

Effectiveness of planned teaching program on knowledge regarding practice of biomedical waste management among regular final year undergraduate nursing and midwifery students at Wollega University, Ethiopia

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Abstract

Background of the study: Hospitals produce a verity of medical waste which is responsible for serious health hazards. Now today nursing is considered as a professional discipline that includes the art of applying scientific knowledge to practice. So it is very important to make awareness among future nurses and midwives regarding biomedical waste management.

Objectives: To assess the effectiveness of planned teaching program on knowledge regarding practice of biomedical waste management among final year regular undergraduate Nursing and Midwifery students of Wollega University, Ethiopia

Methodology: The design adopted is one group pre-test and post-test pre-experimental design, the samples were chosen by purposive sampling techniques, consist 100 from final year regular undergraduate Nursing and Midwifery students of Wollega University, and a structured knowledge questionnaire is given to assess the knowledge on practice of biomedical waste management. Which followed by a planned teaching program on biomedical waste management and administering the same questionnaire to assess the post test.

Results: The overall mean post-test knowledge score regarding practice of biomedical waste management (14.51±4.9) was significantly higher than overall mean pre-test knowledge score regarding practice of biomedical waste management score (11.67±2.88) and the obtained 't' value was 11.12, which was higher than the table value. There was no significant association found between the pre-test knowledge score with the demographic variables of students.

Keywords: effectiveness, planned teaching program, knowledge, bio medical waste management, students

1. Introduction

Hospitals, nursing homes, clinics, medical laboratories and medical research centres are the major source which produce biomedical waste. This wastes are mainly generated by the biological, medical source and activities such as diagnosis, prevention and patient care.

The World Health Organization classify the biomedical waste into eight categories. They are as follows: general waste, pathological waste, radioactive waste, chemical waste, infectious to potentially infectious waste, sharp waste, pharmaceutical waste and pressurized containers used for health care activities ^[1].

As per WHO reports among waste generated by health care activities, about 85% general waste and 15% is hazardous waste. Reports shows that unsafe injections were still responsible for as many as 33 800 new HIV infections, 1.7 million hepatitis B infections and 315 000 hepatitis C infections ^[2].

A qualitative study was done on biomedical waste disposal in India, a system approach was undertaken and found that Waste generated in Colour code Yellow ranged from 64.25 to 27.345 g/day/bed; in Colour code Red from 19.37 to 10.97 g/day/bed and in Colour code Blue from 3.295 to 3.82 g/day/bed in type 1 hospitals to type 5 hospitals respectively ^[3].

A survey conducted in 1 specialty and 5 general hospitals of Addis Ababa, Ethiopia shows that the total quantity of HCW generated at all the hospitals was a median of 182.5 kg/day (range: 86.15–278.85 kg/day). The median generation rate of infectious, pathological, pharmaceutical and sharps waste in each hospital was 25.50, 21.00, 12.00 and 15.13 kg/day, respectively ^[4].

A study conducted assessing the management of healthcare waste in Hawassa city, Ethiopia showed that 48.73% (range: 41.0_67.7%) was infectious and 6.16% sharps (range: 2.12_9.98%) ^[5].

Another study done on determining the generation rate and composition of solid healthcare waste at Gondar University Teaching Hospital Ethiopia done revealed that the average generation rate of solid healthcare waste estimated based on the number of inpatient was 0.95 kg/bed /day and 0.142 kg/outpatient/day ^[6].

Nurses and other health care personnel's are high risk members to acquire infections from the exposure of biomedical waste. So, it is important to make awareness among them for the proper practice of waste management ^[7]. In 2006 a study conducted in medical, dental, nursing and midwifery students at the university teaching hospitals of Shiraz, Iran reported that 71.1% of the students have needle stick injuries ^[8].

