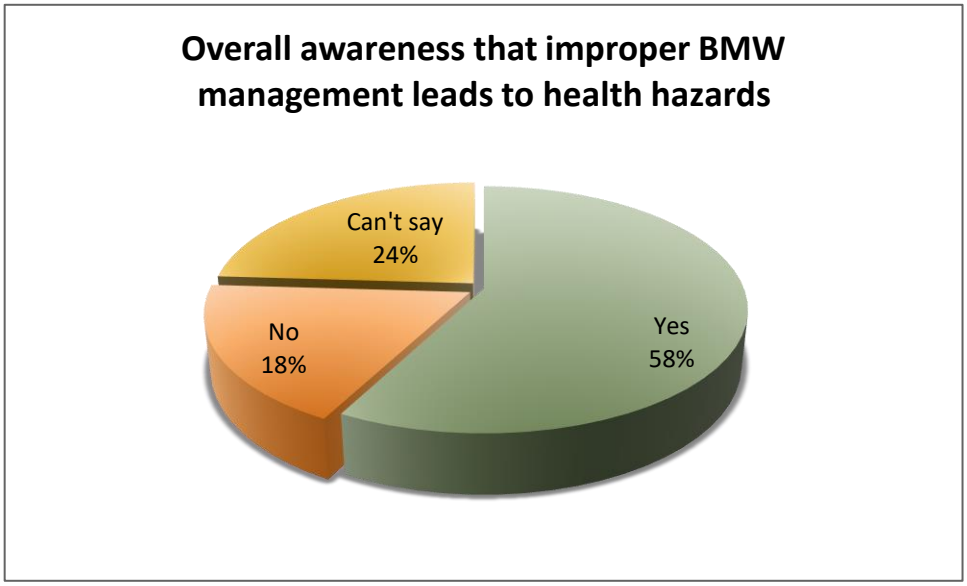
(After categorization)



(Fig 4.2)

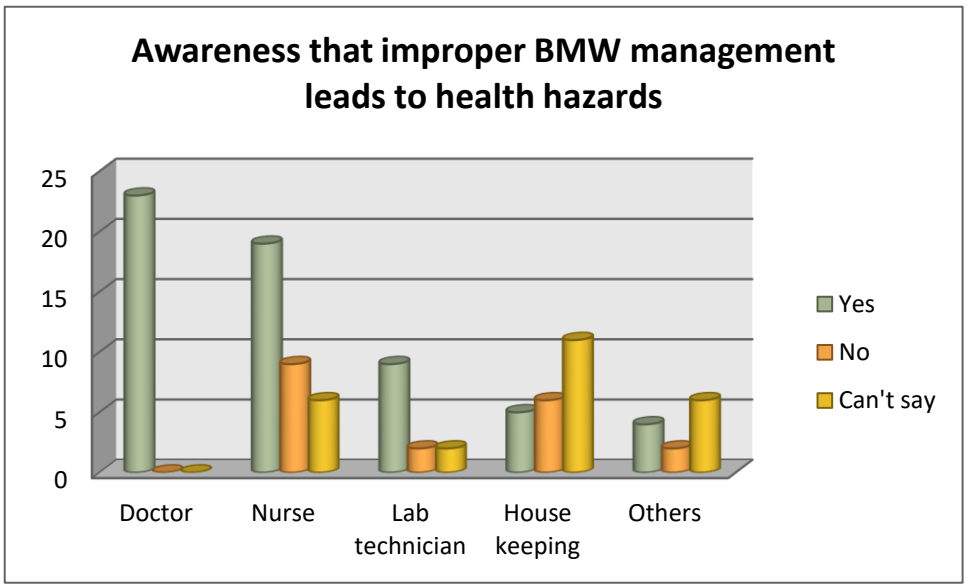
Doctors are quite aware of the fact that treatment of BMW is important, whether there is very less knowledge among other staff regarding treatment of biomedical waste

5.1) Awareness that improper BMW management leads to health hazards



(Fig 5.1)

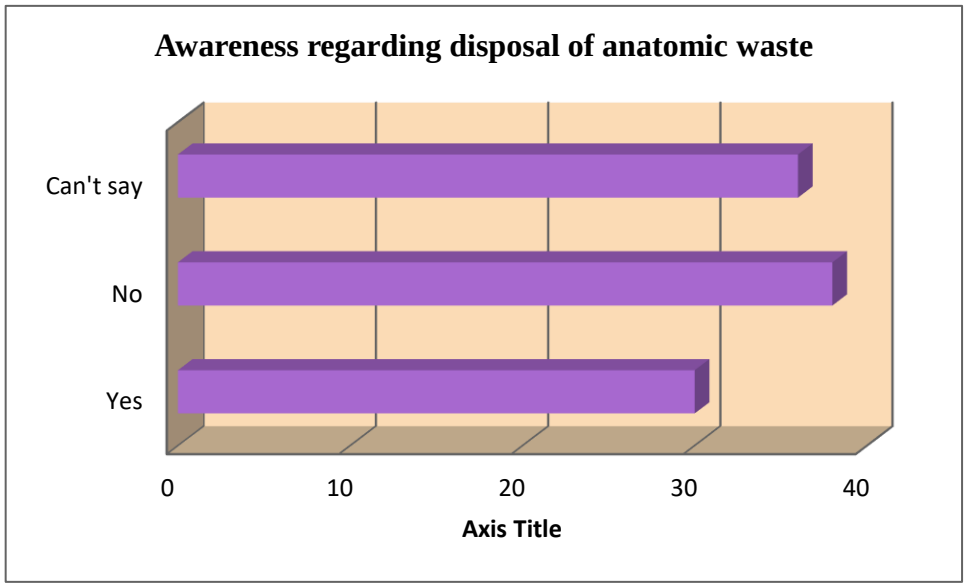
5.2) After categorization



(Fig 5.2)

