CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATION AND RECOMMENDATIONS

SUMMARY

This chapter deals with the summary of the study conducted and the major findings.

The objectives of the study were stated as follows:

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 knowledge of nurses regarding biomedical waste management.
5. To evaluate the effectiveness of orientation programme on practice of nurses regarding biomedical waste management.
6. To find out the association of pre-test knowledge scores with selected socio-demographic variables.
7. To find out the association of pre-test practice scores with selected socio-demographic variables.
8. To find out the relationship between knowledge and practice of nurses regarding biomedical waste management.
Hypothesis tested in the study were as follows:

- 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 demographic variables.
- H04: There will be statistically no significant association between pre test practice scores of nurses with selected demographic variables.
- H05: There will be statistically no significant relationship between knowledge and practice regarding biomedical waste management among nurses.

The present study was conducted to 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.

The literature obtained from published and unpublished research, manual research through recent literature and primary & secondary articles provided information to the researcher to study the selected problem, development of tool, conceptual framework, data analysis& interpretation.

Conceptual framework was developed based on Bertaniy’s General Systems Theory (1968) to achieve the objectives. The theory focused mainly on assessment input, process and output. Assessment was directed towards the background knowledge and practice of nurses, input refers to assess the need for intervention and output refers to validation and collection of evidence that shows improvement in knowledge and practice of nurses on BMW management. Feedback was aimed for the necessity of the reassessment and orientation programme if there is an adequate
gain in knowledge and poor practice which was not needed in the present study as there was a significant increase in knowledge.

The setting of the study was four selected medical colleges of Udaipur district, RNT Medical College and Associated hospitals, Pacific Medical College and Hospital, Umarda, Geetanjali Medical College and Hospital, Manva Khera, Udaipur, Pacific Medical College and Hospital, Bheelon Ka Guda, Udaipur, Rajasthan.

Tool used in data collection was structure knowledge questionnaire, observation checklist and orientation module.

The questionnaire consisted of three sections:

**Section A:** Demographic variables with 7 characteristics: age in years, gender, educational qualification, area of work, year of experience, type of health care organization and area of residence.

**Section B:** Structure knowledge questionnaire consisting of 41 items which were divided into 11 dimensions.

- Concept & Definition of Biomedical Waste
- Waste Management & Handling Rules
- Categories of Waste
- Health Hazards/Disease Transmission posed by Bio-medical waste
- Collection of Biomedical waste
- Disinfection of Biomedical waste
- Segregation and color coding of waste
- Storage of Biomedical waste
Transportation of wastes
Disposal/treatment of wastes
Occupational exposure and needle stick injuries

Section C: Observation checklist containing 31 items divided into 9 dimensions.

Identification of Containers for waste collection
Segregation of waste at the point of origin
Use of personal protective equipments
Destruction of needle by hub cutter
Practice of proper hand washing
Proper disposal of sharps
Waste collection containers are labeled properly
Reporting of needle stick injuries/occupational exposure
Maintenance of records of BMW in facility

Preparation of blueprint construction of items content validity pretesting reliability and conducting a pilot study were carried out for development of instrument and finalizing the tool. The tool and the orientation module was sent to 7 experts, 5 from the field of nursing, 1 doctor who is research expert, 1 biomedical engineer and 1 statistician for content validity.

A pilot study was conducted at Balchikitsalaya, Udaipur after obtaining permission from Principal, RNT Medical College and HOD, Balchikitsalaya, Udaipur. The reliability of the tool was established by split half method.
Stratified random sampling technique was used for selecting the samples. The sample size was 708, selected proportionately from all 4 medical colleges. The data collected was tabulated, organized and analyzed by using descriptive and inferential statistics and interpreted in 6 sections.

Results of the study were summarized as follows:-

5.1. Description of the socio-demographic characteristics of the samples.
5.2. Dimension-wise pre and post test knowledge scores regarding BMW management.
5.3. Dimension-wise pre and post test scores practice scores regarding BMW management.
5.4. Association between knowledge scores and selected socio demographic variables.
5.5. Association between practice scores and selected socio demographic variables.
5.6. Co-relation between knowledge and practice of nurses regarding BMW management.

6.1 Description of the socio-demographic characteristics of the samples.

Majority of the respondents 220 (31.07%) were in the age group of 40-49 years.

- Higher percentage 405 (57.20%) were females.
- Majority of the respondents 357 (50.42%) were diploma (GNM holders).
- Higher percentage of respondents 151 (29.33%) were from maternity department.
- Majority of the respondents 388 (54.80%) were having experience of 10 years and above.
- Higher percentage of respondents were 491 (69.35%) were form public sector tertiary level hospital.
6.2 Dimension-wise pre and post test knowledge scores regarding BMW management.

Post test mean value was found higher than the pretest mean value for knowledge in all 11 dimensions. ‘t’ value for each item also indicates significant difference between pretest and posttest knowledge scores. This shows knowledge gain due to orientation programme on BMW management among nurses. So the hypothesis H01 stated in the study “There will be statistically no significant difference between pre and post test knowledge scores among nurses regarding biomedical waste management” was rejected.