A study conducted on factors associated with risk perception of healthcare workers toward healthcare waste management in health care facilities of Gondar Town, Northwest Ethiopia highlighted that among 260 respondents, 78 (30%), 99 (38%) and 83 (31.9%) had higher, moderate and lower knowledge on diseases transmission with healthcare waste, respectively. The majority (202, 77.7%) had low level of knowledge on the existence of manuals on healthcare waste, healthcare waste types, colour coding containers for healthcare waste and the responsibility of healthcare waste segregation, respectively, while 45 (17.3%) and 13 (5%) had low, moderate and higher knowledge. And they also found that none of the facilities had healthcare waste management guidelines. Only small proportion of the Healthcare workers had adequate risk perception on healthcare waste [9].

Another study among BSc nursing and Ayurveda students at India regarding knowledge and practice of biomedical waste management revealed that there was a below average level of knowledge regarding biomedical waste management among the students. Among 380 students 27.6% had good, only 1.8% had excellent knowledge regarding biomedical waste management. Majority (95.8%) had positive attitude regarding biomedical waste management.¹⁰

The investigators own experiences and data's from various study reveals that the biomedical waste management and safety measures are very important aspects to teach to the students of health care profession during their course. A planned teaching programme consisting of information about biomedical waste management can reduce the risk of hospital acquired infections. In this study we discussed about the knowledge regarding practice of biomedical waste management among final year regular undergraduate nursing and midwifery students as well effectiveness of a planned teaching program on biomedical waste management.

2. Methods and Materials

2.1 Design and Setting

An institutional based pre-experimental, one group pre-test and post-test design study was conducted with an objective to assess the effectiveness of planned teaching program on knowledge regarding practice of biomedical waste management among final year regular undergraduate Nursing and Midwifery students of Wollega University, Oromia region, Ethiopia in May 2017.

2.2 Sample and Sampling Techniques

A purposive sampling technique was used to take a total number of 100 students excluding the absentees on the day of data collection. Age, gender, course of study and previous source of information about biomedical waste management were demographic variables of the study. The planned teaching program was the independent variable, whereas knowledge regarding practice of biomedical waste management and dependent variable for the study respectively.

2.3 Data collection

A pre-test was conducted on knowledge regarding practice of biomedical waste management using 25 item structured knowledge questionnaire prepared by reviewing various research and biomedical waste management guidelines by Ministry of health Ethiopia after checking the reliability of tool. Followed by administration of planned teaching program on biomedical waste management. A post test was

conducted by using same questionnaire by lapse 7 days.

2.4 Data Analysis

After data collection each questionnaire was checked for completeness, and data was entered and analysed by using SPSS version 20 statistical package. Demographic proforma containing the sample characteristics was analysed using frequency and percentage. The knowledge regarding practice of biomedical waste management among the regular final year undergraduate nursing and midwifery students before and after the administration of planned teaching program was calculated using mean, and mean percentage, and standard deviation.

The significant difference between the mean pre-test and post-test knowledge scores was calculated using paired 't' test. The association between selected demographic variables and the pre-test knowledge scores regarding practice of biomedical waste management among regular final year undergraduate nursing and midwifery students was determined by Chi-square test. Level of significance was set at a level of 0.05 to interpret the hypotheses and findings. Based on the reviews of various research articles related to the biomedical waste management the knowledge scores operationally define as excellent knowledge above 81% of correct answers, followed by 61% up-to 80% as good, 41% up-to 60% as average and less than 40% was considered as poor knowledge.

2.5 Ethical Consideration

The proposal was approved by Ethical Review Committee of College of Health and Medical Sciences. Verbal and written consents was obtained from the study subjects after explaining the study objectives and procedures and their right to refuse to participate in the study any time they want to. For this purpose, a one-page consent letter was attached to the cover-page of each questionnaire stating about the general purpose of the study and issues of confidentiality which was discussed by data collectors before filling the questionnaire and proceeding with the interview.

3. Results

Demographic characteristics of the study participants: one hundred students were participated in the study. About 58% were males and majority of them (59%) were in the age group of 22-23 years. Regarding the course of study 55% students were from generic nursing course. Among 50% subjects got basic information regarding biomedical waste management from both classroom and hospital.