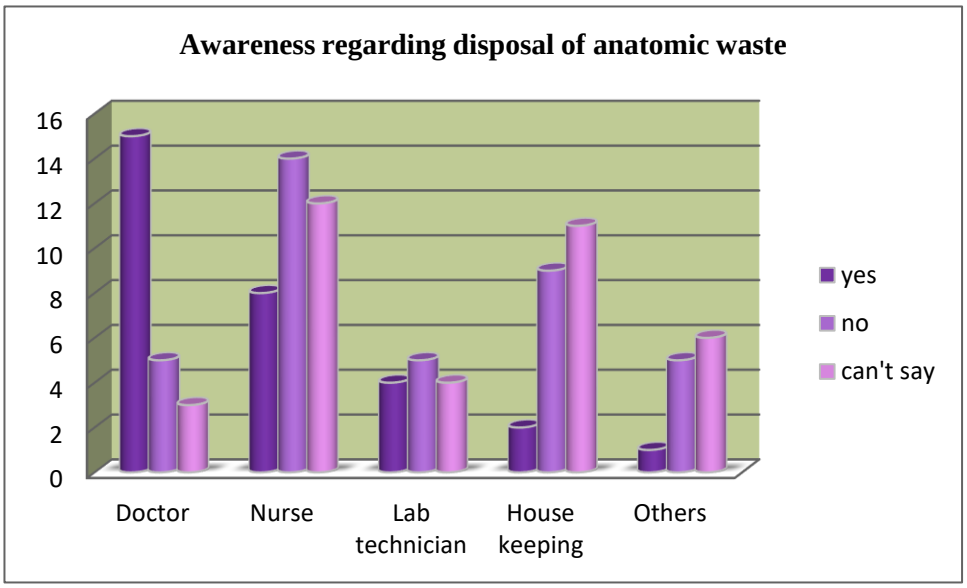
Awareness regarding health hazards related to improper BMW handling is very poor amongst class IV employees; this is one of the major concerns.

6.1) Overall awareness that anatomical waste should go in yellow bag



(Fig 6.1)

6.2) After categorization



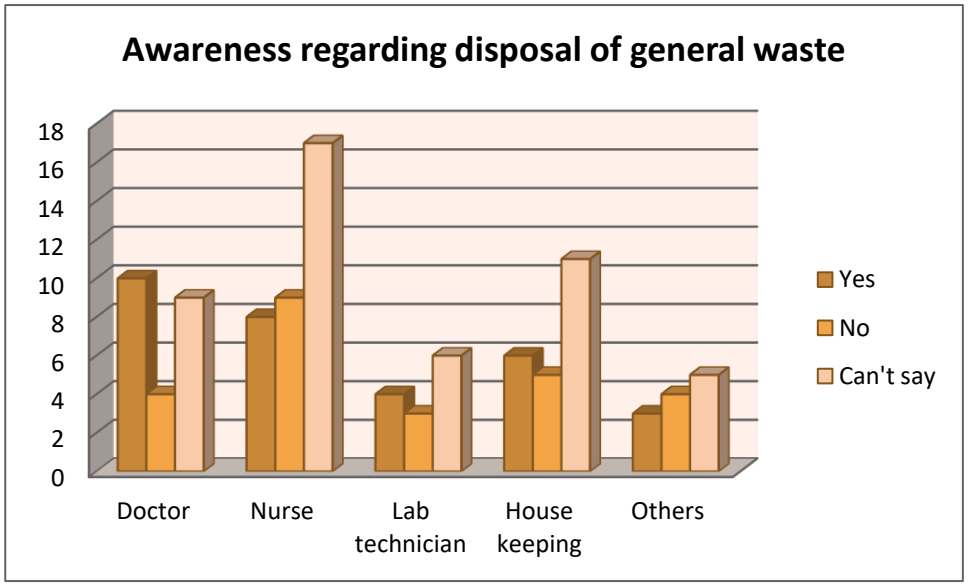
(Fig 6.2)

Apart from doctors, the other staff is having very less knowledge about the disposal of anatomical waste, they are very less aware of the color coding of dustbin and categories of waste disposal.

7.1) Overall awareness that General waste should go in black bag

(Fig 7.1)

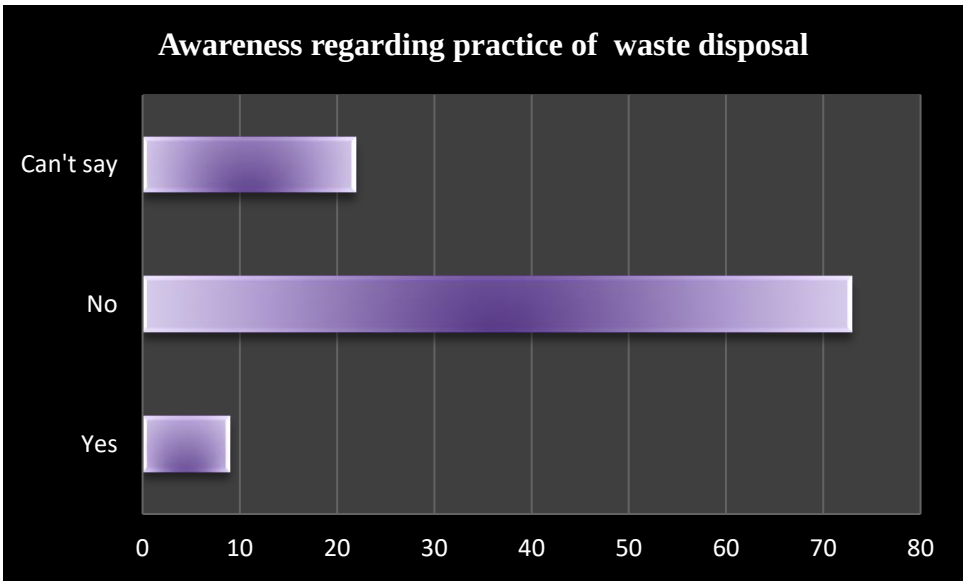
7.2) After categorization



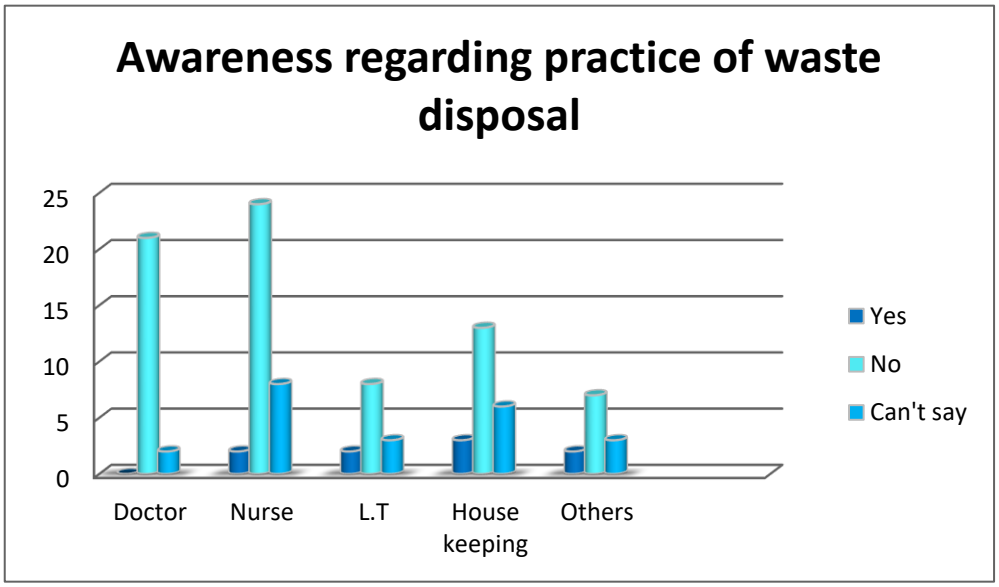
(Fig 7.2)

Overall awareness regarding disposal of general waste is very low amongst the staff including doctors.

