CHAPTER III

METHODOLOGY

A research methodology defines what the activity of researcher is, how to proceed, how to measure progress and what constitute success. Research methods are the steps, procedures and strategies for gathering and analyzing the data in a research investigation.

This Chapter deals with the methodology used to administer and evaluate the effectiveness of an orientation programme on knowledge and practice regarding biomedical waste management among Nurses Working in Selected tertiary level hospitals of Udaipur district, Rajasthan.

Chapter includes the brief description of the different steps that were undertaken by the investigator for the study. It is discussed under the following headings : the research approach, research design, population, sample, setting, sampling technique, selection criteria, description of tools, data collection procedures, plan for data analysis and interpretation of the data.

3.1 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 hospitals.

3.2 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 among nurses.

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 as a result of orientation programme.

### 3.3 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 scores of nurses with selected socio demographic variables.

- **H04**: There will be statistically no significant association between pre test practice scores of nurses with selected socio 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.
3.4 Research Approach

Research approach is a systemic, objective method of discovery with empirical evidence. The research approach spells out the basic strategies that the researcher planned to develop information that is accurate and interpretable.\textsuperscript{80}

Research approach is an overall plan or blue-print chosen to carry out the study.

An evaluative research approach was considered appropriate for the present study because the primary objective of the study was to evaluate the effectiveness of an orientation programme on biomedical waste management.

3.5 Research Design

It is the overall plan for obtaining answer to the questions being studied and for managing some of the obstacles arised during the research process.

To accomplish the objectives of the study a Quasi-experimental design with one group pre-test post-test was selected.

Quasi-experimental research is similar to experimental research and in that there is manipulation of independent variables. There is no control group and random assignment was used to select subjects. All subjects were given pre-test, intervention and post-test and were analyzed for difference.\textsuperscript{81}

In this study, a single test group was selected and the knowledge and practice on bio medical waste management was measured before the introduction of orientation programme. After the orientation programme level of knowledge and practice were reassessed by conducting post-test.
The design chosen for the study is presented in the table as:

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-test</th>
<th>Intervention</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₁</td>
<td>x</td>
<td>O₂</td>
<td></td>
</tr>
</tbody>
</table>

Table -1 One Group pre-test post-test design.

Key:

O₁ - Assessment of knowledge by pre-test.

X - Orientation module on biomedical waste management

O₂ - Assessment of knowledge by post-test.
Figure 4. Schematic Representation of Research Methodology
3.6 Variables of the Study:

- **Independent variable:** It refers to presumed causes. It is the condition of characteristics which are manipulated by the researcher. In the present study independent variable was the orientation programme on biomedical waste management.

- **Dependent variable:** It refers to presumed effect. It is the condition or characteristics which appear or disappear as a result of an independent variable. In the present study the dependent variable was knowledge and practice of nurses regarding biomedical waste management.

- **Demographic variable:** Demographic variables confound the relationship between independent and dependent variables and need to be controlled in the study through research design or statistical procedures. In the present study the socio demographic variables selected were age, gender, educational status, area of work, type of health care organisation year of experience and area of residence.

3.7 Setting of the study

The study was conducted at 4 selected tertiary level hospitals of Udaipur

3.8 Population of the study

Population is the entire set of individuals or objects having some common characteristics selected for a research study. It is a target group whose member’s posses specific attributes that a researcher is interested in studying.

The population for the present study comprised Nurses Working in Selected tertiary level hospitals of Udaipur district, Rajasthan.
3.9 Sample

Sample is a subject of the units that composed the population.\(^82\)

The samples of the present study were Nurses Working in Selected tertiary level hospitals of Udaipur district, Rajasthan.

The Sample size of the present study consisted of 708 Nurses Working in Selected tertiary level hospitals of Udaipur district, Rajasthan.

3.10 Sampling Technique

Sampling technique is the process of selecting samples from the target population to represent the entire population.

Present study adopted stratified random sampling method. Under stratified sampling the population is divided into several sub populations which are called ‘strata’ and then select items from each stratum to constitute a sample.\(^83\)

In this, the population is divided into different strata and then selecting sample independently from each strata. After the population is divided into two or more strata, a simple random sampling method could be used to draw the subject from each group. To decide the number of subjects, proportional certified sampling to be used.

**Strata 1:** Udaipur division of Rajasthan state was divided into 5 districts and one district selected through blindfold method by random sampling. The slip picked out has Udaipur district.

**Strata 2:** The blocks of Udaipur district were listed out prepared slips and randomly picked one slip, had the name of Girwa block.
Figure 5. Schematic Representation of Sampling Technique
**Strata 3:** Girwa block classified as urban and rural, the urban area was consisted of tertiary level hospitals, FRU’s and city dispensaries. On the basis of population density and number of hospitals, urban area was selected.

