CHAPTER I

INTRODUCTION

It is rightly said that “cleanliness is next to godliness” proper biomedical waste management is the mainstay of hospital cleanliness, its hygiene and maintenance activities. Biomedical waste is extremely hazardous type of waste which poses serious health hazards.

To meet the needs of expanding population, the last century witnessed rapid mushrooming of healthcare establishments in both government and in private sector. With the advent, acceptance and increasing demand of “disposable items”, the present hospitals generate healthcare wastes in substantial amount. The absence of proper waste management, lack of awareness about the associated health hazards, human resources, insufficient financial and poor control of waste disposal are the main contentious issues connected with health care waste.¹

Inadequate, inappropriate and improper waste management leads to foul odor, environmental pollution, multiplication of disease carrying organisms like insects, rodents and worms and hence the transmission of diseases like typhoid, cholera, hepatitis A, B, C and AIDS through contact with infected waste and in particular through accidental injuries from used sharps. Owing to unsafe healthcare practices, half a million people all over the world die every year due to infections like hepatitis B, and C, HIV and hepatocellular carcinoma. Apart from these health risks, inappropriate management of healthcare wastes also has a negative impact on environment by adding toxic pollutants to water, air and soil. This environmental pollution can potentially damage our flora, fauna and the ecosystem. As per WHO statement 85% of hospital wastes are non hazardous while 10-15% is infectious.²
In India, the estimated figure of waste generation is 0.5-2.0 kg/bed/day and out of this, 10 to 15 percent is found to be biomedical waste. India generates the highest amount of BMW in the world and is about 0.33 million tons per year.\textsuperscript{3}

According to rules of biomedical waste (Management and Handling) 1998, it is any type of waste generated during the diagnosis treatment or immunization of human, animals or in research activities. The notification again specifies that the biomedical waste management is an integral part of maintenance of hospital hygiene and activities, so the attitude of health care workers is to be incorporated by good practices.\textsuperscript{4}

According to Medical Waste Tracking Act of 1988 medical waste is defined as "any waste that is generated as the result of diagnostic procedures, treatment, or immunization of human beings or veterinary, in research pertaining to, or for the production or testing of biologicals."\textsuperscript{5}

Adequate hospital waste management has become an important worldwide need today the long term effects of poor management is a humanitarian concern for public environment and health workers. So we have to sensitize ourselves and the personnel responsible for this issue in the interest of community.

The purposes of BMW management are prevention of transmission of diseases from patient to patient, patient to health worker and vice versa. Injury to the health workers and workers in support services can also result from improper waste management.

Apart from fear of health hazards the general public is very sensitive by the visual impact of body organs which are recognizable including fetus. It is unacceptable to dispose of these anatomical wastes inappropriately through landfill which is visible to public or approachable to stray animals. It is the moral duty of health care workers for preventing these types of practices.
The pathogens or their spores which enter and remain suspended in the air inside the health care facilities for prolonged periods can result in nosocomial infections or occupational hazards. This can put the health workers, patients and their attendants at risk of contracting air borne infections. When untreated waste is transported outside the health care facility or dumped openly pathogens can contaminate drinking water food stuff, soil etc. Improper disposal of BMW in low-lying areas can contaminate water bodies and lead to severe water pollution through biological chemicals or radioactive substances.

As far as possible health care establishment should encourage purchase of reusable items made of glass and metal. Procedure and policies for proper management of waste generated should be adopted. Meticulous segregation should be followed. The amount of waste generated at the source can be minimized through product substitution and good operating practices. Physical cleaning methods should be followed instead of chemical disinfection.

It is mandatory to train the nursing and housekeeping staff in the methods of proper segregation of waste. They must be educated about the different categories of waste and its management so that they may be able to distinguish between infectious and non-infectious waste and proper management of BMW can be practiced.