Paired ‘t’ test was used to find out the effectiveness of orientation programme on knowledge. The results revealed that the mean percentage of post-test knowledge score (89.10%) is greater than the mean percentage of pre-test knowledge score (56.17%), which depicts that the enhancement in the knowledge of respondents is 13.50%. The result supports that the post-test knowledge scores are higher than the pre-test knowledge scores. The data further represents that the ‘t’ value of 70.42 is significantly higher than the table value. This indicates that there is a significant difference between the pre- and post-test knowledge scores with an enhancement of 13.50% knowledge as a result of orientation programme, hence null hypothesis H02 is rejected.

6.3 Dimension-wise pre and post test scores practice scores regarding BMW management.

Posttest mean value was found higher than the pretest mean value for practice in all 9 dimensions. ‘t’ value for each item also indicates significant difference between pretest and posttest practice scores. This shows improvement in practice due to orientation programme on BMW management among nurses. So the hypothesis H02 stated in the study “There will be statistically no significant difference between
pre and post test practice scores among nurses regarding biomedical waste management” was rejected.

Paired ‘t’ test was used to find out the effectiveness of orientation programme on practice. The results revealed that the mean post-test score for practice was (1.89%) is greater than the mean pre-test practice score was (1.33%). The result supports that the post-practice scores are higher than the pre-test practice scores. The data further represents that the ‘t’ value of -130.09 is significantly higher than the table value. This indicates that there is a significant difference between the pre- and post-test practice scores as a result of orientation programme hence null hypothesis HO2 is rejected.

6.4 Association between knowledge scores and selected socio demographic variables.

Association of knowledge scores with socio-demographic variables of nurses regarding BMW management was obtained by ‘F’ value for age, education, area of work and experience and ‘z’ value was obtained for gender, type of organization and area of residence.

Significant association for knowledge was found among 3 variables out of 7 i.e. for age and years, area of work, year of experience and area of residence of the respondents.

There was no evidence that all variables had influenced practice of the participants of the participants. Thus null hypothesis H04 needs modification.

6.5 Association between practice scores and selected socio demographic variables.

Association of practice scores with socio-demographic variables of nurses regarding BMW management was obtained by ‘F’ value for age and years, education,
area of work and year of experience and ‘z’ value was obtained for gender, type of organization and area of residence.

There was no significant association between practice scores and demographic variables such as age, gender, type of health care organization and area of residence.

Significant association was found only for 3 variables i.e. education qualification, area of work and year of experience. So H05 stated in the study was neither accepted nor rejected and null hypothesis H05 was recommended for modification.

6.6 Co-relation between knowledge and practice of nurses regarding BMW management.

The co-relation between knowledge and practice scores revealed that obtained ‘r’ value - 0.316 shows significant co-relation. With increasing knowledge scores the practice of participants regarding BMW management was found poor which shows negative co-relation between knowledge and practice and thus H05 is rejected.

The present study was conducted to evaluate the effectiveness of an orientation programme regarding knowledge and practice of biomedical waste management among nurses. The results of pre-test scores indicated inadequate knowledge and practice whereas in post-test majority of the nurses had adequate knowledge and good practice so there has been a significant improvement and knowledge and practice course which indicated that the orientation programme was effective.
CONCLUSION

This chapter deals with the conclusion, implications and recommendations for the study conducted to 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.

The following conclusions can be drawn on the basis of findings:

Demographic characteristics of the sample revealed that majority (31.07%) of respondents were from age group of 40-49 years of age. Higher percentage (57.20%) respondents were females. 50.42% of the participants were diploma holders, higher percentage (29.33%) of participants were from maternity department. Majority of the participants were having experience of >10 years. Highest percentage (69.35%) of nurses was from public sector hospital. Majority of respondents (54.10%) were from urban area.

As per the pretest results inadequate knowledge was found in most of the sensitive area like health hazards and disease transmission posed by biomedical waste, collection of biomedical waste, disinfection of biomedical waste, categories of biomedical waste, transportation of waste and disposal/ treatment of biomedical waste. Regarding practice of BMW management poor practice was found in areas like disposal of sharps, reporting of needle stick injuries, use of PPE, practice of proper hand washing etc.

Following the need assessment after doing pretest, orientation programme was conducted in groups of 12-15 nurses. Findings in the posttest revealed that orientation programme resulted in enhancement of knowledge and improvement in practice.

Co-relation between knowledge and practice was negative indicating that the nurses who were having good knowledge, practice was found poor among them. It
was concluded that this lacuna may be due to lack of updating the knowledge with latest technologies related to practice among the nurses who were having more than 10 years of experience.

The nurses who were in the age group of 20-29 years who were recruited within last 3 years were having good knowledge whereas adequate practice was found among nurses from the age group of 40-49 years of age.

The findings concluded that it should be mandatory for health care facilities to train their health personnel who are responsible for health care waste management through periodical trainings, seminars and workshops.

