A STUDY ON ASSESSMENT OF KNOWLEDGE AND AWARENESS OF BIOMEDICAL WASTE MANAGEMENT PROCESS AMONG HOSPITAL STAFF IN SADBHAVNA MEDICAL AND HEART INSTITUTE, PATIALA, PUNJAB

Dissertation submitted to

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For the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

In

Hospital and Health management

By

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Under the supervision and guidance of

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Date: 20th June 2022

TO WHOM IT MAY CONCERN

This is to certify that, Dr. Aksharika Sharma, student of MBA 2nd year (Hospital & Health Management) Batch 2020-22, IIHMR University, Jaipur has successfully completed her internship with Sadbhavna Medical & Heart Institute, Patiala, Punjab from 21st March 2022 to 18th June 2022 in the department of Quality.

During this period her assignment was "A STUDY ON ASSESSMENT OF KNOWLEDGE AND AWARENESS OF BIOMEDICAL WASTE MANAGEMENT PROCESS AMONG HOSPITAL STAFF"

During the period of her internship with us she was committed, sincere and diligent learner.

We wish her all the success to her future endeavours.

Authorized Signatory,
Mrs. Palak Patel
Quality Manager

Mentor,
Dr. SUDHIR VERMA
D.M. (Cardiology)
GOLD MEDALIST
A.I.I.M.S. (N.D.)

DECLARATION

I do hereby declare that I am a student of 2nd year, MBA in Hospital and Healthcare Management, IIHMR University, Jaipur, Rajasthan session 2020-2022.

I would like to state that I have carried out my internship on the topic **KNOWLEDGE AND AWARENESS OF BIOMEDICAL WASTE MANAGEMENT PROCESS AMONG HOSPITAL STAFF** under the guidance of **Mrs. Palak Patel (Head Quality Services) Sadbhavna Medical and heart institute, Patiala,** and **Dr Deepti Sharma (mentor) IIHMR University**, Jaipur, for the partial fulfilment for the degree of MBA in Hospital and Healthcare Management.

This project work is my own and has not been submitted to any of the other Institute or University for the purpose of award of any degree or diploma.

Signature

Dr Aksharika Sharma

CONTENT

PREFACE

ABSTRACT

Title: A STUDY ON ASSESSMENT OF KNOWLEDGE AND AWARENESS OF BIOMEDICAL WASTE MANAGEMENT PROCESS AMONG HOSPITAL STAFF IN SADBHAVNA MEDICAL AND HEART INSTITUTE, PATIALA, PUNJAB.

Author: Dr Aksharika Sharma

Background: Government of India ministry of environment, forest, and climate change, have published in the Gazette of India, notification the BMW Management Rules, 2016.However, the availability of resources must be taken into consideration and HCPs education and awareness in the areas of difference needs to be highlighted before implementing BMW rule. Biomedical waste management has recently emerged as an issue of major concern not only to hospitals, nursing home authorities but also to the environment. the bio-medical wastes generated from health care units depend upon many factors such as waste management methods, type of health care units, occupancy of healthcare units, specialization of healthcare units, ratio of reusable items in use, availability of infrastructure and resources etc. Hospital generated waste is a special category of waste, which needs to be handled appropriately with precautions as it carries a higher potential for infection and injury than any other type of waste. Adequate awareness and practices among the hospital staff regarding the biomedical waste management are crucial to prevent these hazards.

Research question?

What bio-medical waste management system is existing in the hospital?

What is the level of knowledge about the BMW among the staff of the hospital?

Objectives:

- To assess the Knowledge among hospital personnel regarding bio-medical waste and its management.
- To assess the attitudes of health care workers towards biomedical waste management
- To observe the existing practices of biomedical waste management in the health facilities of Sadbhavna Hospital by observational checklist.

Methodology:

A cross-sectional approach was adopted to conduct the study.

The Study Area is Sadbhavna Hospital, Patiala.

The Study duration is 2 months.

The Study design is Situational analysis of the hospital.

The Study Population is nurses and sanitation staff for assessing the knowledge and practices.

Questionnaire was used to conduct the study.

Data were collected from April to June 2022.

The Data collection is based on the present availability of data based on handling the waste.

The Data collected is Primary data collected in the form of questionnaire, feedback, observation of various activities.

The Secondary data is in the form of literature review.

MS Excel was used to analyze the results.

Results:

The obtained data was tabulated, and the results were interpreted. The knowledge on healthcare waste was found satisfactory among all the study groups. The study also found that more training is needed for the housekeeping staff and nursing staff to improve their practices.

Conclusion:

There are no lags in the process flow for biomedical waste management process; to make it more compliant with the rules, the housekeeping staff should be wearing PPEs, which was lacking in the observations. Since, the analysis shows a lower percentage in practices for both the housekeeping and nursing staff, the hospital can formulate a team for auditing compliances, which would be responsible for entire supervision of all practices under BMW Management.

ACKNOWLEDGEMENT

"It is not possible to prepare a project report without the assistance and encouragement of other people. This one also has no exception."

The summer training internship opportunity with **Sadbhavna Medical & Heart Institute, Patiala** was a great chance for learning , understanding and professional development. Being a management student, it helped me learn my duties as a professional, working in a healthcare setup. It has carved some wonderful memories in my life and assisted me with creating as management professional overall. I am also grateful for having a chance to meet so many people and professionals who led me through this amazing period of internship. This period helped me in sharpening my abilities.

Firstly, I would like to express my heartfelt gratitude towards **Dr. P.R.Sodani** (President, IIHMR university) for giving me this opportunity to undergo training at Sadbhavna Hospital, Patiala. I would like to thank my academics mentor, **Dr. Deepti Sharma** for guiding me throughout the project. During my training, he supported me by giving me intellectual freedom in my work and also supported me in getting engaged in new ideas.

I am highly grateful and would like to express my deepest gratitude and special thanks to my organisation mentor, **Mrs. Palak Patel** who inspite of being extraordinarily busy with all the work and duties, took time out to guide and keep me focused by giving her helpful advice , constructive comments and encouragement throughout the project .

I choose this moment to acknowledge there contribution gratefully.

It is my genuine pleasure to express my gratitude towards all the staff of Sadbhavna Hospital Patiala, for their sincere attention towards my work which was exteremely valuable for my study both theoratically and practically. I acknowledge them for taking out time from their hectic schedule for helping me.

Lastly, I would like to thank my family and friends for being always there as a constent source of inspiration for me .

I find this opportunity as a huge step in my career development I will try to use my grained skills and knowledge in best possible way to shape my carrer.

Sincerely.

Dr. Aksharika sharma

MBA HM (2020-22)

LIST OF FIGURES

ABBREVATIONS

- **BMW- Bio-Medical Waste**
- **BMWM- Bio-Medical Waste Management**
- **PPE- Personal protective equipment**
- **WHO- World Health Organization**
- **CPCB-Central pollution control board**
- **CTF-common treatment facility**
- **HCF-health care facility**
- **HCW-health care worker**
- **HIV-human immunodeficiency virus**
- **IPD-in-patient department**
- **OPD-out-patient department**
- **STP-sewage treatment plant**
- **PPU-postpartum unit**
- **BBU-blood bank unit**
- **ICU: Intensive Care Unit**
- **LAB: Laboratory**

DISSERTATION

INTRODUCTION

Bio medical waste means any waste, which is generated during diagnosis, treatment or immunization of human beings or animals or research activities pertaining thereto or in the production or testing of biological or in health camps.

Biomedical waste management has recently emerged as an issue of major concern not only to hospitals, nursing home authorities but also to the environment. the bio-medical wastes generated from health care units depend upon many factors such as waste management methods, type of health care units, occupancy of healthcare units, specialization of healthcare units, ratio of reusable items in use, availability of infrastructure and resources etc.

The proper management of biomedical waste has become a worldwide humanitarian topic today. Although hazards of poor management of biomedical waste have aroused the concern world over, especially in the light of its far-reaching effects on human, health, and the environment.

Now it is a well-established fact that there are many adverse and harmful effects to the environment including human beings which are caused by the "Hospital waste" generated during the patient care. Hospital waste is a potential health hazard to the health care workers, public and flora and fauna of the area. The problems of the waste disposal in the hospitals and other health-care institutions have become issues of increasing concern.

The rules for management and handling of biomedical wastes are summarized, giving the categories of different wastes, suggested storage containers including color-coding and treatment options. Existing and proposed systems of health-care waste management are described. A waste-management plan for health-care establishments is also proposed, which includes institutional arrangements, appropriate technologies, operational plans, financial management and the drawing up of appropriate staff training programs. According to Biomedical Waste (Management and Handling) Rules, 1998 of India "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.

Government of India (notification, 1998) specifies that Hospital Waste Management is a part of hospital hygiene and maintenance activities. This involves management of range of activities, which are mainly engineering functions, such as collection, transportation, operation or treatment of processing systems, and disposal of wastes.

One of India's major achievements has been to change the attitudes of the operators of health care facilities to incorporate good HCW management practices in their daily operations and to purchase on-site waste management services from the private sector.

World Health Organization states that 85% of hospital wastes are non- hazardous, whereas 10% are infectious and 5% are non-infectious but they are included in hazardous wastes. About 15% to 35% of Hospital waste is regulated as infectious waste.

This range is dependent on the total amount of waste generated.

Need of biomedical waste management in hospitals

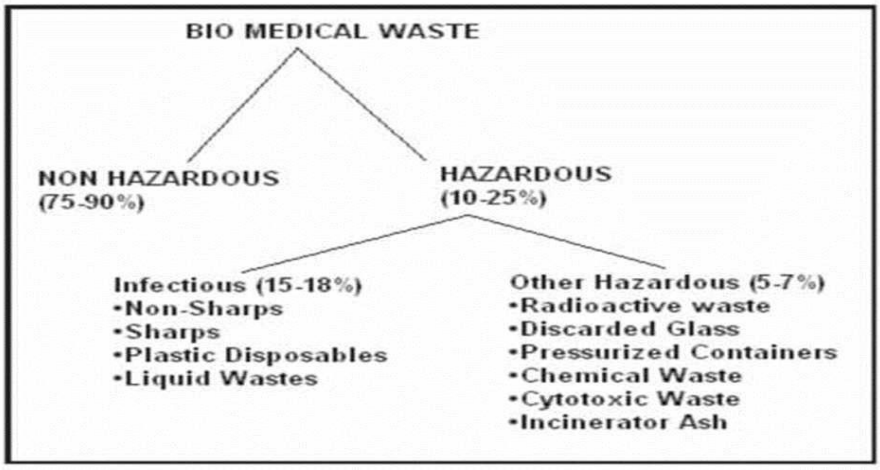
The reasons due to which there is great need of management of hospitals waste such as:

- Injuries from sharps leading to infection to all categories of hospital personnel and waste handle
- Nosocomial infections in patients from poor infection control practices and poor waste management.
- Risk of infection outside hospital for waste handlers and scavengers and at time 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.
- Risk of air, water, and soil pollution directly due to waste, or due to defective incineration emissions and ash.