1.1 Background of the Study

Hospitals and other health care institutions are one of the essential commodities of daily life. They generate “wastes” day in and day out which may be the potential health hazards to health workers. Shockingly, hospitals claim to dispose off their wastes as per the stipulated norms, but most of the infectious waste including needles, syringes, catheters, etc. are being recycled only to find its way back into the market. Waste requiring special attention includes, those that are potentially infectious sharps e.g. needle, scalpels, other subjects capable of puncturing the skin, plastic waste establishments, pharmaceutical waste and various other chemically hazardous waste used in laboratories.
One research study conducted in Delhi on ‘Prevalence and Response to Needle Stick Injuries among Health Care Workers in a Tertiary Care Hospital’ revealed that a large percentage (79.5%) of HCWs reported having had one or more NSIs during practice. The average number of NSIs among HCW was found to be 3.85 per HCW ranging from 0-20. Avoidable practices like recapping needles contributed to the injuries. An important finding was that a majority of the injuries occurred during handling between use and its disposal rather than during use. While 60.9% washed the site of injury with water and soap, while 14.8% did nothing following even recent NSIs as an issue of distress and were not following injury reporting.7

India is the highest generator of waste and is estimated to be 1.5-2 kg/day/bed and out of which 10-15% is found to be bio-medical waste. In the state of Rajasthan, as per local and regional level studies it is presumed that most hospital generates 1-2 kg/bed/day and is about 40 tons per day. BMW disposal in Indian hospitals has become a burning issue of increasing concern prompting the hospital authorities to adopt the new ways of safe scientific and cost effective management of the same.8

The health risk associated with hospital waste is due to infectious agents, toxic chemicals, sharps which renders highly infectious cytotoxic and radioactive. Each year a total of 1200 million infection i.e. 8-10 million Hep B, 2.3 – 4.7 million Hep C and 80,000 to 1, 60, 000 HIV infection are resulting from reuse of syringes and needles without sterilization.

Categories of waste

Waste refers to any unwanted or discarded material which has no future use which is leaked, spilled, pored or emitted which has been emptied or dumped in to land, air or water.
As per WHO classification for developing countries the BMW is classified as

- General waste
- Infected waste
- Sharps
- Chemical and Pharmaceuticals wastes
- Other hazardous waste-cytotoxic and radio active

**Categories of BMW Waste**

BMW rules substituted by Rule 9(1) of the biomedical waste (M&H) (second amendment) rules 2000 notified vide SO 545(E) dated 2-6-2000, the categories of biomedical waste is classified as follows

**SCHEDULE-1**

<table>
<thead>
<tr>
<th>Waste</th>
<th>Waste Class</th>
<th>Waste description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat 1</td>
<td>Human anatomical waste, blood and body fluids</td>
<td>Waste consisting of human tissues, organs, body parts, body fluids, blood and blood products and items saturated or dripping with blood and body fluids contaminated with, blood and body fluids removed,</td>
</tr>
<tr>
<td>Cat 2</td>
<td>Animal Wastes</td>
<td>Waste consisting of animal tissue, organs, body parts, carcasses, bleeding fluids, blood and blood products, items contaminated with blood and body fluids, wastes from surgery, treatment and autopsy and waste of experimental animals used in research. Waste generated by veterinary hospitals, colleges and animal houses.</td>
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<tr>
<td>Cat 3</td>
<td>Microbiology and biotechnology wastes</td>
<td>Wastes from laboratory cultures, stocks or Specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial lab, waste from production of biological, dishes and devices used for transfer of cultures.</td>
</tr>
<tr>
<td>Cat 4</td>
<td>Waste sharps</td>
<td>Wastes consisting of sharps such as needles, syringes, scalpels, blades, glass etc. that are capable of causing puncture and cuts. These include both used and unused sharps.</td>
</tr>
<tr>
<td>Cat 5</td>
<td>Discarded medicines &amp; cytotoxic drugs</td>
<td>Wastes comprising of outdated, contaminated and discarded medicines.</td>
</tr>
<tr>
<td>Cat 6</td>
<td>Solid waste</td>
<td>Items contaminated with blood and body fluids including cotton dressing, soiled plaster casts, linen beddings, other materials contaminated with blood.</td>
</tr>
<tr>
<td>Cat 7</td>
<td>Solid waste</td>
<td>Wastes generated from disposable items other than the waste sharps such as tubings catheters, intravenous sets etc.</td>
</tr>
<tr>
<td>Cat 8</td>
<td>Liquid wastes</td>
<td>Waste generated from laboratory waste, cleaning house keeping and disinfecting activities.</td>
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</tr>
<tr>
<td>Cat 9</td>
<td>Incineration ash</td>
<td>Ash from incineration of any biomedical wastes.</td>
</tr>
<tr>
<td>Cat 10</td>
<td>Chemical waste</td>
<td>Chemicals used in production of biologicals.</td>
</tr>
</tbody>
</table>

**Sources of health care waste**

Health care facilities produce waste which differ in quantity and type which poses threat to human life. The sources of health care waste can be classified as major or minor according to the quantities produced.