8.1) Overall awareness regarding correct waste disposal

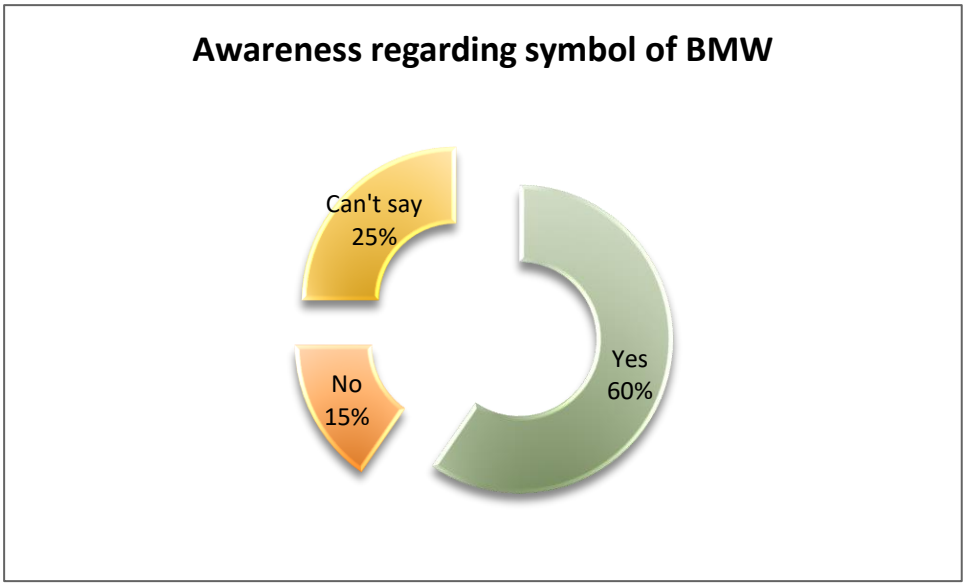


8.2) After categorization



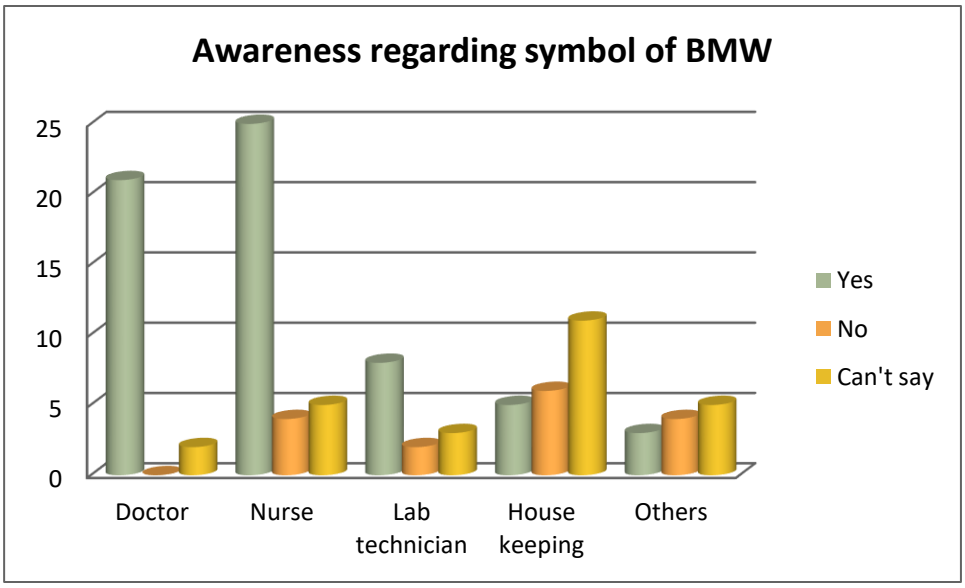
There is a mixed response from housekeeping and other staff regarding correct waste disposal in the hospital, whether doctors, nurses and technicians are aware of the fact regarding waste disposal in the hospital.

9.1) Overall awareness regarding symbol of BMW



(Fig 9.1)

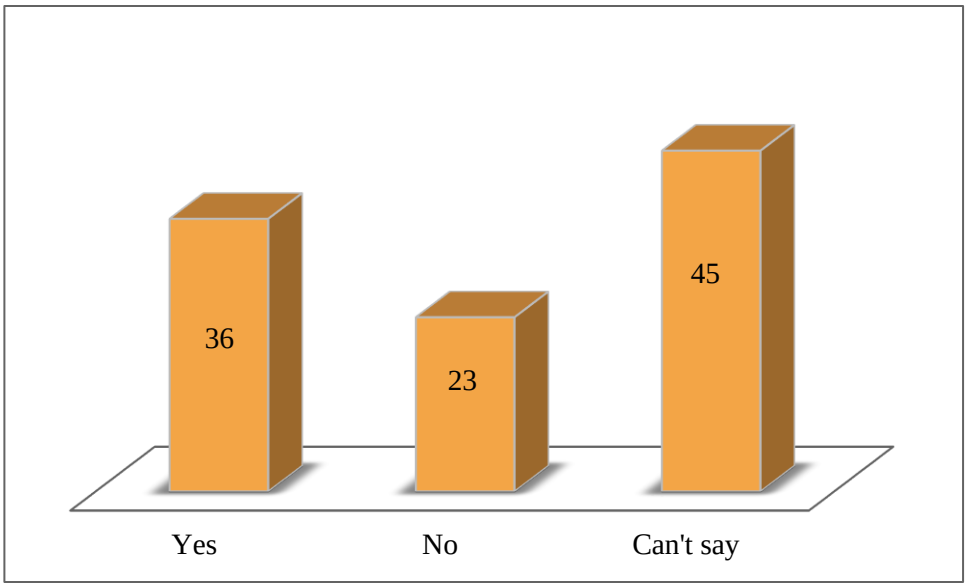
9.2) (After categorization)



(Fig 9.2)