CLASSIFICATION OF BIOMEDICAL WASTE:

The World Health Organization (WHO) has classified medical waste into eight categories:

- General Waste
- Pathological
- Radioactive
- Chemical
- Infectious to potentially infectious waste
- Sharps
- Pharmaceuticals
- Pressurized containers



BMW Process

There is a big network of Health Care Institutions in India. The hospital waste like body parts, organs, tissues, blood, and body fluids along with soiled linen, cotton, bandage, and plaster casts from infected and contaminated areas are very essential to be properly collected, segregated, stored, transported, treated and disposed of in safe manner to prevent nosocomial or hospital acquired infection.

1. Waste collection
2. Segregation

3. Transportation and storage
4. Treatment & Disposal
5. Transport to final disposal site
6. Final disposal

EFFECTS OF BIOMEDICAL WASTE ON HEALTH

Sharps: The reuse of syringes: Worldwide, an estimated 10 to 20 million infections of Hepatitis B and C and HIV occur annually from the reuse of discarded syringe needles without prior sterilization.

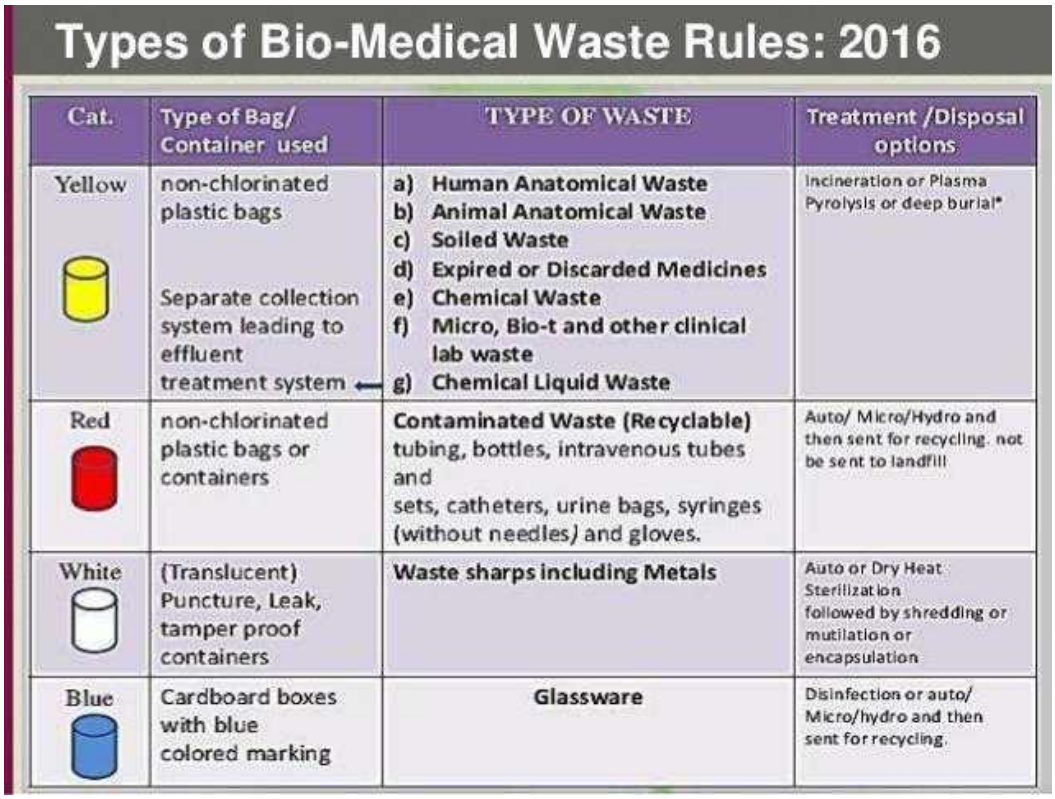
Accidental Contacts: This happens through contaminated air, water or food, by accidental contact with soiled dressings or by injury from sharps.

Infections and diseases:

Serious diseases may develop in healthcare personnel, waste handlers, patients, and the public. In any healthcare establishment, nurses and house-keeping personnel are the main groups at risk of injuries. Risk of infection of hepatitis B after needle stick injury-chances of susceptible health care workers (HCWs) is 6-30% after single needle stick exposure.

THE BIOHAZARD SYMBOL

TYPES OF BIOMEDICAL WASTE



Types of Bio-Medical Waste Rules: 2016

Cat.	Type of Bag/ Container used	TYPE OF WASTE	Treatment /Disposal options
Yellow	non-chlorinated plastic bags Separate collection system leading to effluent treatment system	a) Human Anatomical Waste b) Animal Anatomical Waste c) Soiled Waste d) Expired or Discarded Medicines e) Chemical Waste f) Micro, Bio-t and other clinical lab waste g) Chemical Liquid Waste	Incineration or Plasma Pyrolysis or deep burial*
Red	non-chlorinated plastic bags or containers	Contaminated Waste (Recyclable) tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles) and gloves.	Auto/ Micro/Hydro and then sent for recycling. not be sent to landfill
White	(Translucent) Puncture, Leak, tamper proof containers	Waste sharps including Metals	Auto or Dry Heat Sterilization followed by shredding or mutilation or encapsulation
Blue	Cardboard boxes with blue colored marking	Glassware	Disinfection or auto/ Micro/hydro and then sent for recycling.

PRESCRIBED AUTHORITIES AND CORRESPONDING DUTIES:

- Ministry of Environment, Forest and Climate Change, Government of India
- Central or State Ministry of Health and Family Welfare, Central Ministry for Animal Husbandry and Veterinary or State Department of Animal Husbandry and Veterinary.
- Ministry of Defence
- Central Pollution Control Board
- State Government of Health or Union Territory Government or Administration
- State Pollution Control Boards or Pollution Control Committee.

Management

Biomedical waste must be properly managed and disposed of to protect the environment, public and workers, especially healthcare and sanitation workers who are at risk of exposure to biomedical waste as an occupational hazard. Steps in the management of biomedical waste include generation, accumulation, handling, storage, treatment, transport, and disposal.

Disposal occurs off-site, at a location that is different from the site of generation. Treatment may occur on-site or off-site. On-site treatment of large quantities of biomedical waste usually requires the use of relatively expensive equipment and is generally only cost effective for very large hospitals and major universities who have the space, labour, and budget to operate such equipment. Off-site treatment and disposal involve hiring of a biomedical waste disposal service (also called a truck service) whose employees are trained to collect and haul away biomedical waste in special containers (usually cardboard boxes, or reusable plastic bins) for treatment at a facility designed to handle biomedical waste.

Generation and accumulation

Biomedical waste should be collected in containers that are leak-proof and sufficiently strong to prevent breakage during handling. Containers of biomedical waste are marked with a biohazard symbol. The container, marking, and labels are often red

Discarded sharps are usually collected in specialized boxes, often called ***needle boxes***.

Storage

"Storage refers to keeping the waste until it is treated on-site or transported off-site for treatment or disposal. There are many options and containers for storage. Regulatory agencies may limit the time waste can remain in storage. Handling is the act of moving biomedical waste between the point of generation, accumulation areas, storage locations and on-site treatment facilities. Workers who handle biomedical waste must observe ***standard precautions.***

Treatment

Treatment should render the waste safe for subsequent handling and disposal. There are several treatment methods that can accomplish these goals. Biomedical waste is often **incinerated**. An efficient incinerator will destroy pathogens and sharps. Source materials are not recognizable in the resulting ash."

An autoclave may also be used to treat biomedical waste. An autoclave uses steam and pressure to sterilize the waste or reduce its microbiological load to a level at which it may be safely disposed of. Many healthcare facilities routinely use an autoclave to sterilize medical supplies. If the same autoclave is used to sterilize supplies and treat biomedical waste, administrative controls must be used to prevent the waste operations from contaminating the supplies. Effective administrative controls include operator training, strict procedures, and separate times and space for processing biomedical waste.

Microwave disinfection can also be employed for treatment of Biomedical wastes. Microwave irradiation is a type of non-contact heating technologies for disinfection. Microwave chemistry is based on efficient heating of materials by microwave dielectric heating effects. When exposed to microwave frequencies, the dipoles of the water molecules present in cells re-align with the applied electric field. As the field oscillates, the dipoles attempt to realign itself with the alternating electric field and in this process, energy is lost in the form of heat through molecular friction and dielectric loss. Microwave disinfection is a recently developed technology which provides advantage over old existing technologies of autoclaves as microwave-based disinfection has less cycle time, power consumption and it requires minimal usage of water and consumables as compared to autoclaves.

For liquids and small quantities, a **1–10% solution of bleach** can be used to disinfect biomedical waste. Solutions of **sodium hydroxide** and other chemical disinfectants may also be used, depending on the waste's characteristics. Other treatment methods include heat, alkaline digesters and the use of microwaves.

For autoclaves and microwave systems, a shredder may be used as a final treatment step to render the waste unrecognizable.

STP

Sewage from the hospital comes from various areas of hospitals like ICU, emergency room, canteen, laboratory and, from many other areas. Hospital sewage contains many harmful elements that have worse effect on environment as well as human beings. Therefore, its treatment is necessary.

STP Plant for Hospitals is a method of solving wastewater related problems in medical areas. Its motive is to treat wastewater in a proper way before its release into nature as the wastewater generated from the hospital has unfavourable influence on humans.

According to Pollution Control Board, it is compulsory for hospitals to have a **STP Plant** for their proper treatment of wastewater.

Wastewater Treatment Process in Hospitals:

- **Pre-treatment** – It is an important stage in STP system. It eliminates waste and inorganic solids.
- **Primary Treatment** – At this stage, other solids are removed from the wastewater.
- **Secondary Treatment** – It removes dissolved materials from water. This treatment removes a large percentage of harmful solids.
- **Tertiary Treatment** – This stage separates those harmful materials which are not separated during all the above processes.

STP FLOW CHART

1.	Wastewater comes to Chemical mixing tank
2.	Air diffuser mixes the chemical hydrated lime and ferric alum for precipitation of solid waste
3.	Blower gives air for mixing and reduces the BOD and COD value from water
4.	Water shifts to primary clarifier
5.	Aeration tank
6.	Tube settler / secondary clarifier
7.	Polishing tank with sodium hypochlorite for water disinfection 40 ml/20 litres through Auto dosing pump
8.	Sand filter for silt removal
9.	Carbon filter for deodorization
10.	To the outlet
11.	Sludge will go to sludge tank for drying

CHEMICAL USED AND QUANTITY

- Ferric Alum
  1 kg in 20-liter drum through dosing pump
- Hydrated lime
  1 kg in 20-liter drum through dosing pump
- Sodium hypochlorite
  40 ml in 20 liter through dosing pump

THE STUDY IS UNDERTAKEN ACCORDING TO THE BIOMEDICAL WASTE MANAGEMENT RULES 2016 AS THESE RULES ARE BEING CURRENTLY IMPLEMENTED IN THE HOSPITAL.