(a) The major sources of biomedical waste

- Hospitals
- Obstetric & maternity clinic
- Outpatient clinic
- Dialysis center
- Laboratory and research centers
- Pharmaceutical Companies
- Mortuary and autopsy centers
- Animal research and testing.
- Blood banks and blood collection services
- Nursing homes

(b) The minor sources of health care wastes are
Small health care establishments like,

- Physician's office
- Dental clinics
- Acupuncturist

Special health care establishments like,

- Convalescent nursing homes
- Psychiatric hospitals
- Disabled persons institution
- Funeral services
- Ambulance services
- Home treatment

**Personnel at risk**

The exposure of hazardous health care waste can result into infection, physical injuries, chemical toxicity, radio-active hazards, genotoxic effects and public sensitivity. Every individual who is working in a health care facility is exposed to hazardous waste is potentiality at risk. The statistics about health care workers who acquired HIV/AIDS at work during 1981-2002 is shown as below.
Figure 2. Statistics about HCW who acquired HIV/AIDS at work

All individuals exposed to hazardous health care waste are potentially at risk, including those within health care establishments that generate hazardous waste and those outside these sources who either handle such waste or are exposed to it as a consequence of careless management. The main groups at risk are the following -

- Doctors, nurses, health care auxiliaries and hospital maintenance personnel.
- Patients in health care establishments or receiving home care.
- Visitors to health care establishments
- Workers in health care services allied to health care establishment’s laundries, waste handling and transport.
- Workers in waste disposal facilities, including scavengers.

**Health hazards from infectious waste:**

Infectious waste contains many varieties of pathogenic microorganisms. Pathogens in the infectious waste many enter the human body by a number of routes.

- Puncture abrasion or cut in the skin
- Mucous membrane
- By inhalation
- By ingestion

Sharps may not only cause cuts also result in infection of the wounds when it is contaminated with pathogens. Because of this double risk of injury and disease transmission, sharps are considered as a very hazardous waste class. The principal concern is infection through subcutaneous transmission causing introduction of disease causing agents eg. Viral blood infection. Hypodermic needles constitute an important part of the sharp waste category and are particularly hazardous because they are often contaminated with human blood.

**Hazards from chemical and pharmaceutical waste:**

Chemical waste consists of liquid and gaseous chemicals discarded solids generated from diagnostic and experimental procedure like dishing cleaning & housekeeping. Many of the chemicals and pharmaceuticals used in the health care set up are hazardous. They may cause intoxication either by acute or chronic exposures, injuries including burns. Intoxications can result from absorption of chemicals and pharmaceuticals through the skin or mucous membrane, or from inhalation or ingestion.

**Hazards from genotoxic waste:**

The exposure to genotoxic substances in health care may also occur during the preparation of treatment with particular drugs or chemicals. The main pathway for exposure is inhalation of dust or aerosols, absorption through skin or ingestion of food accidentally contaminated with cytotoxic drugs. Cytotoxicity of many drugs is cell cycle specific targeted on specific intracellular processes such as DNA synthesis and mitosis. Experimental studies have shown that many anti neoplastic drugs are
carcinogenic and mutagenic, secondary neoplasia is considered to be linked with some type of chemotherapy.

**Types of BMW wastes**

Infectious waste describes waste that has the possibility of causing infections in humans. This includes any type of animal or human tissue which may be blood or any other parts of body, bandages soaked with blood and surgical items which are discarded gloves, stocks, cultures, or swabs to inoculate cultures. Most of this type of waste consists of anatomical waste, which might also be labeled as pathological waste, which needed detailed methods of disposal. The waste which contains pathogens is termed as Pathological waste.

Harmful waste has the chances to affect humans in different ways causing disease transmission. Some types of medical waste are hazardous waste. This includes sharps, generally defined as objects that can puncture or lacerate the skin, includes needles, syringes, surgical items which are discarded like knives and lancets, culture dishes and other glassware. Hazardous waste may have, chemicals, both medical and industrial. Infectious waste can also be considered hazardous, depending on its exposure and usage to tissue of human or animals before discarding. Old drugs, including chemotherapy agents, are also sometimes harmful.

