

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Effectiveness Of Training Program On Knowledge Of Paramedical Staffs About Biomedical Waste Management And Practice In A Tertiary Care Centre, Karur: A Quasi Experimental Study.

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ABSTRACT

Biomedical wastes have to be handled with care from the point of segregation to the common treatment facility. If not handled properly they may result in health hazards. To assess the effectiveness of training programme on paramedical staffs' knowledge about biomedical waste management and practice, a quasi experimental study was done among 90 paramedical staffs in a tertiary care centre. A semi-structured pre-tested questionnaire and checklist were designed. Pre-test, followed by training and Post-test evaluation was done. Data entry was done in Microsoft Excel. Entered data were exported to SPSS software version 20 for analysis. Appropriate descriptive and inferential statistics were done, considering p value at less than 0.05, 0.01 and 0.001 as significant respectively. Mean pre test score was 5.8 and mean post test score was 10.2. The difference was found to be statistically significant at p value less than 0.001. With regard to practice also, there was statistically significant improvement after the training program (pre - 7.3, post - 9.5, p value < 0.001). The training program resulted in effective improvement in practice of management of Biomedical Waste in the facility. Reinforcement training can be conducted periodically.

Keywords: Biomedical waste Management, Training, pre - test, post - test.

<https://doi.org/10.33887/rjpbcs/2024.15.2.7>

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INTRODUCTION

Biomedical wastes are infectious wastes. They usually get generated in health care facilities. They are produced during diagnostic procedures. They are generated while therapeutic measures are undertaken. Vaccination campaigns also generate biomedical wastes. Apart from human sciences, infectious wastes are also produced in animal husbandry settings. In current scenario, wastes not only get generated in hospitals but also in houses and elderly homes. As a part of self-care activities patients suffering from Non – Communicable Diseases are in a position to self – administer injections like insulin. Due to enhanced health awareness, utilisation of urine bags and sanitary napkins has amplified in community settings. Unfortunately, there is no properly structured formal system of disposal available for collecting and treating the Biomedical wastes, generated in sources other than hospitals [1, 2].

The health care facilities are sole responsible for the process of management of biomedical wastes. Rules pertaining to handling of biomedical wastes were framed by the central government in 1998. Environment and forest ministry is responsible for implementation of the rules. Considering the complexity attached with previous format, the rules were amended again in 2016. Minor amendments were made in 2018 and 2022 [2]. Even though the rules are framed by central government, states are held responsible to monitor the implementation of waste management rules. Respective board or committee in a state or union territory for pollution control is authorised to enforce the rules.

The necessity for strict monitoring of biomedical waste disposal and treatment has increased drastically. Especially during Covid – 19 pandemic and in post pandemic era, usage of facial masks, sanitizers and other personal protective equipment's by general public has become universal. Striking reality is that infectious waste management can no longer be restricted within hospital campus but to get expanded to community settings. With increase in awareness of health consciousness, multitude of health-related activities are carried out. Both government and private agencies are involved in conducting medical camps in connection with mass screening, treatment of minor illnesses, mass vaccination campaigns and blood donation. Due to increasing integration of modern medicine and other alternative medicines, AYUSH clinics are also getting involved in intervention managements. All these factors have led on to sudden increase in generation of biomedical wastes and the emerging need for safer disposal.

Among the wastes generated in the health care facility, biomedical waste is about 15% and the remaining 85% are general wastes. The biomedical wastes comprise of blood products, infected tissues, excised organs, secretions, biological fluids such as chemicals, discharge from laboratories, expired and discarded medicines, medical and surgical supplies, waste sharps, metallic implants, broken glass equipment's and recyclable plastics etc. According to the biomedical rules, the wastes are classified according to colour code viz., Yellow, Red, White and Blue category. The colour coding has to be followed from the point of segregation to storage and transport to common treatment facility [1, 2].

In health facility, the biomedical wastes are generated, transported and stored in a secluded area with restricted access to public and patients. The wastes are weighed and then sent to the common treatment site for final disposal. The staffs play a crucial role from the process of segregation to storage of biomedical wastes. The staffs have to follow colour coding system in wards since those areas are potential sources of waste segregation. If the wastes are mixed, it will affect the treatment and disposal of wastes. Thus the study was conducted with an aim to assess the effectiveness of training program on paramedical staffs' knowledge about waste management and practice in a tertiary care centre.