**NURSING IMPLICATIONS**

Effectiveness and scientific management of BMW management has become a public issue. Lack of interest, poor self motivation of HCW and lack of awareness are the major problems associated with waste management in health care institutions. To protect the environment and public there should be a uniform pattern in the health sector regarding BMW management. The lack of appropriate waste disposal can lead to health hazards. Proper handling treatment and final disposal is an integral part of waste management. The nurses should also trained to reduce waste generation during treatment and diagnostic procedures through waste minimization.

The findings of the study has implications in the area of nursing practice, nursing education, nursing administration and nursing research

**Implications for nursing practice**

The findings of the study can put into practice which will definitely help to improve the existing system of practice on BMW management in the health care settings, as the current concept of expanded role in nursing practice demands good skills and knowledge.
Poor hospital waste management poses health hazards to human health and especially to the health workers who are directly responsible for waste management. Nurses are the backbone of health team and need to be aware about latest concept and technologies of BMW management.

The nurses, waste handlers, patients, attendants and the general public residing near to the hospitals should be protected from health hazards through proper practice of BMW management. Nurses being good communicators can explain the impacts of improper BMW management and risks associated with disease transmission.

In the present study an orientation module was developed and administered for enhancing the knowledge and practice of nurses regarding BMW management. The nurses as well as student nurses can use this orientation module for updating themselves and for educating student nurses, paramedical staff and waste handlers as the nurses gets a lot of opportunities to help and teach others. The importance and techniques of proper management for BMW waste was highlighted in the module in an understandable manner.

New nursing staff recruited must be oriented for waste management protocols in hospitals which can help in reducing risks associated with BMW management. By following the infection control policies and practices, the risk of disease transmission can be reduced. For this set nursing protocols can be developed and displayed in nursing stations and working stations in the health care facility for immediate reference.

**Implications for nursing education**

The present study has an implication on nursing education as it the base of knowledge which decides the quality of nurses with regard to orientation of nursing staff, nursing students and other health care personnel involved in hospital waste management. Nursing education has the responsibility of equipping the students
through per-service education programmes and updates the knowledge and practice related to BMW management by conducting seminars, workshops, live demonstrations and orientation programmes.

Nursing teachers can use the orientation module to teach the students about biomedical waste management so that they can improve their practice. The statistics related to waste generation presented in the study suggest an increased need of waste minimization so the nurses can be trained for using reusable rubber and glass articles to reduce the generation of waste.

It will be made mandatory for all nursing educators and head nurses to note and recognize whether infection control practices are followed or not in the clinical settings. For this regular monitoring and supervision of the concerned health workers is required. The orientation module was proved to be an effective source in improving the knowledge and practice of nurses with regard BMW management. The findings of the study also imply that there is a need for modification of the said topic in nursing curriculum.

The administration plays an important role in co-coordinating laws. Administrators have a significant role in supervision and management of waste management protocols. Sensitization trainings can help to a larger extent for proper management and waste minimization in health setups. Representation of nursing personnel is implied in BMW management committee so that current issues and grievances can be addressed.

The role of a nursing administrator is significant in encouraging and motivating staff nurses, improper management of BMW. The nurse administrator should facilitate seminars, workshops and other in-service programmes on emerging issues and recent advancements in BMW management. The nursing superintendents and head nurses can coordinate various programmes to initiate actions for updating knowledge of healthcare workers, sanitary staff and other personnel responsible for waste handling.
Nurses must be informed to report needle stick injuries/ occupational exposure to concerned authorities for management of NSI and other health hazards in the health care setup.

Meetings of BMW committee must be carried out at least once in a month for updating of knowledge with current issues and grievance redressal.

**Implications for nursing research**

Findings of the present study contribute towards enriching the knowledge base of nursing research. The methodology adopted for the present study can be used by other future researchers as per their need. The present study can motivate new researcher to conduct study for large populations. It will also be a valuable reference for new researchers. Orientation programme used in the present study was found most effective in enhancing the knowledge and practice of nurses. So in future this intervention package can be used by new researchers.

Based on the research findings the administrators of the selected setting can be informed regarding the gaps found among the staff and they can fill the gaps by doing various interventions as per the need. The report of the present study can also be sent to the state Govt. and SPCB for further improvement in the present system of BMW management through trainings and various in service education programmes.
RECOMMENDATIONS

- Nursing protocols should be framed for every step of BMW management process specifying the role and responsibilities of the health personnel.

- Nursing staff should be sensitized for segregation of waste at the point of origin and minimization of waste.

- Use of PPE during patient care and handling BMW should be assured.

- Reporting of occupational exposure to the concerned official and get treatment as per protocol of the health care institution.

- It should be made mandatory for all nurses to undergo CME, orientation programmes and workshops for updating knowledge on BMW management.

- Protocols related to waste management process should be displayed in all clinical departments where patient care and diagnostic procedures are carried out.

- Periodic training programmes can be organized for the nursing staff to update the knowledge and practice aspects.

- An experimental study can be conducted with a control group.

- A comparative study can be carried out for staff working in public and private health care institutions.

- The knowledge and practice of nurses can be enhanced through various interventions like STP, SIM, demonstration methods.

- It can be made compulsory for hospital authorities to get trained their health care personnel in every 6 months for improvement and effectiveness in BMW management.

- Positive reinforcement can be given to HCW who is practicing biomedical waste properly.