Waste generated from cancer therapy departments or medical equipment used for radioactive isotopes is termed as radioactive waste. Waste termed as Pathological waste are those which is contracted with isotopes is also treated as radioactive waste instead of simply regarding as infectious waste.

Among all waste, general waste constitutes 85% of all waste generated at all medical facilities, and is not different from general household or office waste, which includes paper, plastics, liquids and any other material that does not fit into the previous three categories.¹⁰
A study conducted at Balrampur Hospital, Lucknow on waste management practices within the state said that the hospital does not have any proper treatment facility for infectious waste. Laboratory waste materials are disposed off directly without proper disinfection into municipal sewerage. From the municipal bin and hospital premises disposable plastic items are segregated by the rag pickers, which led to infectious diseases following sharp injuries.\textsuperscript{11}

Keeping in view inappropriate hospital waste management, the Ministry for Forest and Environment developed notification on “Biomedical Waste (Management and Handling) Rules, 1998” in July 1998. According to these Rules developed, it is the duty of every “owner” i.e. a person who has the control over the institution and or its premises, and to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment and the waste is treated within 48 hours period. The rule 1998 has been amended in the year 2016. Adequate hospital waste management has become an important worldwide need today the long term effects of poor management is a humanitarian concerns for public environment and health workers. So we have to sensitize ourselves and the personnel responsible for this issue in the interest of community.\textsuperscript{12}

**Biomedical Waste Management Rules, 2016**

The draft Bio-medical Waste Rules were published in June, 2015 inviting public objections and opinions. Stakeholders consultation meets were organized in New Delhi, Mumbai and Kolkata. Consultative meetings with Central Authorities, State Government, SPCB and major Hospitals were also held. The suggestions / objections (approx. 50) received were examined by the Working Group in Ministry. Based on the suggestions of the various groups, the Government has published the Bio- medical Waste Management Rules, 2016.

a) The ambit of the rules has been expanded to include health camps, mobile surgical camps or any other healthcare activity;
b) Phase-out the use of chlorinated disposable bags, gloves and blood bags within two years

c) Pre-treatment of the laboratory waste, microbiological waste and blood bags through disinfection or sterilization on-site in the manner as prescribed by WHO or NACO;

d) Provide orientation to all its health personnel and vaccinate all health workers regularly;

e) Establish a bar-code system for bins and bags containing BMW for disposal;

f) Report major accidents immediately following exposure;

g) Existing incinerators for achievement of standards for retention time in chamber and Dioxin and Furans within two years;

h) Hospital waste are categorized into 4 types instead of 10 to facilitate the separation of waste at source;

i) Procedure to get a simplified authorization process, automatic authorization for bedded hospitals. The validity of authorization synchronized with consent orders and validity for Bedded HCFs. One time Authorization for Non-bedded HCFs;

j) The new rules prescribe latest technology standards for incinerator to decrease the emission of pollutants in environment;

k) Inclusion of emissions reduction for Dioxin and furans;

l) Concerned Government to provide for setting up common bio-medical waste treatment and disposal facility;

m) No hospital authority shall establish on-site treatment and disposal facility, if a service of `common BMW treatment facility is available at a distance of minimum seventy-five kilometers.
n) Operator of a common bio-medical waste treatment and disposal facility to ensure periodical schedules collection of bio-medical waste from the HCFs and assist the HCFs in conduct of training.\textsuperscript{13}

Study carried out on evaluation of awareness programme on practices of bio-medical waste management at leading hospital in Gujarat among HCP showed that in service training programs on hospital waste management for nursing and paramedical staff showed effective results. The study recommended periodic training workshops on bio medical waste reinforce and update awareness of hospital staff for implementing proper bio medical waste.\textsuperscript{14}

\textbf{Instructions for waste handlers:}

It is observed that during handling and transport the waste handlers becomes less precise and particular above to safety measure. Staff who handles clinical waste bags and containers should be trained on the following aspects to avoid injuries and accidents.

- Adequate protective clothing should be worn during handling of waste.
- When waste bags containers are three fourth full, they should be securely sealed to prevent spillages and properly labeled
- All bags and containers must confirm color coding system. Labeling can be done by writing the information.
- Separation of biomedical wastes to be done at source, hazardous waste should be kept in a specified area.
- Check that waste bags are effectively sealed and the origin of the waste is marked on the waste bag or container.
- Bags should be picked up by the neck and placed as well as manual handling of waste bags should be minimized to reduce the incidence of needle stick injuries.
• Bags should not be clasped against the body and too many bags should not be carried at a time, and avoid the bag hitting the body when being carried.