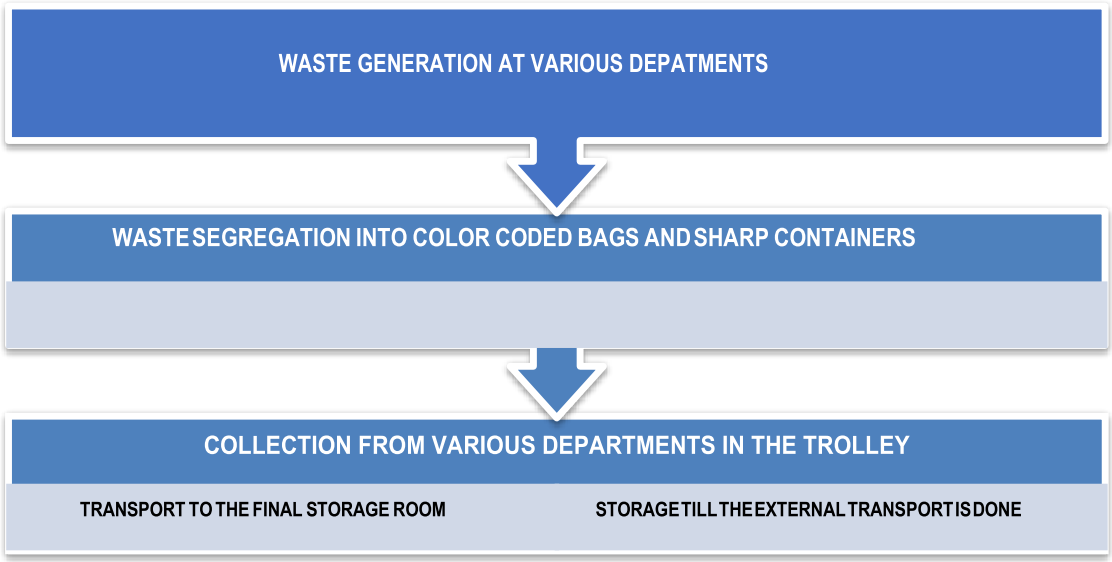
The major salient features of BMW Management Rules, 2016 include the following: -

- The ambit of the rules has been expanded to include vaccination camps, blood donation camps, surgical camps, or any other healthcare activity.
- Phase-out the use of chlorinated plastic bags, gloves, and blood bags within two years.
- Pre-treatment of the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilization on-site in the manner as prescribed by WHO or NACO.
- Provide training to all its health care workers and immunize all health workers regularly.
- Establish a Bar-Code System for bags or containers containing bio-medical waste for disposal.
- Report major accidents.
- The new rules prescribe more stringent standards for incinerator to reduce the emission of pollutants in environment.
- Existing incinerators to achieve the standards for retention time in secondary chamber and Dioxin and Furans within two years.
- Bio-medical waste has been classified in to 4 categories instead of 10 to improve the segregation of

waste at source.

- Procedure to get authorization simplified. Automatic authorization for bedded hospitals. The validity of authorization synchronized with validity of consent orders for Bedded HCFs. One time Authorization for Non-bedded HCFs.
- No occupier shall establish on-site treatment and disposal facility, if a service of `common bio-medical waste treatment facility is available at distance of seventy-five kilometers
- Operator of a common bio-medical waste treatment and disposal facility to ensure the timely collection of bio-medical waste from the HCFs and assist the HCFs in conduct of training.

PROCESS FLOW OF BIO MEDICAL WASTE MANAGEMENT IN THE HOSPITAL



LITERATURE REVIEW

Health-care waste management in India is receiving greater attention due to recent regulations (the Biomedical Wastes (Management & Handling) Rules, 1998). The prevailing situation is analysed covering various issues like quantities and proportion of different constituents of wastes, handling, treatment, and disposal methods in various health-care units (HCUs). The waste generation rate ranges between 0·5 and 2·0 kg $bed^{-1}day^{-1}$. It is estimated that annually about 0·33 million tons of waste are generated in India.

The solid waste from the hospitals consists of bandages, linen, and other infectious waste (30–35%), plastics (7–10%), disposable syringes (0·3–0·5%), glass (3–5%) and other general wastes including food (40–45%).

In general, the wastes are collected in a mixed form, transported, and disposed of along with municipal solid wastes. At many places, authorities are failing to install appropriate systems for a variety of reasons, such as non-availability of appropriate technologies, inadequate financial resources, and absence of professional training on waste management.

Hazards associated with health-care waste management and shortcomings in the existing system are identified. Many synonyms to medical waste exist and they are currently used interchangeably in different parts of the world and in different scientific journals

The generation of these wastes is an ongoing phenomenon if human civilization persists. Hospital waste is sub-divided into health care general waste (HCGW) and health care risk waste (HCRW)

The health system is under pressure to dispose of health care waste in such a way as to avoid unnecessarily high levels of environmental degradation. The aim of health care facilities worldwide is beginning to subscribe to the social goals of a cleaner and safer environment.

To manage health care waste optimally, health care providers should consider all stages or whole life cycle of the medical product by looking at the medical product's upstream and down-stream activities (Kaiser et al. 2001). Determining which portion or components of clinical waste is infectious is challenged by its inherent heterogeneous nature and definitional problems (OTA, 1988).

There are many studies on the management of biomedical waste in hospitals. Some of the studies are discussed below:

- A study was conducted in Srinagar that revealed that the knowledge of health care workers on BMWM and constituents of medical waste. Although majority of the workers seems to be clear on the constituents, there was some confusion on certain constituents as medical waste. Chemicals, unused medicines, and colored containers are the constituents who made most of the confusions among the workers. The sanitary workers are not aware about the color coding of containers. The doctors and nurses were found clearer to some extent about the knowledge and constituents of biomedical waste. The age group/gender doesn't 't have any connection with the knowledge of constituents of medical waste. The study has also shown that more the qualified staff the more is the understanding/awareness or knowledge in the subject of wastes management. The average of all the surveyed HCU's in Srinagar, Doctors rated 88.2% and nurses rated 60.9% with regard to knowledge. Sanitary staff exhibited poor knowledge rated 37.1% about BMWM and rules. This was indicative of the fact that the sanitary staffs were never given even a capsule training with regard to biomedical waste management practices.
  In the regard to attitude towards scientific process doctors had scored an average of 80.3% in all the HCU's in Srinagar city and nurses scored 75.6% whereas sanitary staff have 60 % attitude towards the scientific process.
  The attitude of employees towards medical waste management and scientific process for different groups. It can be noted that the percentage of people who are highly concerned with the waste management are with high education groups

"(Source: STUDY OF KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING MANAGEMENT OF BIOMEDICAL WASTE AMONG HEALTH CARE PROFESSIONALS AND SANITARY STAFF IN SRINAGAR CITY, INDIA KIFAYAT HUSSAIN, ANTOSH AGNIHOTRI, Gh.A. MIR)

- A study was conducted in a Secondary Care Hospital of Al Buraimi Governorate, Sultanate of Oman. It was concluded from the study that the staff knew about documentation related to rules and regulation of biomedical waste management which needed further strict implementation. Higher percentage of health care workers knew about diseases that are transmitted through mishandling of biomedical waste management. Also, it was considered that biomedical waste management is a teamwork and majority of them followed universal precautions while handling biomedical waste. It was found during the study that nurses had better "satisfactory knowledge (90.9%), attitude (94.5%) and practice (80%) scores toward the biomedical waste management in health care institutions as compared to other participants.

(Source: Knowledge, Attitude and Practice of Biomedical Waste Management among Health Care Personnel in a Secondary Care Hospital of Al Buraimi Governorate, Sultanate of Oman, Ahmed Yar Mohammed Dawood Al Balushi, Muhammad Muqeet Ullah, Amal Ali Al Makhamri, Fatma Sulieman Al Alawi, Mansoor Khalid & Hilal Masaud Al Ghafri)

- A study was conducted in dental teaching institutions in india.The results of the review showed that knowledge and awareness level of subjects was inadequate and there is considerable variation in practice and management regarding BMW among different studies. The authors recommend similar studies in different states and further research to provide accurate data for future decision-making.

(Source: Knowledge and awareness regarding biomedical waste management in dental teaching institutions in India- A systematic review, Journal of clinical and experimental dentistry)

- According to a study, the key to minimization and effective management of medical waste is segregation (separation) and identification of the waste. They recommend that the most appropriate way of identifying the categories of medical waste is by sorting the waste into color coded plastic bags or containers

- **According to World Health Organization (WHO)** estimates 85% of Bio medical waste is non-hazardous and around 10% is infectious while the remaining 5% is non-infectious but consists of hazardous chemicals like methyl chloride and formaldehyde.

- **Johannessen et al (2000) opine** that proper management of medical waste can minimize the risk both within and outside healthcare facilities. The priority is to segregate wastes, preferable at the point of generation into reusable and non-reusable, hazardous and nonhazardous components.

AIM OF THE STUDY

The significance of this study is to assess the knowledge of hospital staff (nursing and housekeeping staff) about Biomedical waste Management and to check status of biomedical waste management practices too among the hospital staff in Sadbhavna medical and heart institute, Patiala. By conducting this study, the level of awareness and attitude among health care staff working in Hospital can be evaluated. Further suggestions can be given based on the analysis and findings of study to improve efficiency of BMW management process.

OBJECTIVE

- To determine the knowledge and awareness among hospital staff (housekeeping and nursing staff) regarding biomedical waste management policy and practice.
- To assess the attitudes of health care workers about biomedical waste management
- To assess the practices followed by the hospital staff regarding the handling of the bio- medical waste.
- To determine their awareness regarding needle-stick injury and its prevalence among different categories of health care providers.
- To identify the gaps if any and suggestions based on analysis of study for further improvement in bio-medical waste management and handling.

RATIONALE

A major issue related to current Bio-Medical waste management in any hospital is that the implementation of Bio-Waste regulation is unsatisfactory as some hospital staff are disposing the waste in a haphazard, improper, and indiscriminate manner. Lack of segregation practices, results in mixing of hospital wastes with general waste making the whole waste stream hazardous. Inappropriate segregation ultimately results in an incorrect method of waste disposal.

Inadequate Bio-Medical waste management thus will cause environmental pollution, unpleasant smell, may lead to the transmission of diseases like typhoid, cholera, hepatitis, and AIDS through injuries from syringes and needles contaminated with human.

The problem of bio-medical waste disposal in the hospitals and other healthcare establishments has become an issue of increasing concern, prompting hospital administration to seek new ways of scientific, safe, and cost-effective management of the waste, and keeping their personnel informed about the advances in this area. The need of proper hospital waste management system is of prime importance and is an essential component of quality assurance in hospitals.

RESEARCH QUESTION?

- What bio-medical waste management system is existing in the hospital?
- What is the level of knowledge about the BMW among the staff of the hospital?

RESEARCH METHODOLOGY

The principle aim of this research is to describe the nature of the situation as it exists at the time of study and to explore the causes of the phenomenon. The system approach was taken in this study.

Input in various forms were seen, processed, understood and the output was analysed to find the key findings and recommendations.

Study design

The most encompassing and expensive way of undertaking this study is through the **cross-sectional descriptive research**. It is the most common and widely used method in gathering data regarding the attitude and opinions of groups of people by asking them to provide you with important information by means of questionnaire.

Second direct means of acquiring data is by **observation**. It has been categorized into three types: activity analysis,

product analysis, and

situational analysis.

Third method to be used by the means of devices.

