Original Research Article

Impact evaluation of biomedical waste segregation among junior residents of a South Indian medical college: a quasi experimental study

Ranganath T. Sobagaiah, Karuna Siddappa Patange*, Vishwanatha

Department of Community Medicine Bangalore Medical College and Research Institute, Bengaluru, Karnataka, India

*Correspondence:
Dr. Karuna Siddappa Patange,
E-mail: karunapatange6@gmail.com

ABSTRACT

Background: Biomedical waste is any waste generated during the diagnosis, treatment or immunization of human beings or animals. The quantity of solid waste generated in Bangalore hospitals is from ½ to 4 kg per bed per day. But segregation is done in only 30%. Health care workers have an important responsibility to segregate the biomedical waste and dispose them. Hence this study was undertaken with the objective of assessing the impact of intervention on Biomedical waste segregation knowledge among junior doctors.
Methods: The study design employed is a quasi experimental study with control and intervention design. The junior doctors were selected randomly. After written informed consent the participants were divided as two group of intervention and control group with 74 in each group. Data of pre-test was collected using self-administered and validated questionnaire. After a week of pre-test, training using WHO modules 3 on training of biomedical waste segregation based on IHWM was done only for the intervention group. After a period of 3 months post test was conducted for both the intervention and the control group using a pre tested self-administered questionnaire with questions very similar to the pre-test.
Results: The difference is found to be with t-test value of 1.434 and df of 37 with significant value 0.160 (>0.05) for the control group. The difference is found to be with t-test value of 3.241 and df of 35 with significant value 0.003 (<0.05) for the intervention group.
Conclusions: The knowledge of biomedical waste management was found to increase after an intervention.

Keywords: Biomedical waste segregation, Quasi-experimental, Junior doctors

INTRODUCTION

Biomedical waste is any waste generated during the diagnosis, treatment or immunisation of human beings or animals or in research activities pertaining thereto or in production or testing of biologicals.[1] Exposure to hospital waste possess a disastrous profound impact on health care professionals as well as the public.

The total quantity of waste generated in Bangalore is about 40 tonnes per day (0.5-2 kg/day across the world). Health care workers have an important responsibility to segregate the biomedical waste properly and dispose them.[2] In Bangalore the quantity of solid waste generated in hospitals is from ½ to 4 kg per bed per day. But segregation is done in only 30% of the hospitals.[1]

Lack of awareness about the health hazards from biomedical wastes, insufficient funds and human resources would contribute to improper waste management and poor control of waste disposal. They contribute to the most critical problems relating to healthcare waste.[3] An important component for an effective biomedical waste (BMW) management is

appropriate waste segregation. Improper segregation can pose an adverse impact on public health and thus increase the cost of treatment.[4] Meticulous and scientific disposal of biomedical waste is important and if not done then this waste by healthcare institutions can contribute to the spread of contagious diseases like hepatitis and AIDS (HIV) among those who manually handle it and also among the general public.[5] Appropriate knowledge of health care waste management among the interns is the first step towards developing favourable attitude and practices. This would ensure safe disposal of hazardous hospital waste.[6]

Hence there is a need to segregate the biomedical waste at the very first level of production. This possess the utmost need of knowledge of biomedical waste segregation among junior residents. Hence this study was undertaken with the objective to assess the impact of intervention on biomedical waste segregation among junior doctors of Bangalore medical college.

METHODS

The study design employed is a quasi experimental study with control and intervention design conducted in study setting of Bangalore Medical College and Research Institute, Bangalore. The study was carried out for a period of 3 months, from December 2018 to February 2019.

Sample size

The sample size was calculated and taken with reference to a study conducted by Kumar et al with knowledge as 43%. The sample size was to be 70 in each group.[7]

Inclusion criteria

All interns present during the pre-test were included.

Exclusion criteria

Patients who were not received consent were excluded.

The junior doctors were selected randomly. After written informed consent the participants were divided as two group of intervention and control group with 74 in each group. Data of pretest was collected using self-administered, pre tested and validated questionnaire.