Table 1: Distribution of students according to their baseline characteristics. N=100

	Variable	Frequency	Percentage
Age (in years)	20-21	28	28.00
	22-23	59	59.00
	24-25	13	13.00
	26 and above	0	00.00
Gender	Male	58	58.00
	Female	42	42.00
Course of study	Nursing	55	55.00
	Midwifery	45	45.00
Previous source of information about biomedical waste management	From Classroom	22	22.00
	From Skill lab	10	10.00
	From Hospital	18	18.00
	From Classroom and Hospital	50	50.00

Section II: Analysis of pre-test scores of knowledge regarding practice of biomedical waste management among the final year regular undergraduate nursing and midwifery students

Table 2: Assessment of pre-test knowledge scores regarding practice of biomedical waste management. N =100

Level of knowledge	Percentage range of score	Frequency (f)	Percentage (%)
Poor	≤ 40	25	25
Average	41 -60	61	61
Good	61 -80	13	13
Excellent	81 -100	1	1

The data in Table 2 shows that majority of the respondents, 61 (61%) had average knowledge regarding practice of biomedical waste management, followed by 25(25%) respondents who had poor knowledge, and 13(13%) had good knowledge, while 1(1%) of them had excellent knowledge regarding practice of biomedical waste management.

Table 2.1: Analysis of pre-test scores of knowledge regarding practice of biomedical waste management N=100

Maximum Possible Score	Mean	Standard deviation	Mean percentage
25	11.67	2.88	46.68

Table 2.1 reveals that the total mean percentage of the pre-test knowledge scores was 46.68% with total mean and standard deviation of 11.67 and 2.88 respectively.

Section III: Analysis of post-test scores of knowledge regarding practice of biomedical waste management among the final year regular undergraduate nursing and midwifery students

Table 3: Assessment of post-test scores of knowledge regarding practice of biomedical waste management among regular final year undergraduate nursing and midwifery students. N=100

Level of knowledge	Percentage of range of score	Frequency (f)	Percentage (%)
Poor	≤ 40	15	15.00
Average	41 -60	30	30.00
Good	61 -80	39	39.00
Excellent	81 -100	17	17.00

The data in table 3 shows that 39 (39%) respondents had knowledge regarding practice of biomedical waste management, followed by 30 (30%) respondents who had average knowledge, 17(17%) had excellent knowledge and 15(15%) had poor knowledge regarding practice of biomedical waste management.

Table 3.1: Analysis of Post-test scores of knowledge regarding practice of biomedical waste management N=100

Maximum Possible Score	Mean	Standard deviation	Mean percentage
25	14.51	4.9	58.04

Table 3.1 reveals that the total mean percentage of the post-test knowledge scores was 58.04% with total mean and standard deviation of 14.51 and 4.9 respectively.

Section IV: Evaluation of the effectiveness of planned teaching programme on biomedical waste management

Table 4: Difference between pre - test and post - test scores of knowledge regarding practice of biomedical waste management. N = 100

Area	Mean knowledge scores		Mean diff.	SD of diff.	‘t’ value	Level of significance
	Pre-test	Post-test				
Knowledge on practice of biomedical waste management	11.67	14.51	2.84	2.02	11.12	P<0.05*

One tail $t_{99} = 2.00$, $P < 0.05$ $df = 99$ *Significant

The data presented in Table 4 shows that the mean post-test knowledge score regarding practice of biomedical waste management were higher than the mean pre-test knowledge scores. The obtained ‘t’ value is also higher than the table value indicating significant difference between the pre-test and post-test scores regarding knowledge on practice of biomedical waste management.

Section V: Association between pre-test scores of knowledge regarding practice of biomedical waste management with selected demographic variables

There was no significant association between knowledge regarding practice of biomedical waste management among regular final year undergraduate nursing and midwifery students with their selected demographic variables.