Steps followed to put in practice the design:

1) First, a general visit to all the departments in the hospital was made.
2) On subsequent visit to these departments' various observation about the bio- medical waste management in the hospital were noticed.
3) The observation was made about the process of BMW, all the steps of hospital followed and the practice of the hospital staff.
4) After the observation were made about the running practice of BMW management in the hospital, a questionnaire was prepared to assess the awareness' of the staff regarding the BMW management.
5) The questionnaire was circulated to the staff and the information were collected and analyzed.

Study area

The study area **was Sadbhavna medical and heart institute, Patiala in Punjab**. The full 50 bedded hospital was covered during the study that includes the departments; emergency, labour room, ICU, CCU, O.T, OPD and IPD pharmacy, laboratory etc.

Duration of study

2 months from 1st April 2022 to 1st June 202

Sample size

The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample.

In this case**, 44 nursing staff and 25 housekeeping staff** was used to carry the study.

Sampling technique

Simple random sampling

Sample selection

The inclusion criteria were all the healthcare professionals at the hospital (doctors, nurses, technical staff, and housekeeping staff etc.) who were available for the study and were willing to participate.

The exclusion criteria were those who decided to exercise their right not to participate in the study.

Study tools

A checklist was prepared to collect data from the different bio-medical waste generating centers of the hospital. The checklist has all the essential steps concerning Bio-Medical waste management process.

A structured questionnaire is used for assessing the awareness and knowledge of the heath care personnel.

The questionnaire is prepared in English and regional language.

Data type

Data collection is a term used to describe the process of preparing and collecting data is the basic input for any decision-making process. In this study, two types of data were collected and analysed:

a. **Primary data:** - data which are collected from the field under the control and supervision of the invigilator. In this case, questionnaire and verbal interview were the major means of collecting data.
b. **Secondary data**: - records made by already existing records gathered by someone else maybe in context of some other requirements is called secondary data. In this case, existing registers, and records available in the housekeeping department, internet and books on the subject were referred to. It is collected by the hospital records, SOPs of the study hospital, literature review, articles, journals, and websites available on internet.

Data collection Instruments

Records about the bio-medical generated in the hospital were collected from the record register maintained by the nursing in-charge in the hospital.

The observation about the practices of BMW management were made during the study, in various wards in the hospital. The staff was continually asked for their suggestions regarding general cleanliness, BMW management and any records that might be required for the process. The questionnaire was administered to the available staff by providing the questionnaire to the caretakers who in turn administered to the nurses and housekeeping staff.

Data collection Method

The data to be collected was of the primary and secondary nature.

The method applied for collecting the primary data were:

i. **Observation method:** OB method was used to collect the primary data**.**
ii. **Interview method:** the process involved oral-verbal stimuli and reply in terms of oral-verbal responses. Time required for the process was less and the data analysis becomes easier. Personal information can be easily obtained. While asking the questions, structured and previously framed questions were asked.

The secondary data is collected through academic pursuit of books, magazines, official websites, and Google. However, reliability, suitability and accuracy of the data must be kept in mind.

Data management

Data management consist of data collection in a systematic and consistent manner, data storage is considered to reconstruct the subject under similar conditions, data protection for its integrity and loss, data retention for a specified time, data analysis in which raw data is chosen evaluated and interpreted into meaningful information. it also includes data sharing and data reporting with others. The data was stored electronically by means of notes, graphs, and pictures.

Data analysis technique

The data is entered and tabulated in Microsoft Office Excel. The Statistical method used for the data analysis was estimation of simple percentage. The results are analysed by using tables and graphs.

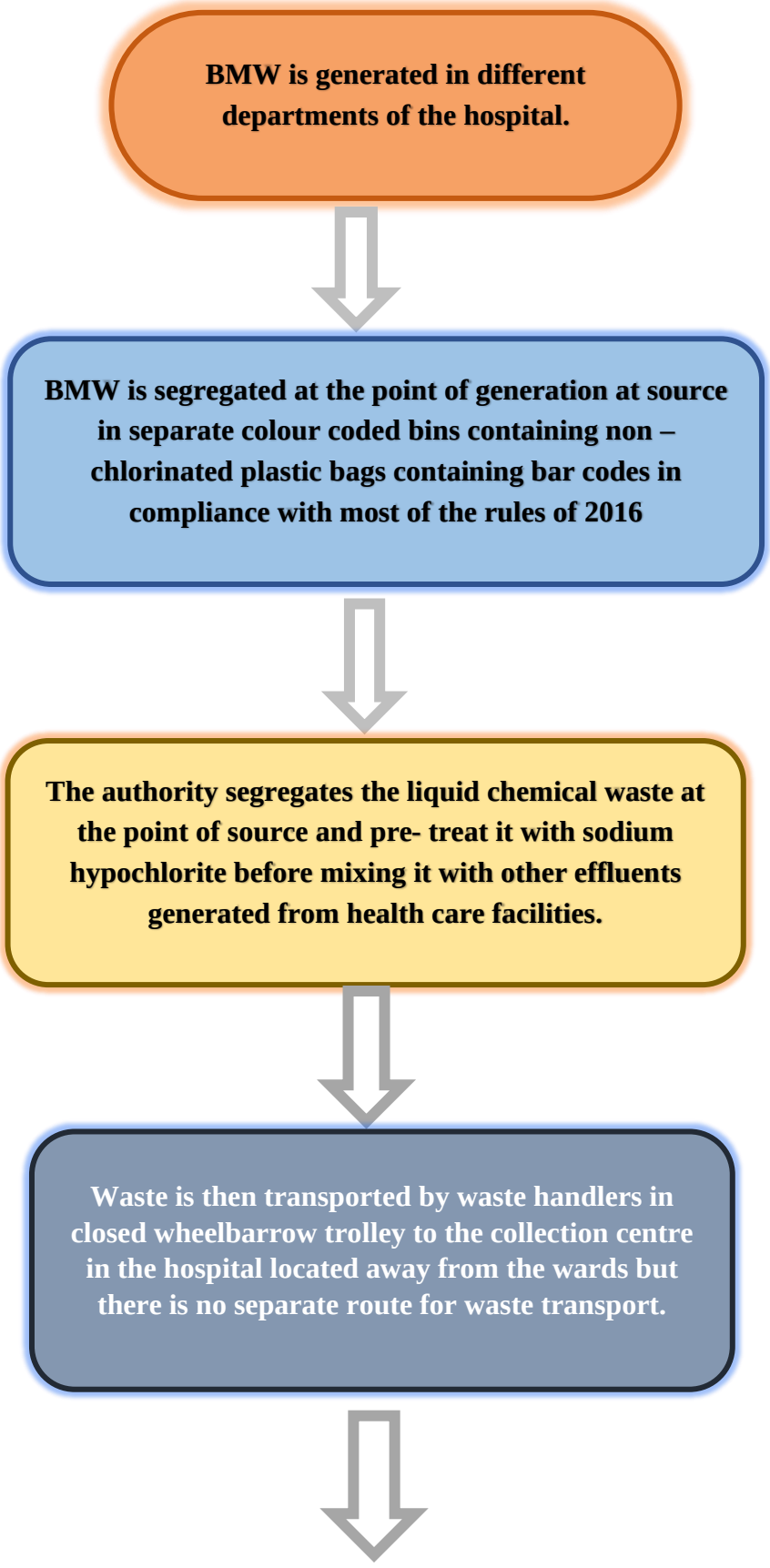
Ethical considerations

The permission for conducting the study was taken from senior medical officer in charge of the hospital. The respondents were explained the purpose of the stud yand verbal consent is obtained from them prior the interview. All the respondents were assured that their confidentiality will be maintained.

GENERAL FINDINGS

CURRENT PROCESS OF BMW MANAGEMENT IN SADBHAVNA MEDICAL AND HEART INSTITUE, PATIALA

Process of waste management in sadbhavna medical and heart institute, Patiala is evaluated by the help of checklist and directly observing the practices followed by the workforce.



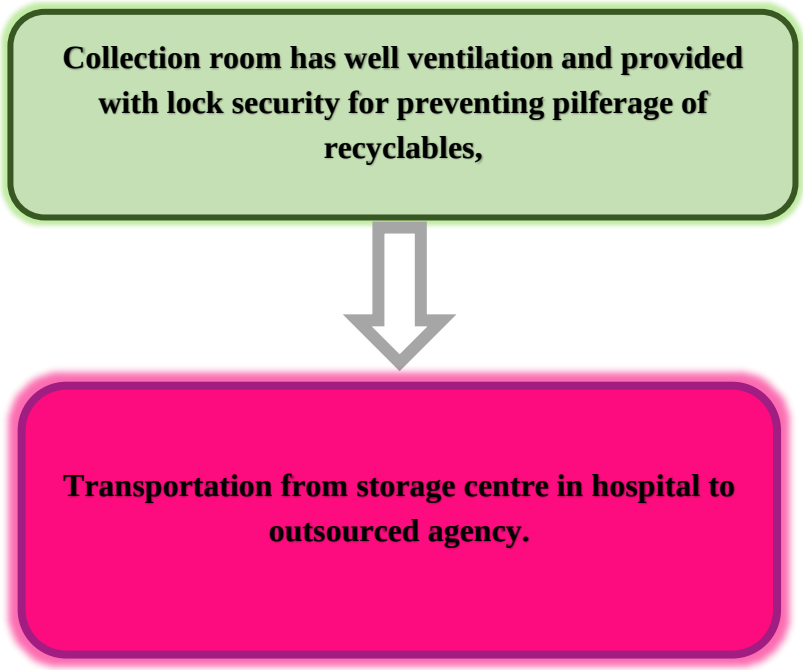


Fig 1: Current Process of BMW Management at Sadbhavna medical and heart institute, Patiala

PROCESS FLOW

- **Segregation**

It was observed that segregation practice was followed satisfactorily. Departments has four colour bins except for few, unavailability of the blue dustbin and the use of cardboard boxes covered by blue tape was observed in many departments.

- **Collection**

Collection was done at 2 times a day from every department by the housekeeping staff. The hospital has trolley system, the housekeeping staff collect the waste in different colour bags and put them in a container and carry the container all the way to the store room.

- **Storage**

The storeroom for the collection of the BMW was situated outside the hospital within its premises, although the room was small, but the waste was kept separately with demarcated area. Although storeroom was not so clean and was not locked every time.

- **Transportation**

There were no such assigned duties of the staff for each department, the staff just carried out the waste according today wise and transport the collected waste to the storeroom. From the storeroom the waste was carried out every day under the guidance of the nodal office of BMW and the nursing in charge.

After the literature review was carried out and the methodology devised, the hospital department visits were conducted. The observation was taken and recorded in questionnaire form and visit findings. certain pictures were also taken to re-emphasize on the observation. The same were then analysed to come out with various findings on the subject study.