METHODOLOGY

A quasi-experimental study – pre-test, post-test design was conducted among the paramedical staffs in a tertiary care centre, located in the city of Karur, Tamil Nadu. Based on a study conducted among healthcare providers regarding healthcare waste management at various maternal and child health centres in Egypt [3], $Z\alpha$ at 95% level with an allowable error of 5% , power of the test 95% and dropout rate at 20% , the size of the sample was derived as 87 and the same was rounded to 90. Those 90 paramedical staffs consisted of staff nurses and Lab technicians (table -1). The study was carried out in the period of June to September 2022.

The staffs who had worked either in the ward or lab continuously for at least 3 months were included in the study. Informed consent from all the participants was obtained in prior. The staffs those

who had already undergone training in biomedical waste management within one year were excluded. The study was conducted among wards namely Casualty, Emergency ward, Intensive Care Unit (ICU), medical wards, surgical wards, labor ward, Obstetric wards, New born ICU and Laboratories.

The pre-test evaluation of practice of biomedical waste management in wards and labs was done using a pre-validated checklist. Then pre-test evaluation of paramedical staffs on knowledge about biomedical waste was done using the pretested semi structured questionnaire.

A well organised training programme was conducted to the paramedical staffs using the available biomedical waste management guidelines. Then post-test evaluation of paramedical staffs on knowledge about biomedical waste was done using the same pretested semi structured questionnaire. Then post-test evaluation of practice of biomedical waste management in wards and labs was done using the pre-validated checklist. The data were collected on parameters like types and categorisation of hospital wastes, disposal of biomedical wastes, segregation of wastes, disinfection and treatment of wastes and record maintenance.

Institutional ethical committee clearance was obtained. The study has less than minimal risks.

Statistical Analysis

Data entry was done in Microsoft Excel. Entered data were exported to SPSS software version 20 for analysis. Appropriate descriptive and inferential statistics were done, considering p value at less than 0.05, 0.01 and 0.001 as significant respectively.

RESULTS

Demographic Details

Age of the participants ranged between 18 and 58 years with mean and standard deviation were 35.53 and 6.43 years respectively. The average years of experience were 7.5 years. About 96.7% were females.

Knowledge About Biomedical Waste Management

About 12 questions were asked both before and after training program to assess the knowledge about biomedical waste management like percentage of biomedical waste, types of colour bags to be used, categorisation of some wastes, and some questions were on rules.

Each question was given scoring of 0 to 1. The scores are summed up and analysed both pre-training and post-training. The score of each question as well as the overall score is analysed using the paired t-test.

There was a statistically significant improvement in scoring for each of the question related to the knowledge on biomedical waste. Overall improvement in all the aspects of knowledge was also found to be statistically significant (table -2).

Practice Of Biomedical Waste Management

About 10 wards including labs and ICU were evaluated. During pre-training evaluation of wards, there was proper utilisation of bins in 9 wards, bags in 7 wards and blood spill management kits in 4 wards. Needle stick injury register was maintained in 9 wards. All wards had puncture proof container, hub cutter, biomedical waste management record and biomedical waste management charts. None of the wards had personal protective equipment's. About 40% of the staffs in those wards showed correct practice of biomedical waste management.

S. no	Designation/ Qualification (frequency)	Percentage
1	Lab Technicians (11)	12.4%
2	Staff Nurses	
	a. Diploma in Nursing (55)	61.8%
	b. B.Sc Nursing (14)	15.7%
	c. M. Sc Nursing (9)	10.1%

S. no	Question	Pre-test (mean score)	Post-test (mean score)	t value	p value
1	Constitution of Biomedical Waste	0.66	1.0	2.602	<0.011***
2	Coating of colour coded bags	0.42	0.83	7.245	<0.001*
3	Duration of storage of Biomedical waste	0.23	0.71	7.082	<0.001*
4	Disposal of blood bag	0.73	0.98	5.366	<0.001*
5	Disposal of discarded formalin	0.66	0.96	5.381	<0.001**
6	Disposal of used copper T	0.41	0.60	3.097	<0.003**
7	Disposal of broken ampoule with cytotoxic drug	0.66	0.47	-2.908	<0.005*
8	Orthopaedic screw disposal	0.34	0.82	7.748	<0.001*
9	Disinfection of sputum cups	0.52	1.08	4.229	<0.001*
10	Amendment of BMW rules	0.48	0.86	6.488	<0.001*
11	Ministry responsible	0.21	1	18.237	<0.001*
12	Capacity of bags to be filled	0.54	0.91	6.576	<0.001*
Overall score		5.8 (5.35 - 6.26, 95% CI)	10.2 (9.84 - 10.64, 95% CI)	15.177	<0.001*

* p value less than 0.001 - statistically significant
 **p value less than 0.01 - statistically significant
 *** p value less than 0.05 - statistically significant