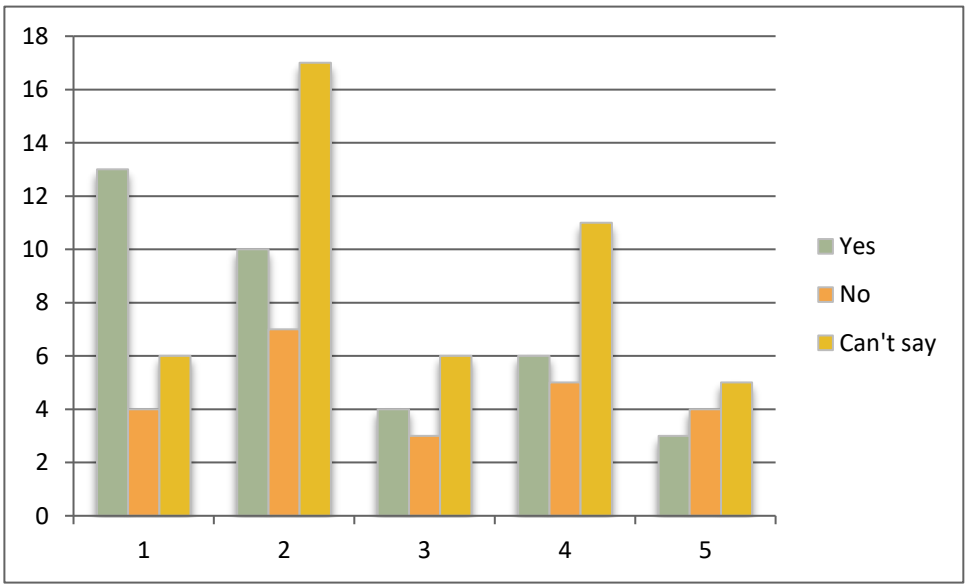
60% staff is aware of the symbol of BMW, but also a low awareness was being observed among class IV employees.

10.1) Overall awareness regarding disposal of sharps



(Fig 10.1)

10.2) After categorization

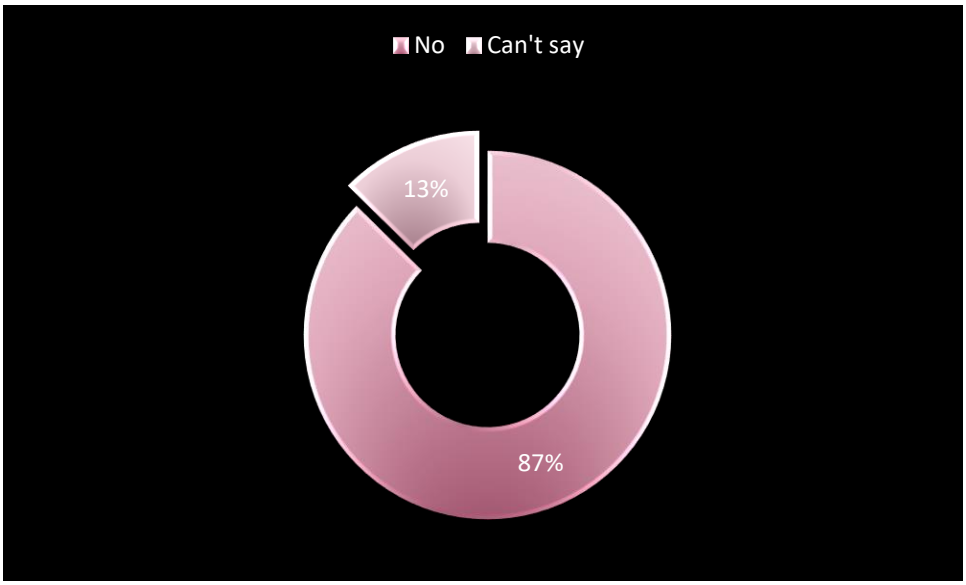


(Fig 10.2)

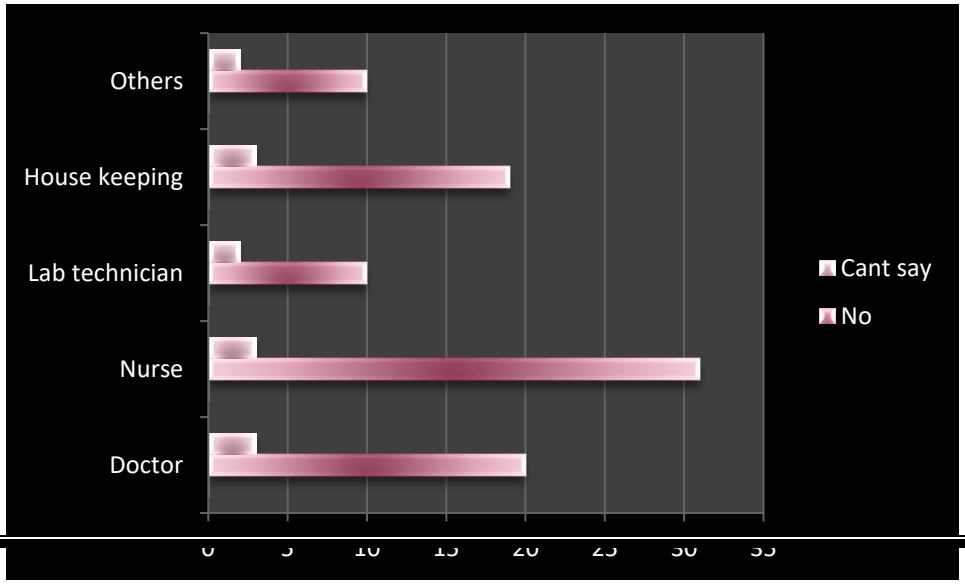
Mostly doctors were aware of disposal of sharps, while less awareness was seen among nursing, housekeeping and other staff.

11.1) Awareness about the training programme on hospital waste management in hospital

(Fig 11.1)



11.2) (After categorization)



(Fig 11.2)

Figure shows that nobody was aware of any training program being conducted in the hospital.

Intervention

The awareness lecture was conducted from Monday to Wednesday i.e. from 21-23 April 2014. Between 12:00 to 1:00 P.M. daily. Educational lecture were held including knowledge about hospital waste (Composition- hazards for patients, Doctors, other hospital staff, community and environment - segregation methods & benefits of segregation) with power point demonstration of method for sealing boxes, sharps containers and red bags.

A questionnaire was being administered to the participants before the awareness lecture and at the end of the last 3rd session for evaluation of their knowledge & attitude before and after the course.

Pre and Post test Statistical analysis was done using Excel.