Data analysis

The data collected was converted from the questionnaire to bar graphs through micro-soft excel sheets. Certain data was stored and analysed in a tabular form. Also, the environment was captured through camera and pictures were used to emphasize on certain points. The observation during the visit to various department of the hospital were analysed and compared with the existing rules and regulation as per BMW rules. Also, critical aspects of patient safety, staff safety, aesthetic look of the hospital and better management issues were kept in mind. After the detailed analysis of collected information, the same was interpolated to:

- **General findings**
- **Critical findings**

OBSERVATION OF BIOMEDICAL WASTE DISPOSAL AT DIFFERENT PARTS OF HOSPITAL

The following departments were observed in the main generating sites for BMW:

a. Laboratory
b. Wards
c. ICU
d. Operation Theatre
e. OPD

Observations are made on the following points:

- The waste generating source and area
- The segregation technique
- The working technical staff as well as the housekeeping staff in the department.
- The storeroom inside and outside the department
- Condition of dustbins and sharp containers
- Mode of transportation

General observations

Different areas of the hospital are observed for proper biomedical waste management and disposal practices in hospital which are as follows:

❖ **GENERAL WARD**

Types of waste:

- Sharps: needles
- Plastics: syringes
- Human waste: blood, urine, soiled cotton

The department was clean and tidy.

Dustbins are not clean.

Improper waste disposal in yellow and green coloured bins.

Soiled cotton was found thrown in the normal waste bin.

Proper universal precaution is not being used.

The house keeping staff should mandatorily wear PPE while managing biomedical waste.

- **PRIVATE BLOCK**

Improper waste disposal in yellow coloured bin is observed.

- **CCU**

The department was clean and tidy.

There was no spillage of waste outside the dustbin.

Biomedical waste management 2016 guidelines are correctly followed in MICU and CCU.

- **DIALYSIS**

The waste disposal segregation is not properly followed in dialysis.

All the disposals are seen thrown in red.

- **EMERGENCY**

Proper waste disposal is seen in coloured bins of emergency and procedure room

The housekeeping staff and nurses are observed not wearing PPE.

- **OT**

Types of waste in operation theatre are:

Sharps: needles and broken glass

Plastic: syringes, tubing's and cannulas

Human waste: blood, urine, body parts after surgery.

The biomedical waste is collected and removed from the area every 8 to 10 hours.

The waste is not immediately removed after some surgeries.

The dirty utility room was not clean.

The housekeeping staff is not well versed with the special precautions to be taken for maintaining the cleanliness of the OT area.

- **OPD AREA**

Types of waste:

Sharps: needles, broken glass

Plastic: Syringes

Human tissue: blood, pus

Dustbins were clean.

DEPARTMENTS	YELLOW	RED	BLUE	WHITE	GREEN
EMERGENCY	YES	YES	YES	YES	YES
OPD	YES	NO	NO	NO	YES
LABOUR ROOM	YES	YES	YES	YES	YES
MATERNITY WARD	YES	YES	NO	NO	YES
OT	YES	YES	YES	YES	YES
IPD	YES	YES	NO	NO	YES
LABORATORY	YES	YES	NO	NO	YES
WARDS	NO	YES	NO	NO	YES

Table 1.1 (Availability of the BMW dustbins in the department)

RESULTS AND ANALYSIS

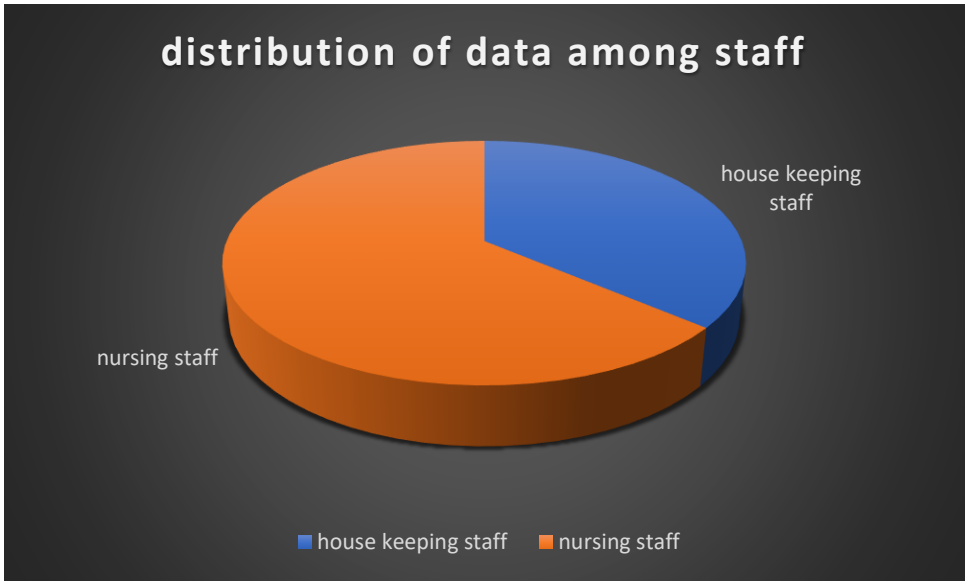
A self-structured questionnaire was developed for nurses, and housekeeping staff.

The questionnaire was developed in the framework to assess the knowledge, awareness, and practices of biomedical waste management and to assess the infection control measures among the hospital staff. The data was collected by interacting with the staff by asking them questions from the questionnaire.

Along with the questionnaire, an observation checklist was also developed, and the practices of bio medical waste management and handling and infection control measures were observed through the checklist.

Data was analysed with the help of Advanced Microsoft Excel Function.

Distribution of study subjects



The above fig represents the distribution of respondents taken for study. Number of nurses, and housekeeping staff participated in study. Only those respondents who consented for participation in study were taken for study.

HOUSEKEEPING STAFF	**25**
NURSING STAFF	**44**

Knowledge and practice analysis among housekeeping staff

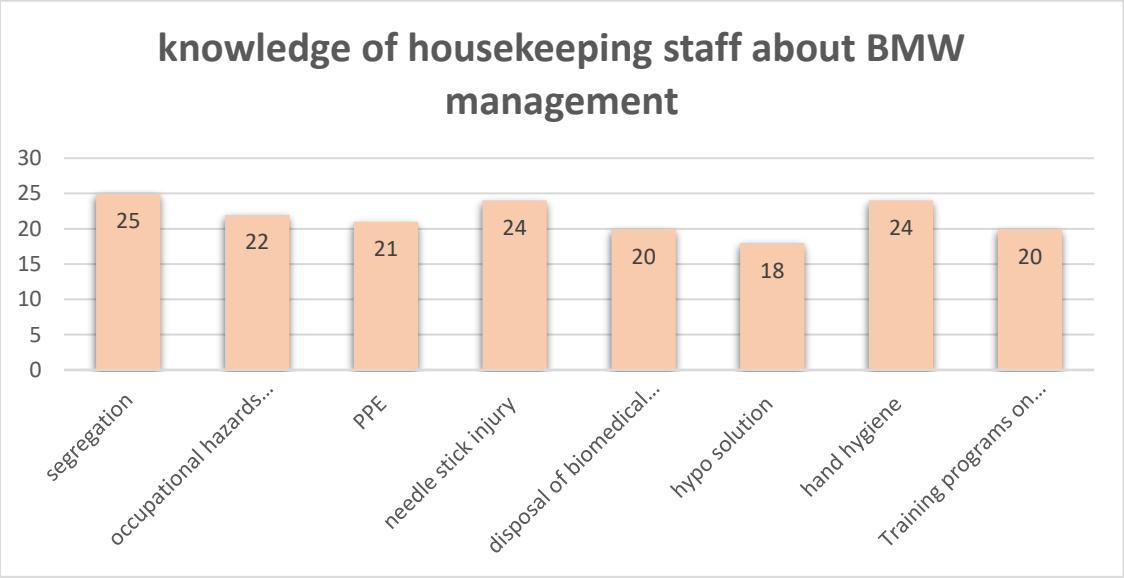


Figure 1: Knowledge among the housekeeping staff

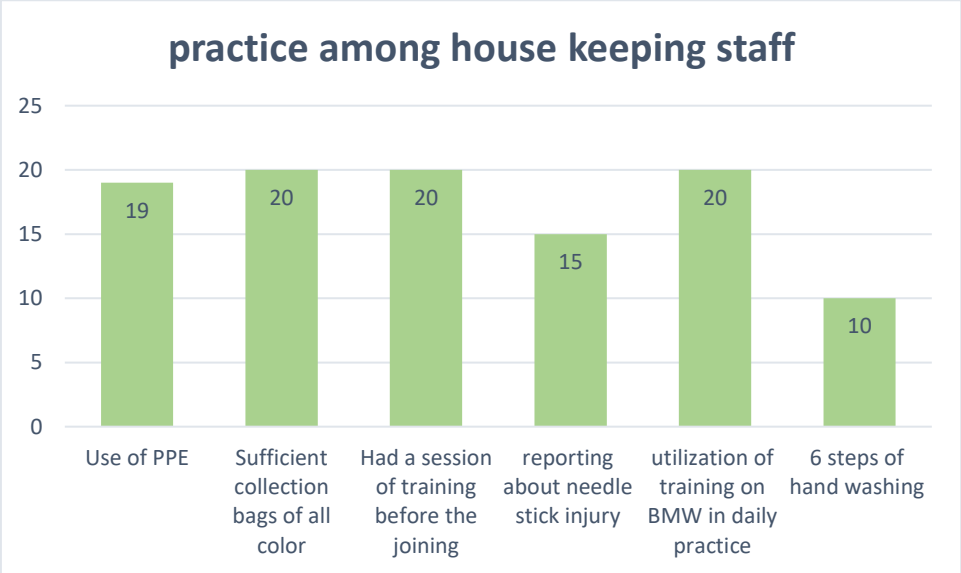


Figure 2: Practice among the housekeeping staff

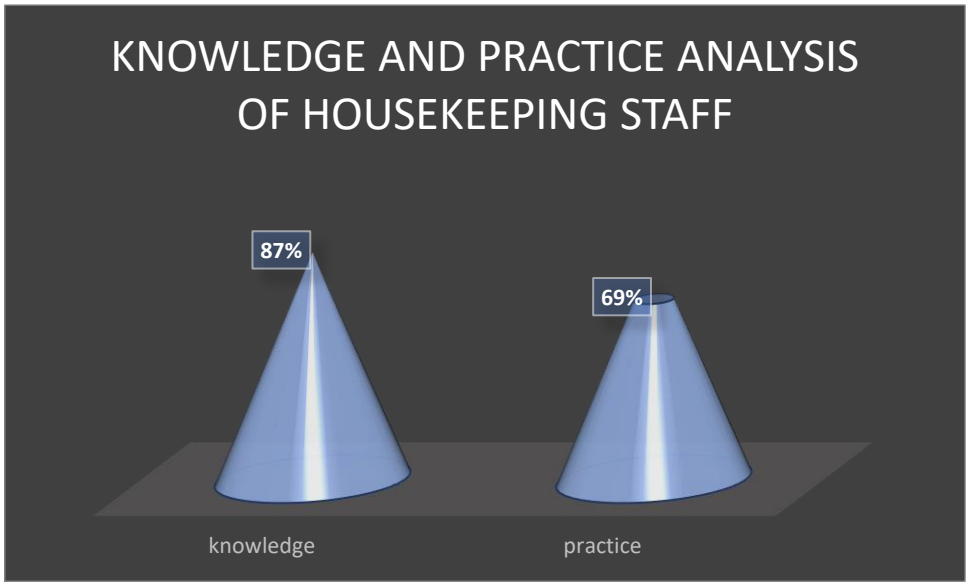


Figure 3: Knowledge & Practice analysis of housekeeping staff

INTERPRETATION

The housekeeping staff score 87% in knowledge which is a good indicator that shows the staff has a good knowledge regarding the bio-medical waste management. But housekeeping staff seemed to have less knowledge regarding the hypo solution (sodium hypochlorite) so proper training is needed regarding this among them.