S.no	Items	Pre - test (mean score)	Post-test (mean score)	t value	p value
1	Proper utilisation of Bins	0.9	1.0	1.000	0.34
2	Proper utilisation of Bags	0.7	1.0	1.964	0.08
3	Proper utilisation of Puncture proof container	1.0	1.0		-
4	Proper utilisation of Hub cutter	1.0	1.0		-
5	Proper utilisation of Personal protective equipment	0.0	1.0		-
6	BMW records maintenance	1.0	1.0		-
7	Proper utilisation of Blood spill management kit	0.4	0.6	1.000	0.34
8	Needle stick injury register maintenance	0.9	0.9		-
9	BMW chart display	1.0	1.0		-
10	Practice - on spot observation	0.4	1.0	3.674	0.005**
Overall score		7.3 (6.8 - 7.9, 95% CI)	9.5 (9.2 - 9.8, 95% CI)	6.128	<0.001*

*p value at less than 0.001 - statistically significant
 **p value at less than 0.01 - statistically significant

During post-training evaluation of wards, blood spill management kits were properly utilised in 6 wards while needle stick injury registers were maintained in 9 wards. All wards were found to utilize properly the bins, bags, puncture proof container, hub cutter, personal protective equipment's. All wards

were found to maintain biomedical waste management records and biomedical waste management charts. All 100% of the staffs showed correct practice of biomedical waste management.

About 10 items were evaluated and each one was given scoring of 0 to 1. The scores were summed up and analysed both pre-training and post-training. An overall statistically significant improvement in practice of biomedical waste management was found (table -3).

DISCUSSION

Our study results show that the mean age and standard deviation of the participants were 35.53 and 6.43 years respectively. About 96.7% are females. The study findings can be compared with the study conducted by Sukhbir singh et al. [4] in which range of age is 20 to 30 years and majority of the participants are female (83%). On comparing with the study conducted by Sobhy et al. [5], age of participants ranges between 35 to less than 50 years. All these findings suggest that the majority of the participants are females and most of them are at thirties.

About 12.1% are lab technicians and others are staffs with BSc Nursing, MSc Nursing and Diploma nursing qualification respectively. The average years of experience are 7.5 years. These findings are comparable to study done by Sukhbir singh et al. [4], in which 93.9% of the participants are nurses and 46.9% of them had less than 10 years of experience. In the study conducted by Tahira shaheen et al. [3], nearly 36% of them had average years of experience of about 5 to 7 years. Similar findings are seen in the study carried out by Mannapur et al. [6], where 14% of participants are lab technicians and remaining are staff nurses. All findings indicate that majority of paramedical staffs are with nursing qualification and most of them are having experience of about 7 years.

In regarding to knowledge related to duration of storage of biomedical wastes, disposal of implants and ministry responsible for implementation of biomedical management rules, there was a drastic improvement of scores after the training program when compared to other parameters. Over all mean pretest knowledge score is 5.8. Mean post-test knowledge score is 10.2. it is evident that there is a gross statistically significant improvement in waste management. In Mannapur et al. study, before training only 31.97% of the participants are aware about disposal methods of Bio-medical waste. Awareness level increased dramatically up to 56.56% after training. Thus the increase in percentage of knowledge is found to be statistically significant [6]. The study findings are comparable to study done by Tahira shaheen et al. [3], where the mean pre-test score is 15.8 and mean post-test mean scores is 22.4. The mean difference is found to be statistically significant.

In regarding to practice of waste management, there was notable improvement in proper utilisation of bins, bags and blood spill management kits. Mean pre-test practice score is 7.3 and mean post-test practice score is 9.5. Overall, this mean difference in practice score is statistically significant. In the study done by Sobhy et al. [5], pre-test percentage of proper practice is 16.3% and post-test increase in proper practice is 81.6% and the difference is statistically significant and similar to our study findings. The crux of training program in sensitizing the participants about responsibilities in addition to improvement of knowledge may be the reason for sustained improvement in practice of waste management.

CONCLUSION

The study was done with intend to assess the effectiveness of training program on biomedical waste management. The study shows that the training program showed a striking improvement in knowledge while an evident improvement in practice of Biomedical Waste Management in the facility. The ultimate purpose of the study is to sensitize the staffs that biomedical waste management is equally important to patient care. In the absence of waste management patient care will go on vain irrespective of its quality. It can be concluded that periodic reinforcement training to all the staffs in the health facility will maintain the biomedical waste management at the satisfactory level.

Limitations

Conduction of study was limited to paramedical staffs only. Knowledge and practice of other staffs especially the hospital workers would have been evaluated.



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