**Strata 4:** Under urban area, the hospitals were enlisted in 3 categories i.e. tertiary level hospitals, FRU’s and city dispensaries. Again on the basis of randomization, tertiary level/ teaching hospitals were selected for the present study. The tertiary level hospitals selected under study were:

1. Geetanajali Medical College and Hospitals (N=112)
2. Pacific Medical College and Hospitals (N=105)
3. RNT Medical College and Hospitals (N=1250)
4. Pacific Medical College, Bhilo ka Guda (N=110)

Where N = Number of nurses

The samples from all four selected were enlisted which was around 1577. The sample was given random numbers and through lot method a sample size of 708 (around 45%) was selected as study subjects.

**3.11 Sample size**

The sample size selected for the present study was 708 nurses from selected hospitals.

**3.12 Sample selection Criteria**

**Inclusion Criteria:-**

- The staff nurses who are willing to participate in the study.
- The staff nurses who are present at the time of data collection.
Both male nurses & staff nurses will be included in the study.

The nurses who have undergone a prescribed period of training, prescribed by accrediting body.

**Exclusion Criteria:**

- The staff nurses who have undergone training on Biomedical Waste Management.
- The staff nurses who are not willing to participate in the study.
- The staff nurses who were not present during data collection.

**3.13 Ethical consideration**

After getting permission from research committee of Geetanjali University, permission was obtained from concerned Principals/Medical Superintendents of selected medical colleges. Consent was taken from each participant included in the study.

**3.14 Tool for data collection**

A structured knowledge questionnaire and an observation checklist was developed on the basis of objectives of the study as it was considered the best and appropriate tool to explore the response of the subjects. The tool was prepared on the basis of

- Extensive review of related literature
- Suggestions and opinions from experts from nursing, medical and bio-engineering fields
- Personal experiences in the clinical setting while supervising the nursing staff and students.
Preparation of blueprint

A blueprint was prepared prior to the construction of knowledge questionnaire on 11 areas of BMW management and practice checklist in 9 areas of BMW management.

Description of the tool

The tool consisted of 3 sections:

**Section A:** consisted of 7 items on demographic variables such as age, sex, educational qualification, area of work, year of experience, type of health care organization and area of residence.

**Section B:** consisted of structured knowledge questionnaire on knowledge regarding BMW management with 41 items on selected aspects which were:

- Concept and definition of BMW.
- Source of origin of BMW
- Categories of Biomedical Waste
- Waste (Management and Handling) rules
- Health hazards and disease transmission posed by BMW
- Collection and segregation of waste
- Disinfection of waste
- Segregation and Color coding
- Transportation of BMW
- Disposal/treatment of BMW
Occupational exposure/ NSIs

**Interpretation of knowledge**

The level of range of knowledge was interpreted as:

- Inadequate knowledge <50%
- Moderately adequate knowledge 50-75%
- Adequate knowledge >75%

Each item had only one correct response and the score for the same was ‘1’ and for incorrect response the score was ‘0’.

**Section C:** consisted of an observation checklist containing 31 items related to BMW management categorized into 9 dimensions. The selected aspects were:

- Identification of containers for waste collection
- Segregation of waste at the point of origin
- Use of PPE
- Destruction of needles by hub cutter
- Practice of proper hand washing
- Proper disposal of sharps
- Labeling of waste collection containers
- Reporting of needle stick injuries/ occupational exposure
- Maintenance of records in BMW facility
**Interpretation of practice scores:** The level of practice was interpreted as

1. Adequate practice > 75%
2. Moderately adequate practice 50-75%
3. Poor practice < 50%

**3.15 Intervention of the study**

**Development of orientation module**

Orientation module was prepared by the investigator to enhance the knowledge and practice of nurses regarding bio-medical waste management.

The initial draft was prepared on the basis of

- Extensive review of literature
- Based on suggestions and modifications from guide and experts
- Based on the need of the participants following pre-test assessment.

The module was titled as “orientation module on bio-medical waste management” which covered the following contents:

- Concept and definition of bio-medical waste
- Statistics related to BMW management
- Sources of BMW
- Categories of BMW
- Personnel at risk and occupational hazards
- Waste minimization
• Waste management process
• Instruction to waste handlers
• Nurse’s role and responsibilities

3.16 Content validity of the tool

Content validity is the extent to which the method of measurement consists of all the major aspects relevant to the construct being measured.\(^8\)

The prepared instrument along with the objectives, blueprint and criteria checklist was sent to eight experts out of which five from the area of nursing, one research expert from medical field, one bio-medical engineer and one statistician for establishing content validity.