Somehow, they scoreless in practice just 69% as they were lagging following the proper precautions needed in the BMW management.

The reason for less score in the practice is that the hospital is not providing sufficient PPE to all the staff due to which they have to sacrifice with their protection.

Like sufficient gloves were not provided so they must share them with their colleagues also they do not have proper mask to cover their face.

It was seen that very less housekeeping staff was reporting about the needle stick injury to the higher authorities. This may lead to serious health issues.

Also, it was reported that a lot of housekeeping staff was not following the six hand washing steps in daily basis even after they have knowledge regarding that.

Knowledge and practice analysis among Nursing staff

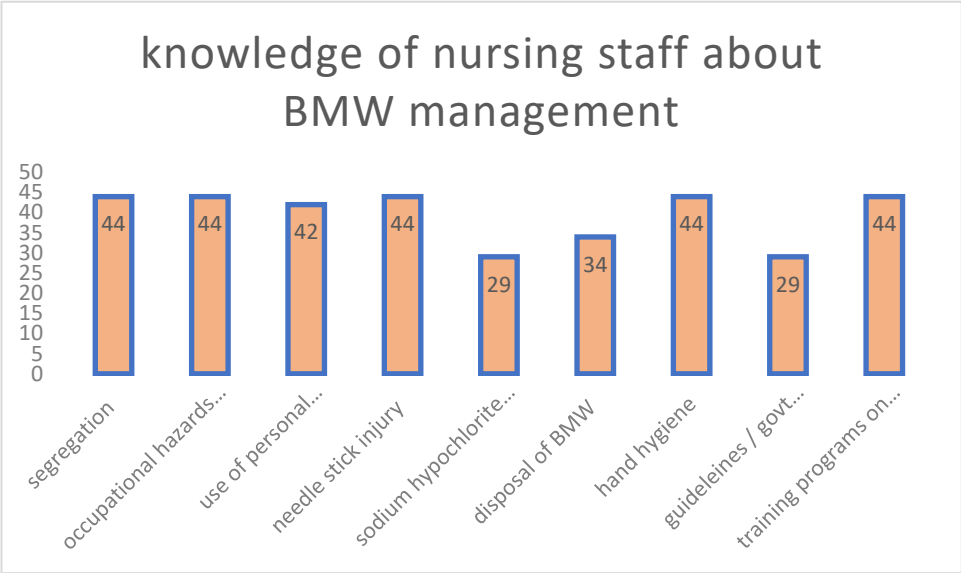


Figure 4: Knowledge among the nursing staff

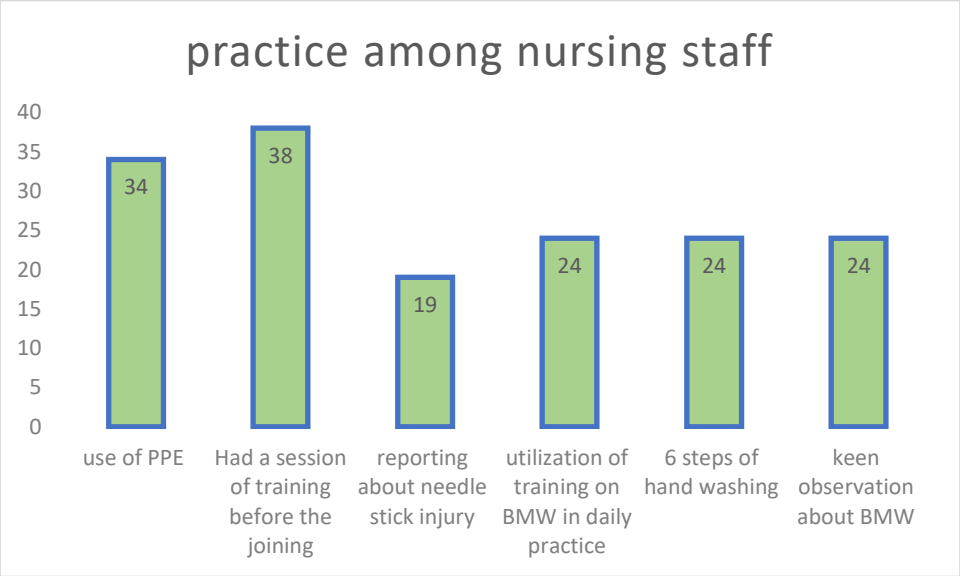


Figure 5: Practice among the nursing staff

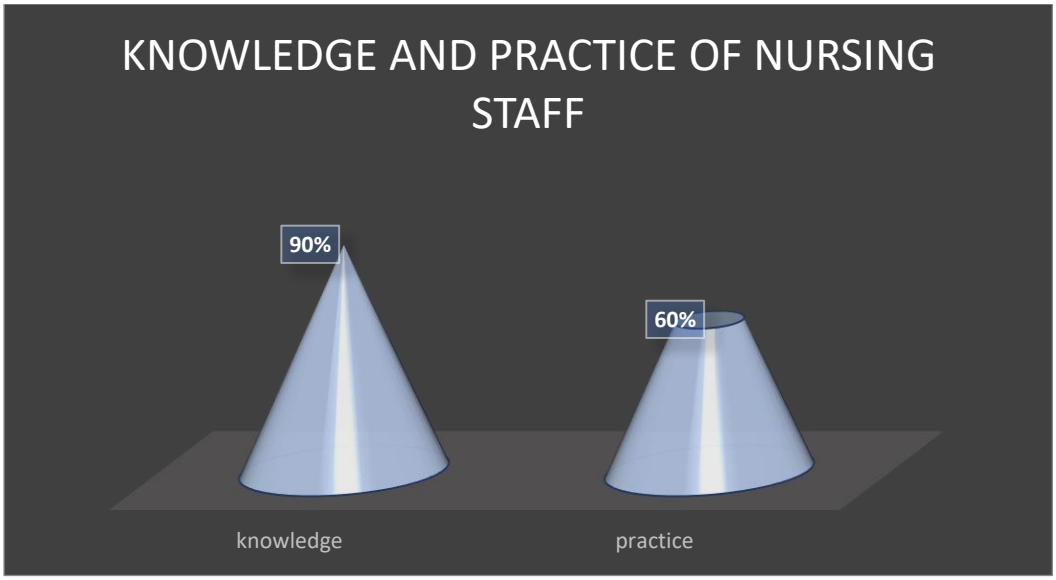


Figure 6: Knowledge & Practice analysis of the nursing staff

INTERPRETATION

The nursing staff score 90% in knowledge as they were much more aware than the housekeeping staff. But they need to have more knowledge regarding the hypo solution and should be more aware regarding the government guidelines of biomedical waste management.

But they score 60% in practice which is lower in comparison with the housekeeping staff.

The reason is that many departments do not have needle discarder and they were using plastic boxes to discard the needles. Even the staff not seemed to report about needle stick injury to higher in charge.

Some of the nursing staff seemed not to do their job seriously by not attending the seminars properly and even by not observing the biomedical waste management keenly.

Also due to not proper BMW management team the nurses were not aware about the general knowledge about the waste collection as only the nursing in-charge is involved in maintaining the registers.

Knowledge of needle stick injury among hospital staff

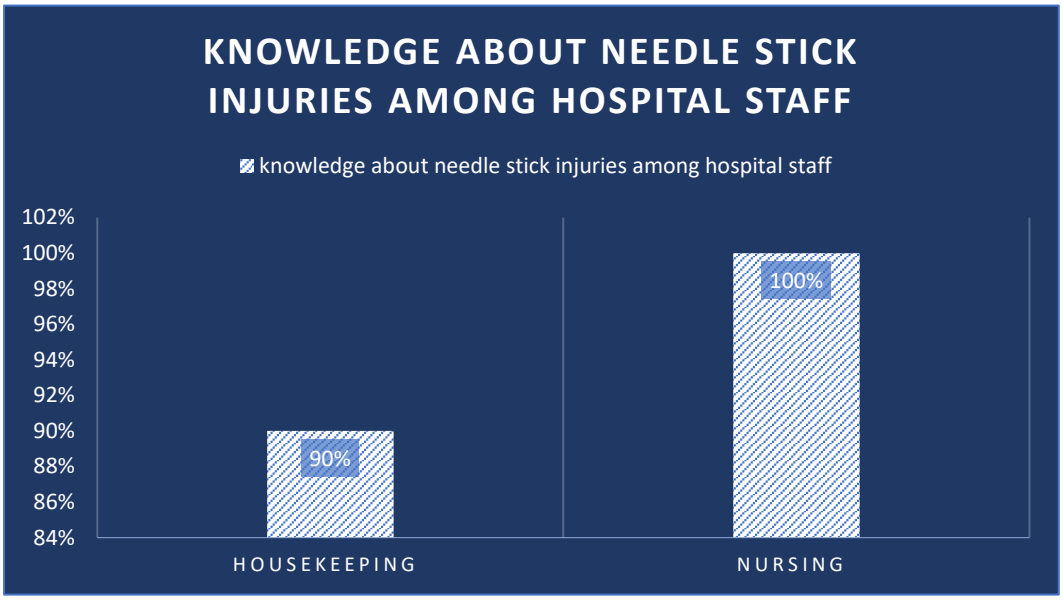


Fig 7: Knowledge about needle stick injury among hospital staff

INTERPRETATION

After the analysis of the data collected through questionnaire, the results showed 100% of nursing staff and 90% of housekeeping staff had proper level of knowledge on needle stick injuries.