Level of knowledge and awareness of BMW practices among healthcare personnel (Pre intervention)

Excellent: 10 correct answers out of 12

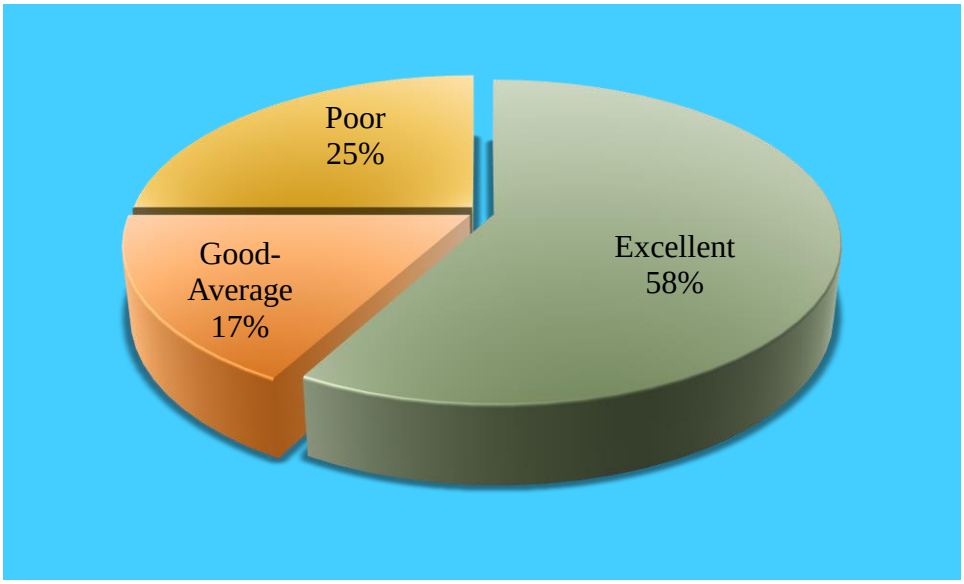
Good- Average: 7-8 correct answers out of 12

Poor: >4 correct answers out of 12

(Table no.3)

	10-12 Excellent	7-8 Good-Average	>4 Poor
Doctors	**58%**	**17%**	**25%**
Nurses	**17%**	**42%**	**42%**
Technicians	**17%**	**50%**	**33%**
Housekeeping	**0%**	**25%**	**75%**
Others	**0%**	**8%**	**92%**

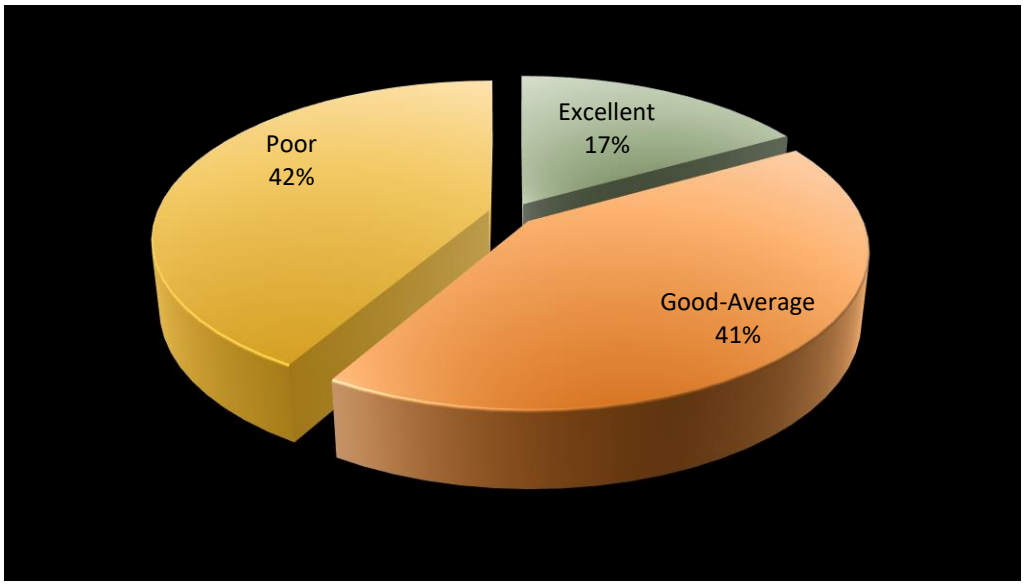
1) **Graph showing awareness level of doctors (pretest)**



(Fig 12.1)

Figure shows that only 58% doctors had excellent knowledge regarding management and regulations of BMW.

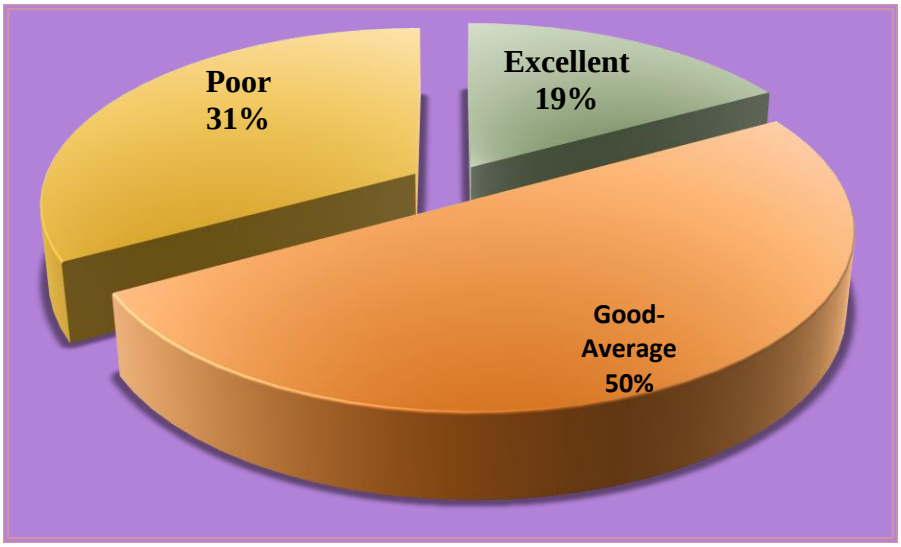
2. Awareness level of Nurses (pretest)



(Fig 13.1)

Out of 34 nursing staff, only 17% were able to answer all the questions correctly, and rest 42% had a poor knowledge regarding BMW.