The experts were requested to judge the items for relevance, clarity and appropriateness of the content of tool. Necessary modifications were made as per expert’s suggestion and consultation with the guide.

3.17 Reliability of the tool

Reliability of research instrument refers to the extent to which an instrument consistently measures a concept or attribute.\(^8\)

Reliability was established by split-half method for structured knowledge questionnaire. Karl Pearson’s correlation formula used to compute ‘r’ value which was 0.69, which was substitute into Spearmen Brown Formula to get the reliability (r’) and value obtained was 0.82, which showed that tool was highly reliable.
3.18 Pilot study

Pilot study was a smaller version of a proposed study conducted to develop and refine methodology such as intervention, instrument or data collection process to be used in the larger study.\textsuperscript{82}

The purpose of the pilot study was:

- To assess the effectiveness of data collection plan and make due modifications as required
- To find out the feasibility of conducting the final study and to determine the methods of statistical analysis

Pilot study was the miniature trial run on small sample size and this sample was excluded from main study.

A pilot study was conducted at Bal Chikitsalaya, RNT Medical College, Udaipur, Rajasthan after getting the formal permission from the principal and HOD for conducting the study.

The pilot study was conducted in the month of June, 2013 for a period of one week (16-6-2014 to 23-6-2014) on a sample of 70 nurses working in pediatric ICU, pediatric medical and surgical wards, NICU, MTC and nursery. Pre-test was taken on the first day from the samples and the orientation program was administered the same day following pre-test. Post-test was taken on the 7\textsuperscript{th} day from all participants.

Data was analyzed with the help of descriptive and inferential statistics. The findings indicated that the orientation program was effective in increasing the knowledge and practice of nurses regarding bio-medical waste management. The feasibility and time required to complete the questionnaire was assessed. The language was found effective for all the items to be clearly understood by the
participants without ambiguity. Hence, the tools were found to be feasible and practicable for the main study. The items of the tools were retained same without any changes. As such no problem was found during pilot study.

Findings of Pilot study:

- Majority (37.4%) of respondents were from the age group of 40-49.
- 70% respondents were female
- 77% respondents were diploma/ GNM Staff
- Area of work was Pediatric Department, RNT Medical College.
- Majority (65.71%) of nurses were having experience of 10 years and above.
- All participants were from public sector
- 62% of participants were from urban background whereas only 8% were from rural background.
- Reliability of section 2 was found 0.764 and section 3 practice items were 0.850, so the tool was found reliable, hence the reliability of the tool was established to conduct main study.

3.19 Data collection procedure

Data collection is the gathering of information needed to address the research problem. Formal written permission was obtained from the Principal/Medical superintendent of RNT medical college, Pacific medical college and hospital, Umarda, Geetanjali medical college, Manvakhera and Pacific medical college and hospital, Bheelon ka Guda, Udaipur.

The main study was conducted from 16-08-15 to 20-10-15. Proportionate stratified random sampling was used to select 708 nurses for the study. A written
informed consent was taken from each nursing staff during the period of data collection. Appropriate orientation was given to samples regarding aim of the study, nature of questionnaire and checklist. The subjects were assured for confidentiality and anonymity of the responses. After obtaining the permission and consent pre-test was conducted on the first day and the orientation program was administered following pre-test. Samples in the selected setting were divided into groups of 12-15 each and orientation program was conducted. Post-test was administered on day 7 for subjects using the knowledge questionnaire and observation checklist.

3.20 Plan for data analysis

Data analysis is the technique used to reduce, organize and give meaning to the data. In the present study, the data obtained were analyzed on the basis of objectives of the study using descriptive and inferential statistics. A master data sheet was prepared by putting the responses given by the participants. The plan for data analysis was as mentioned below:

- Distribution of respondents according to socio demographic variables
- Mean, SD and mean percentage were used to describe the area wise pre and post test knowledge scores of the respondents for knowledge and practice regarding BMW management.
- Paired ‘t’ test was used to find the effectiveness of orientation program comparing pre and post test knowledge and practice scores of the respondents
- ‘F’ value, ‘z’ value was calculated to find the association between knowledge and practice scores with demographic variables.
- ‘r’ value was calculated to find out the relationship between knowledge and practice.
Summary

This chapter dealt with the methodology adopted to conduct the study which were discussed under research approach, research design, population setting, sampling technique, selection criteria, description tools, data collection procedure, plan for data analysis and interpretation of data. Pilot study was conducted to find out the feasibility and time required to complete the questionnaire. Tool was found reliable and proceeded for main study.