Knowledge and practice analysis of PPE kit among hospital staff

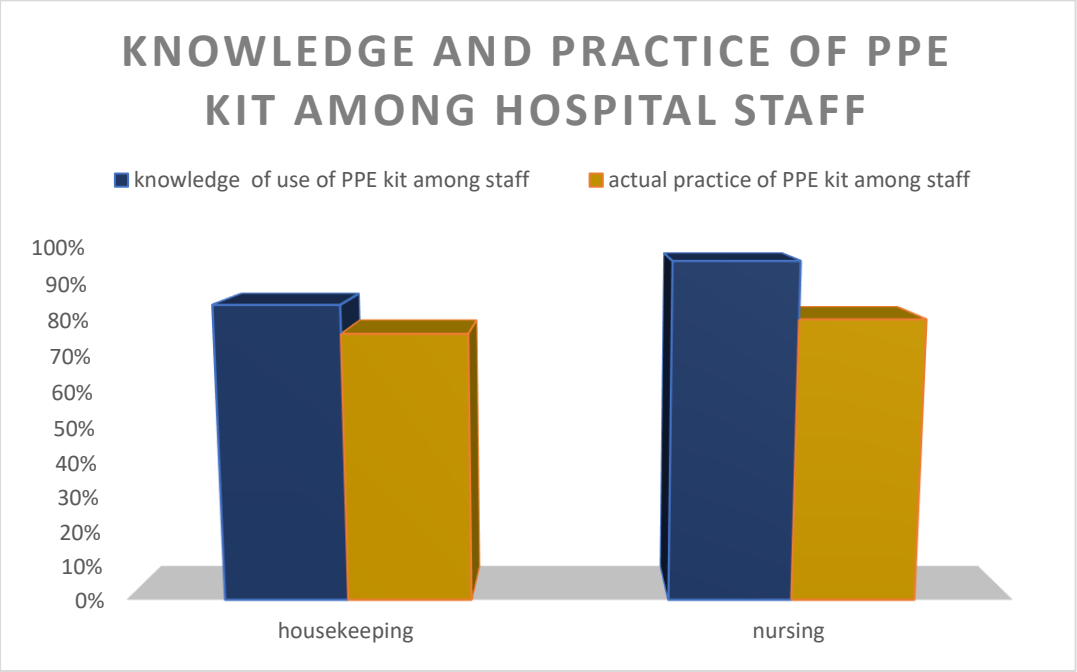


Fig 8: Knowledge and practice of PPE kit among hospital staff

INTERPRETATION

After collecting the data, the results showed-

When the staffs were asked that is personal protective equipment important to be used, 96% of staff nurses, answered it as yes and 84% of housekeeping staff/ sanitary staff answered it as yes.

But on observation for the use of personal protective equipment the result was as follows 80% of nurses, and 76% of housekeeping were actually using the personal protective equipment.

Knowledge and practice of 6 steps of hand washing among hospital staff

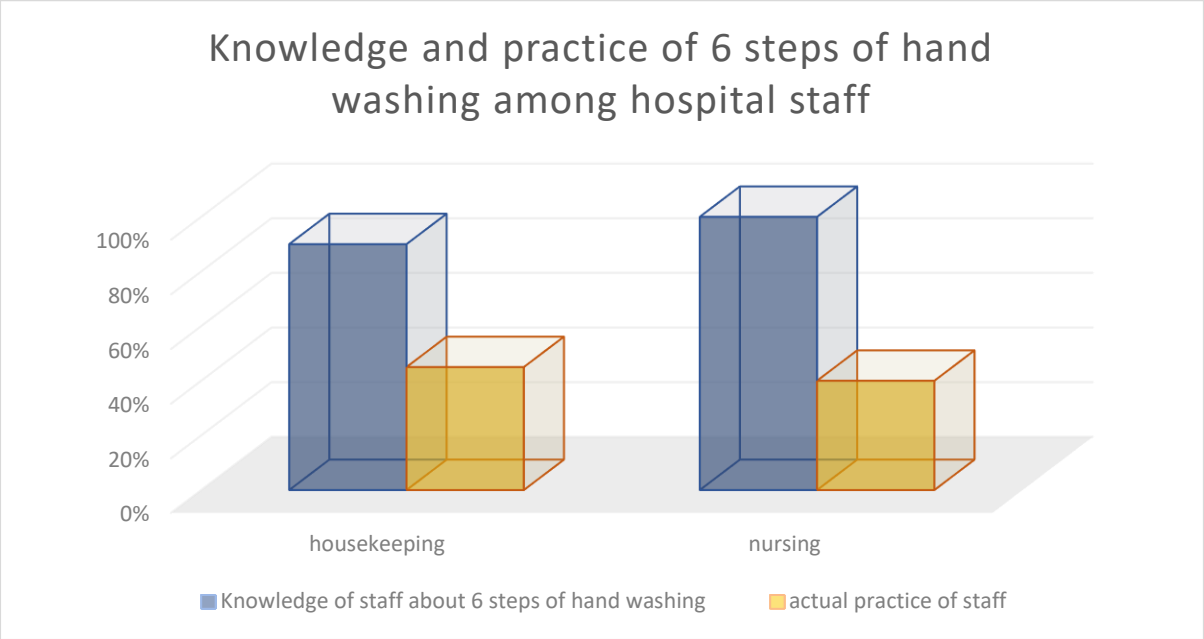


Fig 9: Knowledge and practice of 6 steps of hand washing among hospital staff

INTERPRETATION

When the staff was asked that do you follow five moments of hand washing 100% of staff nurses and 90% of housekeeping staff answered yes.

But on observation,

40% of Staff nurses, and 45% of housekeeping/sanitary staff were actually following it.

Knowledge about handling and disposal of COVID 19 waste

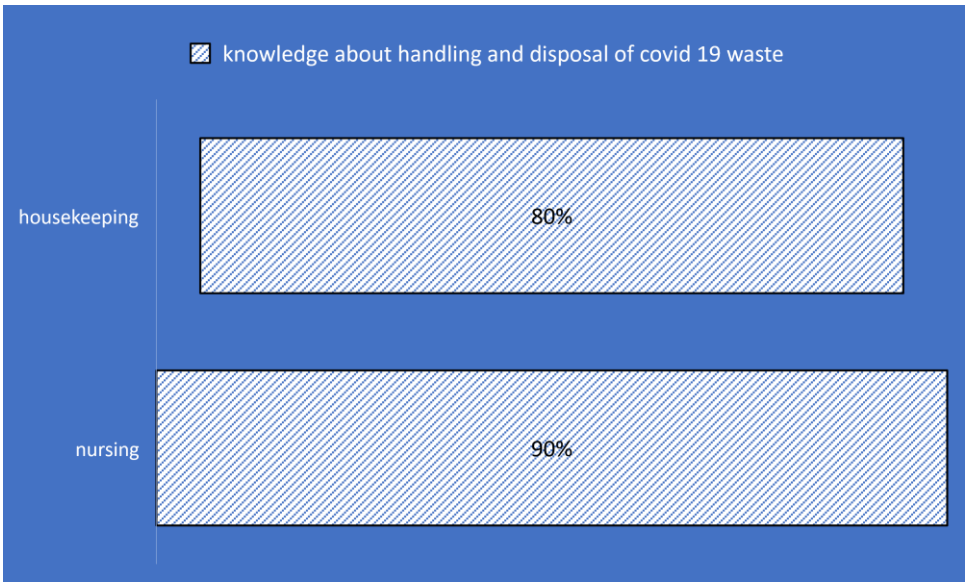


Fig 10: Knowledge about handling and disposal of COVID 19 waste

INTERPRETATION

After the analysis of the data collected through questionnaire, the results showed 90% of nursing staff and 80% of housekeeping staff had proper level of knowledge about handling and disposal of covid 19 waste.

Knowledge of Biomedical waste management among hospital staff

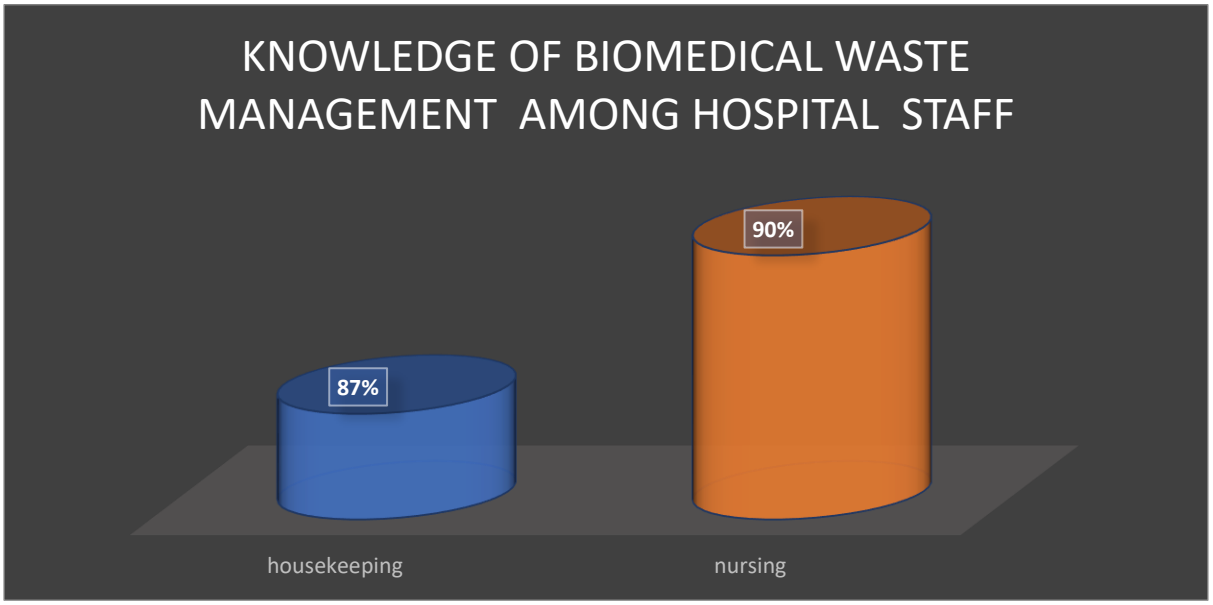


Fig 11: Knowledge of Biomedical waste management among hospital staff

INTERPRETATION

On observing the collected data and the above graphical representation, it is interpreted that nursing staff is having 90% knowledge regarding biomedical waste management whereas housekeeping staff is having 87% knowledge about biomedical waste management. This shows that nursing staff is having more knowledge about biomedical waste management than housekeeping staff.

Practice analysis of Biomedical waste management among hospital staff

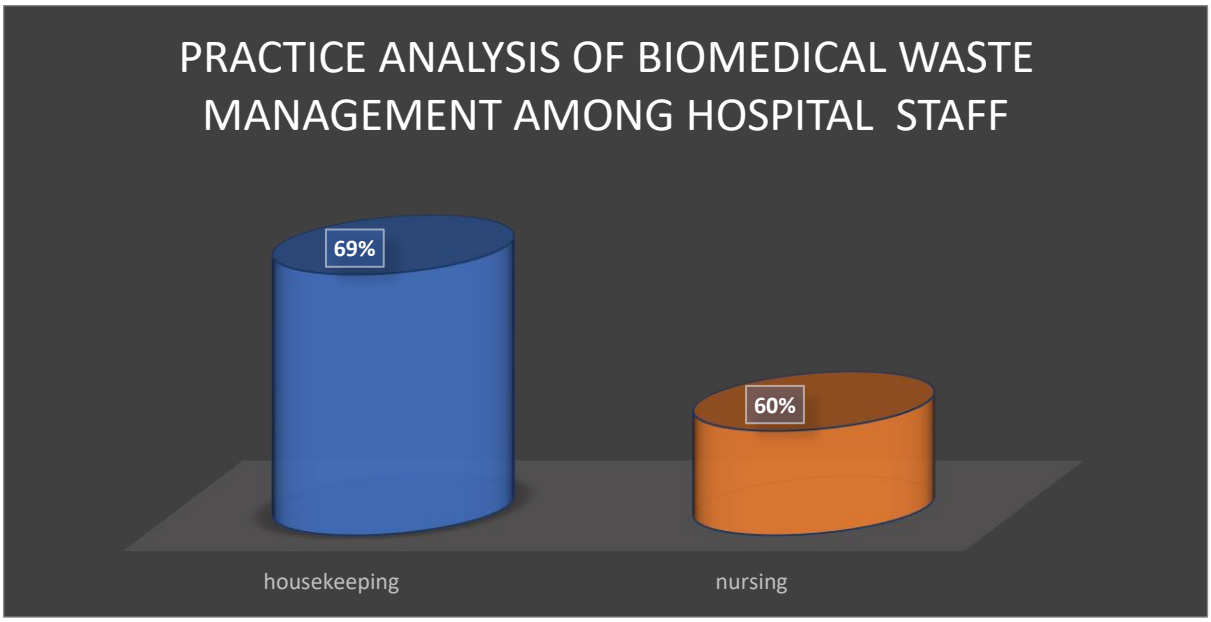


Fig 12 : Practice analysis of Biomedical waste management among hospital staff

INTERPRETATION

On observing the collected data and the above graphical representation, it is interpreted that nursing staff score 60% in practice regarding biomedical waste management whereas housekeeping staff score 69% in practice about biomedical waste management. This shows that housekeeping staff is more actively and seriously practice biomedical waste management process than nursing staff.