• Staff should know the appropriate cleaning and disinfection procedures.

• All accidents while doing therapeutic, diagnostic procedures while handling of waste should be recorded. If spillage occurs report immediately to responsible staff members.

All health care workers should be made aware of BMW rules through training programmes.\(^\text{15}\)

**Nurses role and responsibilities:**

• Disinfect the waste so that it is no longer the source of pathogenic organisms.

• Reduce the bulk through waste minimization in order to reduce requirements for storage and transportation.

• Make waste unrecognizable for aesthetic reason.

• Make recyclable items unusable. eg. Cutting up syringes and damaging the needles.

• Disposable items like gloves, syringes, etc. should be mutilated after use and before disposal.

• Waste minimization can be done by Purchase of reusable items made of glass, rubber, metal etc.

• Strengthen sterilization procedure through different methods.

• Color coding of bags to be done as per Biomedical Waste (Management and Handling) Rules.

• Needles, syringes, sharps should be placed in a puncture resistant plastic metal containers at the work station.
- Do not recap the used syringes
- Disinfection should be done by using 1% hypochlorite or equivalent disinfectant ensuring all surface come in contact with chemicals with a minimum contacting time of at least 30 minutes.
- Change chemical solutions frequently at least once a day.
- Always use gloves and masks, apron and boots if splashing is expected.
- Use sharp decontaminating unit made up of outer solid plastic puncture proof and inner perforated container with handles and filled 1/3 with hypochlorite.

BMW management has been emerged as a major issue of concern among hospital, health care workers and authorities. It is well understood fact that hospital waste can cause many adverse effects to environment and human due to waste generated during patient care. The problems related to disposal of waste in health care facilities is a risk and is a humanitarian topic worldwide.\(^{16}\)

1.2 Need for the Study

The present scenario of bio medical waste management in Indian hospitals is grim. It should be mandatory for healthcare establishments to ensure that such type of waste is handled without any adverse effects to human health and environment.\(^{17}\)

There are so many health hazards related to BMW management. The current practices of BMW management in many hospitals are unsatisfactory. The wastes are disposed in an improper manner. Due to improper wastes management process mixing of hospital waste with general waste leading to occupational hazards which leads to transmission of diseases like typhoid cholera, HIV through injuries from sharps like contaminated needles.

A study conducted on knowledge attitude and practices about biomedical waste management among nursing professionals in Srinagar revealed that
knowledge regarding biomedical waste, transmission of diseases was good (70 %). Attitude of the nurses towards segregation of infections and non-infections waste was positive with 80% in favor of implementation. The practice of low reporting of injuries due to sharps was low possibly due to lack of awareness about formal system of injury reporting. The study recommended regular training and awareness generation activities among nursing staff needs to be held to increase knowledge, attitude and practices.18

The waste scattered in an around the premises of health care facility invites insects, rodents, flies and other sources leading to spread of communicable diseases like rabies and plague. Improper disposal can also result in recycling of disposable items like syringes, needle, IV sets and other articles without proper sterilization which are coming back to the market. So it becomes the responsibility of the occupiers to manage hospital was in an echo-friendly manner.19

The generation of waste ranges from 0.5-2 Kg./bed/day in India and estimated waste generation per year is 0.33 million. The constituents of solid waste were disposable syringes (0.3-0.5%) plastic waste, 7-10% glass materials, 3-5% general waste, 40-45% and infectious waste 30-35%. The shortcomings and hazards associated with management of health care waste is to be identified.21

Serious threats to environment and human are posed by indiscriminate disposal of hospital waste which is further compounded by the high prevalence of diseases such as HIV and hepatitis B.20

Hospital acquired infections have been estimated as 10% of all fatal life threatening diseases in South Asian countries which indicates the need for waste management. Hospitals which are supposed to maintain and restore the health of public are threatening their well being. Roper hospital wise disposal can help to prevent hospital acquired infections, the major cause of which is improper biomedical waste management.22
The system of hospital waste management in health care systems is a burning issue of increasing concern so the administrators has to see new ways of safe cost effective and scientific system of waste management. Above all the personnel responsible for BMW management should be trained for advanced techniques in this area.23