4. Discussion

In pre-test the majority of the respondents, 61 (61%) had average knowledge regarding practice of biomedical waste management with the total mean percentage of the pre-test knowledge scores was 46.68% with total mean and standard deviation of 11.67 and 2.88 respectively.

The findings of the present study are consistent with the findings of a study conducted in Vizianagaram, Andhra Pradesh India on awareness about biomedical waste management among undergraduate medical and nursing students at a teaching institute in it included a survey in total 113 students, out of which 71 were from final MBBS and 42 were final year nursing students. And they found that MBBS students had a fairly better awareness regarding the subject than nursing students. Almost all study participants were aware about colour coding in segregation of biomedical waste. But when asked about which waste is to be put in which bag, correct response was given by almost half amongst them^[11].

Post test revealed that 39 (39%) respondents had good knowledge regarding practice of biomedical waste management, with the overall mean post-test knowledge score regarding practice of biomedical waste management (14.51±4.9) was significantly higher than overall mean pre-test knowledge score (11.67±2.88) and the obtained ‘t’ value was 11.12, which was higher than the table value.

The findings of the study was consistent with a comparative study was done on knowledge and attitude regarding biomedical waste management with a preliminary intervention in an academic hospital at Mumbai, India. Revealed that there was a statistically significant difference in the knowledge scores between the groups. Post test revealed that the specialists (20.82 ± 5.121) knowledge scores were significantly higher as compared to resident doctors (16.96 ± 5.268), medical interns (18.44 ± 4.293), and

nursing students (15.33 ± 5.144)^[12].

The findings of the study was also consistent with an interventional study conducted on assessment of educational intervention on biomedical waste management among all years nursing students at Government Nursing College, Bengaluru India. And found that the knowledge improved in all years, from 22.3% in first year, 17.5% in second year to 7.8% in third year. Pre-test average score was 18.942 and the post-test average score improved to 19.695. There was improvement in practice ranging from 34.7%, 19.7%, to 8.8% in first, second, and third years of nursing, respectively^[13].

The study findings also revealed that there was no significant association between pre-test knowledge regarding practice of biomedical waste management among regular final year undergraduate nursing and midwifery students with their demographic variables.

5. Recommendations

Based on the findings of the study the following recommendations are forwarded

- A similar study can be conducted by using experimental and control group.
- A similar study can be conducted using a large sample.
- A survey study can be conducted by using large population including all other course students from health science stream.
- A similar study can be conducted in junior students as well as staff nurses working in various departments.

6. Implications of the study

The findings of the study have the following implications in the areas of nursing practice, nursing education, nursing administration, and nursing research.

6.1 Nursing practice

Health education is an important tool of healthcare agency. It is one of the most cost effective interventions. It is concerned with promoting health as well as reducing disease. Biomedical waste have high impact on spreading many diseases including communicable diseases. So, proper handling of waste is necessary to prevent such issues. The nurses can make awareness among the co-workers, especially the supportive staff such as housekeeping regarding safe handling and management of biomedical waste.

6.2 Nursing education

The study also implies that health personnel have to be properly trained on management of biomedical waste. Nursing students should be made aware of the importance of understanding the cause, risk and management of biomedical waste in the hospital.

6.3 Nursing administration

Nursing administration should take an initiative in creating plan and policies to implement the policies and guidelines for proper segregation, storage, transportation, treatment and disposal of biomedical waste. Nurse administrators need to make some information booklet, leaflet, pamphlet about biomedical waste management. Thus it will help health care workers to work effectively on management of biomedical waste

6.4 Nursing research

Nursing practice need to be based on scientific knowledge.

Various studies can be conducted to improve the practice and awareness about proper handling and management of biomedical waste.

7. Conclusion

This research revealed that the final year regular nursing and midwifery students had good knowledge regarding practice of biomedical waste management after administering a planned teaching program. Since the final year nursing and midwifery students are the future nurses and midwives so it is important to provide additional training on certain basic aspects of health care activities mainly to refresh their knowledge and make awareness among them.

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