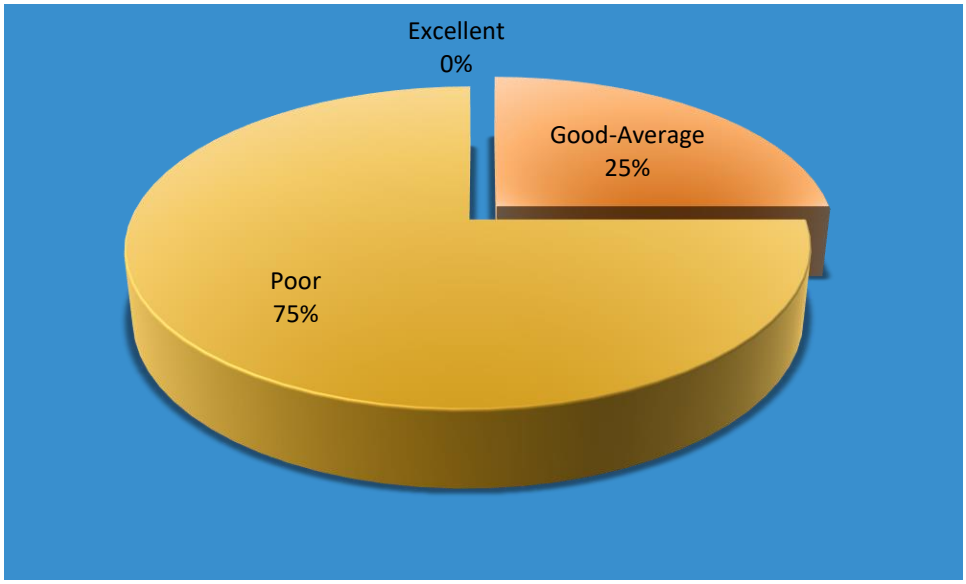
3. Awareness level of Technicians(pretest)



(Fig 14.1)

Out of 12 Lab technicians, 6 were having an average knowledge, while 4 were having poor knowledge of BMW management.

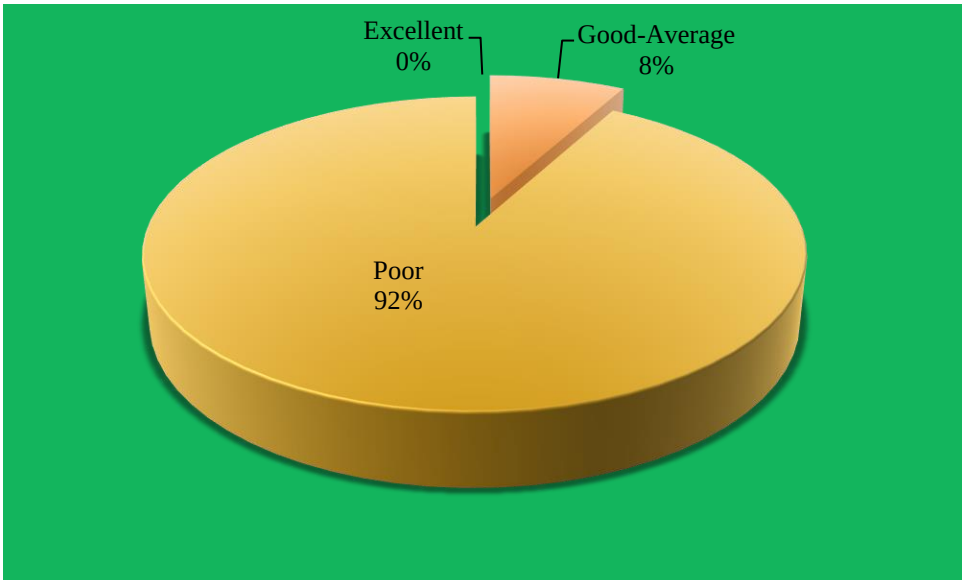
4. Awareness level of Housekeeping staff (pretest)



(Fig 15.1)

Housekeeping staff had a very poor knowledge regarding BMW management, out of 22 housekeeping staff; nobody could answer all the questions correctly.

5. Awareness level of other staff (pretest)



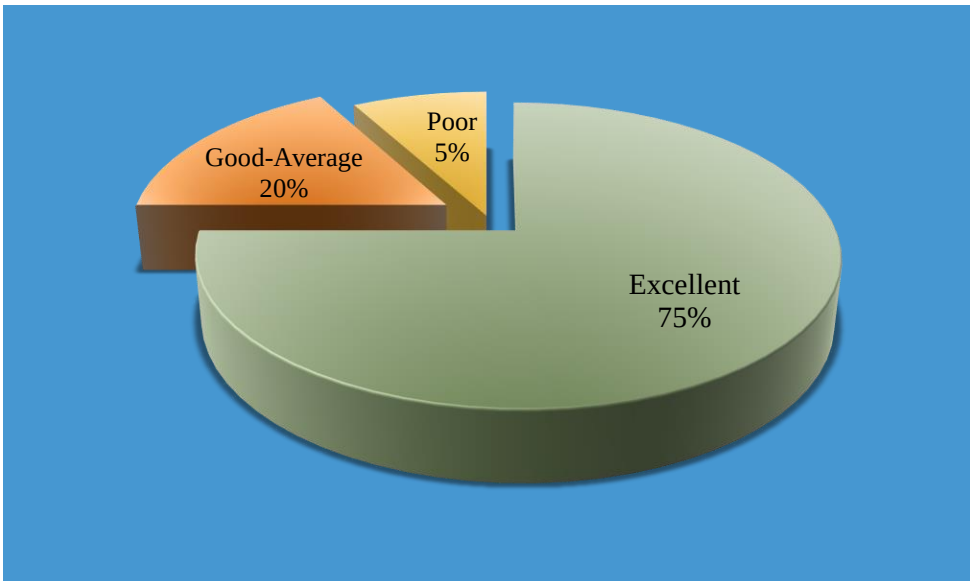
(Fig 16.1)

It is very unfortunate that the hospital staff had a very poor knowledge regarding biomedical waste management, 92% staff dealing with BMW is not aware of the proper management of BMW.