A study conducted on awareness regarding biomedical waste management among doctors, paramedical staff and non medical staff in a district of MP, revealed that practices of waste management in hospitals were grossly inadequate. The study recommended orientation and re-orientation training programmes for hospital staff and strict implementation of guidelines of BMW management to protect themselves and hospital visitors.24

Study carried out on waste generation in a Govt. Hospital revealed that head nurses, Personnel in hospital wards, and top management did not seem to pay required consideration to BMW management, which occurred as result of insufficient knowledge and their lack of interest in BMW management. The Hospital did not follow the prescribed color coding system as required by the biomedical waste management rules. Employees haphazardly used bins and bags without any organized segregation or treatment. Waste handlers for the proper disposal of BMW were not effectively trained, which led to inappropriate management and insufficient implementation of the regulation.25

Only a small portion of waste generated in health care facility is harmful, segregation at the point of origin reduces the amount of wastes requiring special attention and minimizes the cost of wastes disposal. So there is a need of personal responsible must be well aware about materials used and its methods of disposal.

There is a great need of hospital waste management because:

- An occupational hazard with sharps leads to life threatening infections among the health care workers.
- Due to poor wastes management hospital acquired infections can result among patients and attendants and HCW.

- There is a risk of infections for waste handlers and scavengers and public living near to hospital and dumps.

- The articles and drugs which have been disposed are recycled, repacked and return to the market through unsuspecting buyers.

  Unscrupulous elements collecting the disposable items and repacked which get its entry into market without even washed.12

  Costs effective procedures like regular hand washing, disinfection of articles, fumigation of the work area, use of personal protective equipments are proven to be effective methods in reducing health hazards. For safeguarding the environment and health of the public it is important to carry out proper management of hospital waste.

  Through the proper management of BMW the environment can be kept clean, acquired infections and death due to infections resulting from reuse and repack of drugs and materials can be prevented. Proper BMW management can also improve the image of hospitals and betterment of hospital care.26

  The nurses and nursing students were having deficient knowledge regarding biomedical waste management. In my study setting during my clinical visits it has been noticed that proper collection and segregation has not been carried out and Bio-Medical Waste Management practice was poor. Proper hand washing was not practiced by most of the nurses. Availability and use of PPE was poor .The status of the patient for serious infectious disorders were declared after many days of admission which led to the possibility of infection during diagnostic procedures carried out in initial phase of admission. Improper and indiscriminate collection of waste was done in many wards by waste handlers. Single means of transportation was used for many departments, and various purposes like getting linens, articles, drugs from stores. Route of transportation of waste was not demarked and was lot of
spillage of waste occurs during transportation. The scavengers and rag pickers were segregating disposable items from common collection areas of hospital to sell out in market for unauthorized person which make it easy for entry back into market.

So this study was undertaken to assess and evaluate the knowledge and practice of nurses so that suggestions can be made for implementation strategies. In the health care settings of Udaipur no studies on biomedical waste has been carried out for nursing staff while they are the most vulnerable and exposed group.

1.3 Statement of the Problem

A study to evaluate the effectiveness of an orientation programme on knowledge and practice regarding BMW management among nurses working in selected tertiary level hospitals of Udaipur district, Rajasthan.

1.4 Aim of the Study

The study was aimed to administer and evaluate the effectiveness of an orientation programme on knowledge and practice regarding biomedical waste management among nurses in selected tertiary level hospitals of Udaipur district, Rajasthan.

1.5 Objectives of the Study

1. To assess the knowledge of nurses regarding biomedical waste management.
2. To observe the practice of nurses regarding biomedical waste management.
3. To plan and administer an orientation programme on knowledge and practice regarding biomedical waste management.
4. To evaluate the effectiveness of orientation programme on level of knowledge regarding biomedical waste management among nurses.
5. To evaluate the effectiveness of orientation programme on practice regarding biomedical waste management among nurses.

6. To find out the association of knowledge scores with selected socio demographic variables.

7. To find out the association of practice scores with selected socio demographic variables.

8. To find out the relationship between knowledge and practice of nurses regarding biomedical waste management.

1.6 Operational Definitions

- Effectiveness: In this study it refers to significant gain in the difference between pre test and post test knowledge & practice scores.

- Orientation Programme: In this study it is a written valid module on biomedical waste management prepared and served to participants through lecture cum demonstrations.

- Knowledge: In this study it refers to the ability of the nurses to respond correctly to the knowledge questionnaire and observation checklist regarding biomedical waste management.