After a week of pre-test, training using WHO modules 3 on training of biomedical waste segregation based on IHWM, was done only for the intervention group.[8] 1 training program of 3 hours duration was conducted for the intervention group.
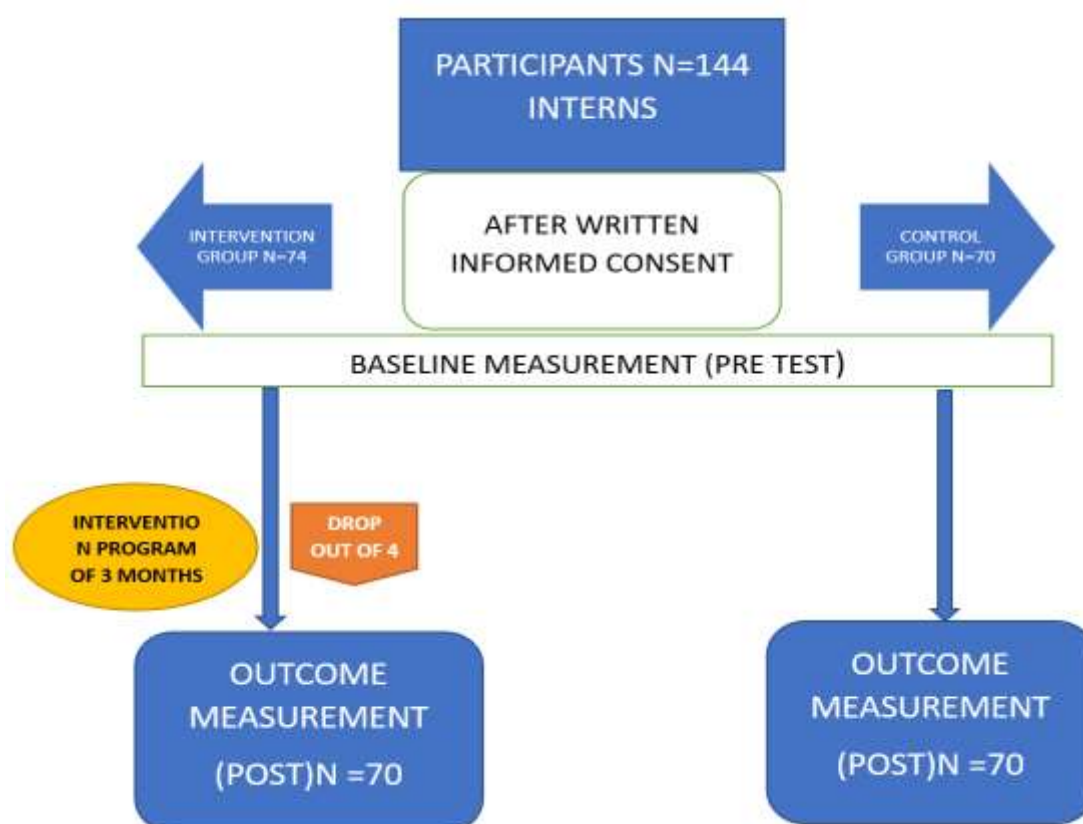

Figure 1: Describing the process of data collection and training of quasi experimental study.

After a period of 3 months post test was conducted for both the intervention and the control group using a pre tested self administered questionaire with questions very similar to the pretest. The same is as shown in Figure 1.

Statistical analysis

Data was coded and entered in MS excel and analysed using statistical software SPSS version 20.0. Results were expressed in terms of percentages, tables and graphs. Appropriate descriptive statistics, independent and paired t-test was used.

RESULTS

Table 1 describes the demographic characteristics of the participants. The study population included maximum of 51 (70.8%) male in intervention group. But the control group had maximum of females of 40 (55.55%). The total number of males were 83 (57.63%) and 61 (42.36%) females.

Table 2 describes the mean score of knowledge of subjects in the intervention and control group regarding segregation of infectious waste. The mean score of subjects in the pre-test of intervention group was found to be 5.61 (of the maximum score of 10) and the mean score of pre-tests in the control group was 4.56 (of the maximum score of 10). Similarly, the mean score of post-test group in intervention group was found to be 6.91 and 4.25 in the control group.