(Table no.4) Post intervention

	>10 Excellent	7-8 Good-Average	>4 Poor
Doctors	**75%**	**17%**	**8%**
Nurses	**50%**	**25%**	**25%**
Technicians	**50%**	**17%**	**33%**
Housekeeping	**25%**	**33%**	**42%**
Others	**25%**	**25%**	**50%**

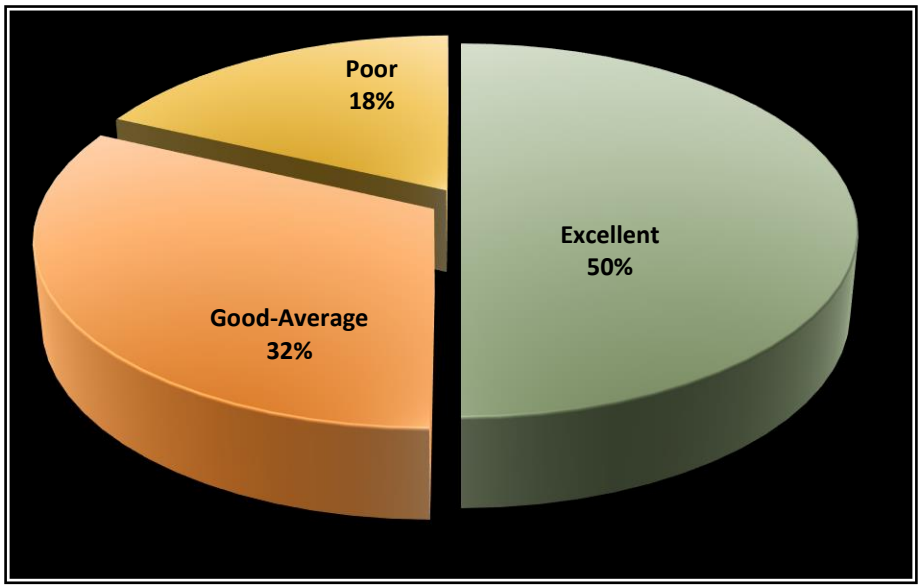
1. Awareness level of doctors (Post intervention)



(Fig 12.2)

Post intervention graph shows an increased level of knowledge from 58%- 75% among Doctors i.e. around 15% positive responses from the staff.

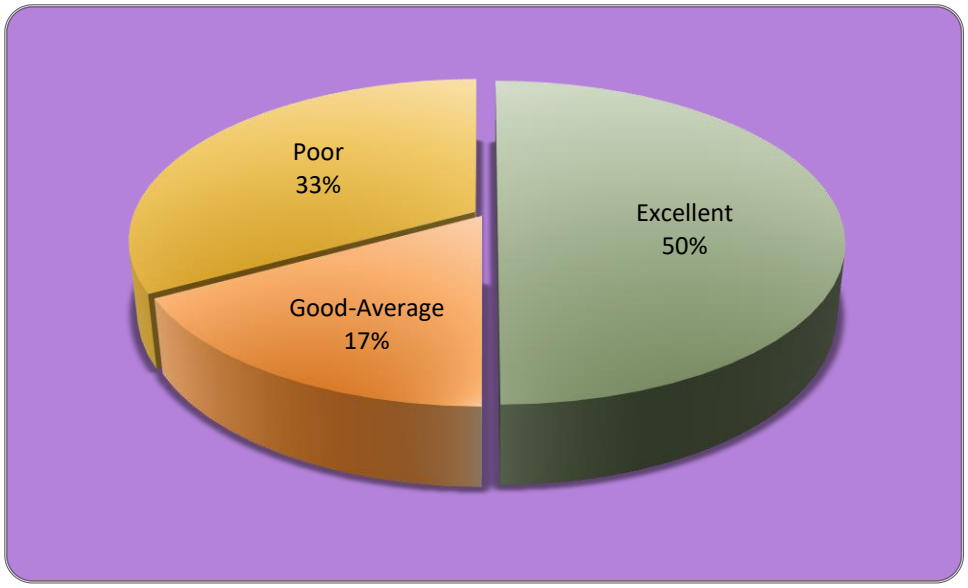
2. Awareness level of nursing staff (post intervention)



(Fig 13.2)

It shows that after the educational session, 50% (i.e. 16 out of 34) of the nursing staff was able to give correct answers to those questions that were not known to them before.

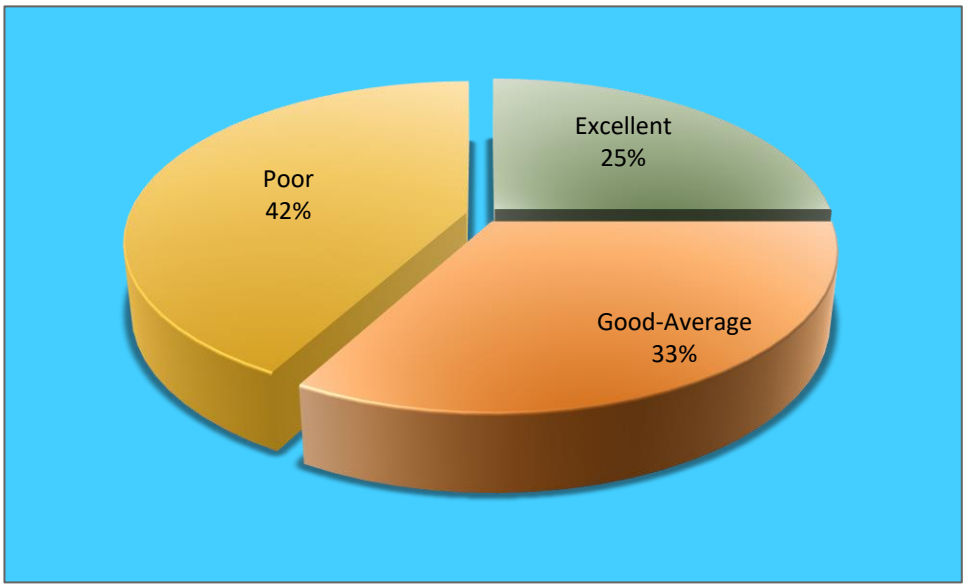
3. Awareness level of Technicians (Post intervention)



(Fig.14.2)

Technicians were able to attempt 50% of the questions correctly after the educational session.

4. Awareness level of Housekeeping staff (Post intervention)



(Fig.15.2)

An improvement had been seen from 0 to 25% among housekeeping staff after the session, while 8 out of 22 gave an average response.

5. Awareness of other staff (post intervention)

(Fig.16.2)

Staff including ward boys, GDA's etc. showed a good response after the session, they were able to achieve 25% of correct questions and the number decreased from 92% to 25% of the staff, who could not attempt 3 correct questions earlier.

Discussion

A cross-sectional study was conducted using a questionnaire with closed-ended questions. It was distributed to 104 doctors, nurses, laboratory technicians and Class IV employees (cleaners and maintenance personnel) at Park Hospital, Gurgaon. The questionnaire was used to assess their knowledge of biomedical medical waste disposal Pre and Post test. The resulting answers were graded and the percentage of correct and incorrect answers for each question from all the participants was obtained.

Hospitals in developing countries have sanitary inspectors and other staff for biomedical waste management, but due to lack of periodic training, waste management is not up to the mark.