DISCUSSION

A cross sectional hospital-based study was conducted among Nursing staff and housekeeping/Sanitary staff.

All the participants have heard about Bio medical waste management and infection control measures.

About 90% nursing staff and 87% of housekeeping had proper knowledge and awareness about Bio medical waste management.

About 100% of nursing staff, 90% of housekeeping had proper knowledge of needle stick injuries.

On observation major gaps observed by comparison with the assessment of current practices of bio medical waste management were,

The HCF is cutting/shredding syringes to stop its reuse with needle shredder, however in one of the wards it was observed that the needle shredder provided was unable to cut needles.

The hospital has not adopted practice of cutting of gloves and glucose bottle before disposing in the color-coded bin

The hospital has not provided arrangement for the treatment of liquid waste generated from operation theatre, labour room, dialysis section and laboratory. The entire quantity of liquid waste is being discharged into the sewer without any treatment imparted to it.

RECOMMENDATION

Basic knowledge about BMW management should be communicated to all staff using training programmes.

Training should be given regarding:

- Training regarding color coding, only 43% of the housekeeping staff were aware about the biomedical waste management.
- Training regarding the storage time duration
- Training regarding proper PPE protocols by the management.
- Training and imparting knowledge about the usage of puncture proof containers

Special training regarding importance of segregation of waste at the source is important.

A protocol should be set for the proper recording of the needle stick injury and improve its reporting on the staff behalf.

There is a need of strict implementation of guidelines of biomedical waste management and regular supervision and monitoring by a separate committee, exclusively formed for the implementation of rules related to the safe management and handling of hospital waste.

Proper blue bins should be made available according to the biomedical waste management guidelines 2016.

There should be a strict policy for the correct waste disposal in general ward, sharing rooms and cubicles. Floor supervisors should be made available on each floor for checking the waste disposal practice.

SPECIFIC SUGGESTIONS:

- **Regarding staff:**

a) The housekeeping staff must be regularly rotating so that everyone must be well acquainted with all the aspects of job.
b) Regular small test of 10 to 15 min duration should be conducted by the housekeeping supervisor.
c) The usage of personal protective equipment must be made mandatory among all the hospital staff.
d) And also awareness program should be conducted for all the staffs including doctors nurses and lab technician so that they should get updated with the waste handling rules.

- **Regarding Dustbins and Poly bags:**

a) The sharp containers must contain the sodium hypochlorite solution.
b) Stickers should be made available on each of the color bags with the name of the housekeeping staff shift wise with the ward number and the shift number.
c) Stickers with instructions in local language should be made available so as it becomes easy for the housekeeping staff to understand.
d) A day before only the inventory should be checked for the stock outs so that it is made available the very next day.

- **Regarding the garbage area**:

a) Good quality of disinfectant should be provided in the dirty utility rooms.
b) Plastic aprons must be provided to the boys who are entering the garbage area
c) It must be ensured that the containers are dry from outside.

There is a need for intensive training programs at regular time interval to repeatedly train and re-train all the staff with special importance to the newcomers and to periodically acquaint them with updated BMW management.

CONCLUSION

The process of BMW management in Sadbhavna Medical and heart institute, Patiala follows majority of rules as per new amended rules of BMW Management rule 2016.

Nearly about all the participants have heard about Bio medical waste management and infection control measures. But there is lack of proper and complete knowledge about bio medical waste management practices.

Proper segregation practices are done in colour coded bins containing non chlorinated bags with bar codes on it.

With regards to knowledge about the segregation, legislation, storage of waste andoverall basic rules of BMW 2016, it was found that nurses had the good knowledge and awareness as compared to other sanitary staff.

Regarding practices related to BMW management, housekeeping staff were more actively participating than nursing staff but found ignorant on many counts especially in regard to needle stick injuries.

Also, injury reporting was low across the housekeeping staff

After the assessment of infection control practices, it was analysed that nurses and other health professionals were aware of all the infection control measures but on observation a smaller number of staff were actually practising them.

On comparing the Observation checklist and assessment of practices, it was analysed that the gloves and glucose bottles were not being cut before disposal.

In order to improve the efficiency of BMW management process strict implementation of rules should be required.

Periodic monitoring and evaluation of BMW management practices followed by workforce in department need to be checked by thehospital administration for ensuring safe hospital environment.

There is need that each person involved with generating and managing BMW should be accountablefor any violation done from the correct rule and zero tolerance policy should be followed against any violation found by the hospital administration during daily rounds of the departments.

For effective management of BMW conscious, coordinated and cooperative efforts are required between nurses and sanitary staff.

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ANNEXURE 1

Questionnaire for project report

- **Name**
- **Your position in hospital**

- Nurse staff
- Housekeeping staff

- **Knowledge of biomedical waste management among nurses**

1.Which disease can be transmitted by improper handling of biomedical waste?

- HIV and AIDS
- Jaundice
- Hep. B
- Others

2. Do you know about the colour coding segregation of Bio medical waste?

- Yes
- No
- Not sure

3. Do you follow color-coding for BMW?

- Yes
- No
- sometimes

4. Are you aware about the guidelines provided by the biomedical waste management and handling rules 2016

- Yes
- No
- Not sure

5. According to biomedical waste rule, waste should be stored beyond

- 12 hours
- 48hours
- 72 hours
- 96 hours

6. Who regulate the safe transport of medical waste

- Pollution control board of India
- Transport corporation of India
- Administration

7. Needles, syringes with fixed needles, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts should be disposed off in which colour code bin ?

- Red
- Green
- Yellow
- Blue

8. Gloves even the solid ones to be disposed off in which colour code bin?

- Red
- Green
- Yellow
- Blue

9. Do you know what sodium hypochlorite is and when it is used?

- Yes
- No

10. The approximate proportion of infectious waste among total waste generated from hospital is

- 10-20%
- 30-40%
- 50-60%
- 80-90%

11.Do you know the treatment options / disposal options for discarded or expired medicines?

- Yes
- No
- Not sure

12. The colour code of BMW to be autoclaved and disinfected is?

- Red
- Yellow
- Blue
- White

Knowledge of BMW management among housekeeping staff

1.Do you think its important to wear protective gears (gloves, masks , gum boots) while handling biomedical waste management

- Yes
- No

2.Are you aware of diseases or hazards that can occur by improper handling of biomedical waste?

- Yes
- No

3. Syringes without needles should be disposed off into which colour bag?

- Red
- Blue
- Yellow
- Green

4. needles and syringes with fixed needles should be disposed off into which colour coded bag/container?

- Red
- Blue
- Yellow
- Green

5. Items contained with blood should be disposed off into which colour coded bag

- Red
- Blue
- Yellow
- Green

6.what is the collection method from the point of generation

7. how is the waste carried from the point of generation to the final disposal site ?

8. Are you aware to who to report on getting a needle stick injury and what measures to adopt immediately on getting the injury?

- Yes
- No
- Not sure

9.Waste should be stored to the final disposal site for more than how many hours ?

- 12 hours
- 48 hours
- 72 hours
- 96 hours

Level of knowledge among nurses and housekeeping staff on needle stick injuries

1.is needle stick injury a matter of concern ?

- Yes
- No
- Do not know

2. do you recap the used needle ?

- Yes
- No
- Do not bother

3. do you discard the used needle immediately ?

- Yes
- No
- Have not noticed

4. are you aware of needle stick injury ?

- Yes
- No

5. how did the most recent incident occurred ?

- Poor disposal of needle
- Individual carelessness / acid
- Cannot remember
- Other (specify)

6.to who did you report the injury

- Line manger
- Occupational health
- Infection control
- Nobody
- Cannot remember
- Other (specify)

Knowledge of infection control practices among nurses and housekeeping staff

1.Do you feel it is important to use personal protective equipment's

- Yes
- No
- Not sure

2.do you follow five moments of hand washing

- Yes
- No

3. you follow six steps of hand washing

- Yes
- No

4. do you feel its important to use fresh gloves before each new patient procedure

- Yes
- No

5. do you know the correct method of wearing gloves

- Yes
- No

- **Assessment of practice of biomedical waste management among nursing staff and house keeping staff**

1.Are you following the colour coding of BMW management

- Yes
- No

2. are you using PPE kits

- Yes
- No

3. are you using sufficient collection bags for all colours

- Yes
- No

4. for enhancement and up gradation of your knowledge about biomedical wate management , would you like to attend any voluntary programmes/ training ?

- Yes
- No

5. do you think its important to report needle stick injuries and sharp injuries

- Yes
- No
- Do not know

6. do you think you have adequate knowledge regarding bio medical waste management

- Yes
- No
- Not sure

7. do you think you require more trainings regarding proper management of BMW management

- Yes
- No
- Never thought

8. do you think that liquid waste should be pre treated with sodium hypochlorite solution

- Yes
- No
- Do not know

ANNEXURE 2

CHECKLIST

NURSING STAFF		
Sl. No	(A) KNOWLEDGE QUESTIONS	Response- Yes/No
1	Segregation	
2	Occupational hazards related to the BMW	
3	Ppe	
4	Needle stick injury	
5	Hand hygiene	
6	Chlorine percentage	
7	Disposal of the BMW	
8	Use of personal protective equipment	
9	Training programs on BMW	

Sl. No	(B) PRACTICE QUESTIONS	Response- Yes/No
1	Of Proper PPE	
2	Immunization against vaccine	
3	Reporting of needle stick injury	
4	Keen observation about the BMW	

HOUSEKEEPING STAFF		
Sl. No	(A) KNOWLEDGE QUESTIONS	Response- Yes/No
1	Segregation	
2	Occupational hazards related to the BMW	
3	PPE	
4	Needle stick injury	
5	Hand hygiene	
6	Chlorine percentage	
7	Disposal of the BMW	
8	Use of personal protective equipment	
9	Training programs on BMW	

Sl. No	(B) PRACTICE QUESTIONS	Response- Yes/No
1	Use of PPE	
2	Sufficient collection bags of all color	
3	Had a session of training before the joining	
4	Training on BMW	
5	Immunization against vaccine	


Thank You !