- Practice: In this study it refers to activity performed by nurses on biomedical waste management evaluated through an observation checklist.

- Biomedical waste management: In this study it refers to systematic and scientific way of managing the health care waste through a step-by-step process such as collection, segregation, storage, transportation and disposal.

- Nurses: The registered & certified nurses who have undergone a training of scheduled period prescribed by accrediting body.

- Biomedical waste: Is any solid, liquid or fluid waste generated during diagnosis and treatment in the selected health care settings.
1.7 Assumptions

- The nurses are having less knowledge regarding BMW Management.
- The practice of nurses regarding BMW Management is poor.
- Orientation programme will be helpful in enhancing the knowledge and practice of nurses on BMW Management.

1.8 Null Hypothesis

- H01: There will be statistically no significant difference between pre and post test knowledge scores among nurses regarding biomedical waste management.
- H02: There will be statistically no significant difference between pre and post test practice scores among nurses regarding biomedical waste management.
- H03: There will be statistically no significant association between pre test knowledge score of nurses with selected demographic variables.
- H04: There will be statistically no significant association between pre test practice score of nurses with selected demographic variables.
- H05: There will be statistically no significant relationship between knowledge and practice regarding biomedical waste management among nurses as a result of orientation program.

1.9 Delimitations of the Study

- The sample size is restricted due to administrative constraints.
- The study is limited only to the nurses working in selected tertiary level hospitals.
- The limited sample size of nurses limit the generalization of the study findings.
• The study limited to specific geographic area of east Rajasthan limits the generalization.

1.10 Conceptual Framework

The conceptual frame work is a schematic representation of a theory. It provides frame of differences for clinical practice, research and education.

The present study is intended to assess the knowledge & practice of nurses regarding Biomedical Waste Management. The conceptual frame work for the present study was based on Bertanfly's model. The phases of the model are assessment, input, process and output.

The theory is concerned with change due to interaction between the factors in a particular situation. There is a continuous interaction between human being and environment.

Assessment

During assessment phase the factors influencing knowledge and practice of nurses regarding BMW management was assessed as demographic variables such as age, sex, education and qualification, area of work, year of experience, type of healthcare organization, area of residence and the background knowledge and practice of nurses on BMW management were also assessed.

Input

A pre test was conducted to assess the level of existing knowledge and practice related to in all dimensions on BMW management and the need was assessed based on the findings.
Process

The Process refers to various operational programmes and intervention carried out by investigator. Under this the development and administration of orientation programme for nurses was done in an organized way following assessment of pre test knowledge and practice on BMW management.

Output

In the present study output is gain in the knowledge and improvement in the practice of study subjects as a result of orientation programme which is assessed through post test and is interpreted as inadequate, moderately adequate and adequate level of knowledge and as poor, average and good practice regarding BMW management by using knowledge questionnaire and observation checklist.

Feedback

Feedback is the process by which information is received from each system which is not applied in the present study.
Figure 3. Conceptual Framework Based on Von Bertalanffy’s General System Theory (1968)
Summary

The present study is organized under the following sections:

Chapter I: Introduction

This chapter dealt with the introduction, background of the study which covered the different aspects related to the topic like categories of waste, personnel address, health hazardous posed by BMW, BMW (Management and Handling) rules 2016, instructions to waste handlers. The need for study was discussed in this chapter along with aim and objectives, operational definitions, assumptions, null hypothesis, delimitations of the study and conceptual framework developed for the study.

Chapter II: Review of literature

Deals with brief review of literature regarding knowledge and practice of BMW and reviews related to need and importance of BMW, occupational exposure and needle stick injuries, studies related to knowledge on BMW, studies related to practice on BMW, studies related to knowledge and practice and literature review on effectiveness of orientation programme on BMW management.

Chapter III: Methodology

Describe the methodology which includes research approach, research design, population, setting, sampling technique, selection criteria, description tools, data collection procedure, plan for data analysis and interpretation of data.

Chapter IV: Data Analysis and Interpretation

Outline the results based on the analysis of data with tables and figures following a brief description.
Chapter V: Discussion

It is concerned with the detailed discussion of the results comparing with similar studies.

Chapter VI: Summary Conclusion and Implications.

Provides a brief summary with salient findings, limitations of the study, implications for nursing practice, research, administration and education along with recommendations for future research.