The results of this study highlighted that the practice of BMW management was not satisfactory at Park hospital but after the awareness session the results improved to some extent.

Results

- The results of this study showed that the pre and post intervention knowledge of the participants, the pre intervention knowledge were limited in many important aspects. The intervention of this study emphasized not only the details of the well-known hazards of hospital waste but also on the sound preventive behavior and the fruitful effect of its application. (9)

- In the pre test phase, Out of 23 only 14 (58%) Doctors were able to attempt all the questions correctly but in post intervention phase it has been increased to 75%.

- Pre and post intervention finding varies from 17% to 50% in nursing staff and 18% to 50% in Lab technicians that obviously shows an increased level of awareness and knowledge regarding BMW management.

- A second major finding was that the attitude of the participant showed a significant improvement especially in class IV employees who were not highly educated but shows an improvement from 0% to 25% while 8 out of 22 gave an average response.

- Staff including ward boys, GDA's etc. showed a good response after the session, they were able to achieve 25% of correct questions and the number decreased from 92% to 25% of the staff, who could not attempt 3 correct questions earlier.

- The effectiveness of the intervention phase in improving the knowledge of the health professionals regarding biomedical waste management is directly related to the scores that they have gained in the post-test phase. An increase in the post-test knowledge scores than the pre-test scores clearly indicates an improvement in the knowledge of the health professionals.

- The knowledge and attitudes between the groups of healthcare personnel varied and was not up to the mark Pre test, but post intervention it was been found to be satisfactory.

Conclusion

The success of a study based on the self-administered questionnaire (pre intervention and post intervention). In order to avoid any recall bias, most of the questions were of closed-end type. Such questions are easy to analyze and may achieve a quicker response from participants.

A further advantage for this study was that all the participants were based at the same workplace, so all were following similar guidelines from a waste management protocol.

The present study was conducted in Park Hospital, Gurgaon City. It showed that the level of knowledge and awareness about BM waste generation hazards, legislation and management among Doctors, Nurses, Lab technicians and Class IV employees was highly inadequate but Post intervention it was found to be satisfactory.

Medical wastes pose significant impact on health and the environment. Especially in a developing country like India, may be because of its huge population and pollution level when taken into account as such.

Though the management of waste is done in very appreciable level still there is an urgent need for raising awareness and education on medical waste issue for the staff.

Proper waste management strategy is needed to ensure health and environmental safety. Proper handling, treatment and disposal of biomedical waste play a vital role in hospital infection control programme. Objectives of BMW (Biomedical waste) management mainly involves preventing transmission of disease from patient to patient, from patient to health worker and vice versa, to prevent injury to the health care worker and workers in support services, while handling biomedical waste, to prevent general exposure to the harmful effects of the cytotoxic, and chemical biomedical waste generated in hospitals. If properly designed and applied, waste management can be a relatively effective and an efficient compliance-related practice.

The study findings pointed to upgrading staff knowledge and practice in relation to management of health care waste. The results showed a statistically significant improvement in staff knowledge and practice about health care waste management after the awareness session.

Concluding from the results, the importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts practices of appropriate waste disposal.

Recommendations

Waste management is every body's concern starting from doctor up to supporting staff.
Waste management is not a waste of time. It is worth while giving few minutes of time to make hospital environment clean, healthy and free from infection.

The need of comprehensive training programs regarding handling, segregation, transportation, storage of waste in color bins until final disposal and treatment for all hospital staff is highly recommended to deal with this burning issue of bio-medical waste management.

Personal protection

- Protective equipments
- Vaccination: Hepatitis B and tetanus
- Periodic/surprise audits
- Proper hand washing techniques

Staff safety

- Pre –employment and Annual health check
- Training on occupation safety
- Display of SoPs at all working areas
- Provision of required PPE
- Spillage kits, First aid kits

- It should be ensured that the injuries happening to the healthcare personnel are reported to the person in-charge of biomedical waste management and they should know about the remedial measure of accidental needle stick injury.

Education and training

- Training on induction
- Training on color coding, labeling etc.
- Training on special problems related to sharp disposal.
- Awareness about the occupational risks and hazards.
- Training on appropriate cleaning and disinfection procedures.
- Mock drills
- Awareness materials including hoardings, wall writing stickers etc should be provided in the hospital.
- Post training assessment and competency evaluation.

Quality audits

Process audits

Planned and surprise

Cross departmental

Waste audits

Segregation

Labeling

Departmental waste volume/day

Quality assurance

- BMW management – permanent agenda in monthly infection control committee meeting
- Adherence to cleaning checklists
- Incident reports
- Nosocomial infection rate
- Quality watch
- Maintenance of record registers

- Biomedical waste management training should be made compulsory for all health care personnel.

- Information with respect to risks involved in health care waste management practices have to be disseminated, for public or general community through organizing seminars, workshops, practical demonstrations, group discussions, lectures etc.

- Continuous in-service programs and refreshing courses should be conducted for all the health professionals to fill the deficiency of their knowledge and practice.

- Though, students from medical, dental and nursing courses have BMW as part of their curriculum, their practical skills in collection, handling and disposal of waste need to be strengthened for improving the overall performance of all concerned including patients and visitors to the hospital.

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Appendix

Questionnaire for interviewing health personnel

Doctor _____ Nurse_____ Lab technician_____ Housekeeping ____

1. Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities is called as biomedical waste.
   A) Yes B) No C) Can't say

2. Is there any biomedical waste generated in your department?
   A) Yes B) No C) Can't say

3. Do you know about color-coding segregation of BM waste?
   A) Yes B) No C) Not sure

4. Do you follow color-coding for BM waste?
   A) Yes B) No C) Not sure

5. Biomedical waste should be treated within 48 hrs.

A) Yes B) No C) Can't say

6. Improper biomedical waste management leads to risk to the health of employees of the hospital, patients receiving treatment and visitors to the hospital.

A) Yes B) No C) Can't say

7. Human anatomical and soiled wastes should go into yellow bag.

A) Yes B) No C) Can't say

8. General waste/Non infectious waste has to be put into black bag.

A) Yes B) No C) Can't say

9. Objects that may be capable of causing punctures or cuts, which may have been exposed to blood or body fluids including scalpels, needles etc. How should these objects be disposed of?

A) Red bags B) Clear/blue bags C) Can't say

10. Is the waste disposal practice correct in your hospital?

A) Yes B) No C) Can't say

11. Have you undergone any training program on hospital waste management in your hospital?

A) Yes B) No C) Can't say

12. Symbol used to label the biomedical waste container is

A) Yes B) No C) Can’t say