Table 3 presents the difference between the knowledge in the pre-test between intervention and control group regarding infectious waste. The test used to infer the difference in the pre-test between the 2 independent groups is the independent t-test. The difference is found to be with t-test value of 2.002 and df of 69 with significant value 0.51 (>0.05). This test would infer that the difference that exists is not significant and hence there is no difference between the intervention and control group before conducting the intervention.

Table 1: Demographic characteristics of the participants.

Variables		Intervention		Control		Total	
		N	%	N	%	N	%
Gender	Male	51	70.8	32	44.4	83	57.63
	Female	21	29.1	40	55.5	61	42.36
Experience	<6 months	122	84.72	22	15.27	144	100

Table 2: Mean score of knowledge of subjects regarding infectious waste.

Variable	Intervention group		Control group	
	Pre (n=74)	Post (n=70)	Pre (n=70)	Post (n=70)
Segregation of waste	5.61	6.91	4.56	4.25

Table 3: Difference between the knowledge of subjects (between intervention and control group) regarding infectious waste.

Variable	T (independent t test)	df	Sig	Inference
Pre-test score	2.002	69	0.51 (>0.05)	No significant difference

P<0.05* statistically significant.

Table 4: Difference between the knowledge of subjects regarding infectious waste (pre-test and post-test).

Variable	T (dependent t test)	df	Sig	Inference
Pre-post test of control group	1.434	37	0.160 (>0.05)	No significant difference

P<0.05* statistically significant.

Table 5: Difference between the knowledge of subjects regarding infectious waste (pre-test and post-test).

Variable	t test	df	Sig	Inference
Pre-post test of intervention group	-3.241	35	0.003 (<0.05)	Significant difference

P<0.05* statistically significant.

Table 4 shows the difference between the knowledge in the pre-test and post-test in the control regarding infectious waste. The test used to infer the difference in the pre-test and post-test is the t-test. The difference is found to be with t-test value of 1.434 and df of 37 with significant value 0.160 (>0.05). This test would infer that the difference that exists is not significant and hence there is no difference between the pre-test and post-test of control group.

Table 5 describes the difference between the knowledge in the pre-test and post-test in the intervention group regarding infectious waste. The test used to infer the difference in the pre-test and post-test is the t-test. The difference is found to be with t-test value of 3.241 and df of 35 with significant value 0.003 (<0.05). This test would infer that the difference that exists is a true significant difference and hence there is difference between the pre-test and post-test of intervention group.

DISCUSSION

The present study was conducted with an intention to assess the impact of intervention on biomedical waste segregation among junior doctors of a South Indian medical college.

In this study the total number of males were 83 (57.63%) and 61 females 42.36%. Similar study conducted by Kumar et al had the study population of M:F ratio as 47:53 in intervention group, and 66:34 in the control group.[7] Another study conducted by Radha et al shows that 90.3% of the doctors knew about segregation of waste at the source.[6]

In a similar study conducted by Datta et al in Lucknow the knowledge about biomedical waste segregation is seen in >70% of the doctors.[9] The mean knowledge was 4.35±1.63 among the participants of a study conducted by Sanjeev et al.[10] Also another study conducted by Pandey et al was found to be >90% among the participants.[11]

The mean score of subjects in the pre-test of intervention group was found to be 5.61 and the mean score of pre-tests in the control group was 4.56. Similarly, the mean score of post-test group in intervention group was found to be 6.91 and 4.25 in the control group. The difference is found to be with t-test value of 2.002 and df of 69 with significant value 0.51 (>0.05). This test would infer that the difference that exists is not significant and hence there is no difference between the intervention and control group before conducting the intervention. The difference is found to be with t-test value of 1.434 and df of 37 with significant value 0.160 (>0.05). This test would infer that the difference that exists is not significant and hence there is no difference between the pre-test and post-test of control group. The difference is found to be with t-test value of 3.241 and df of 35 with significant value 0.003 (<0.05). This test would infer that the difference that exists is a true significant difference and hence there is

difference between the pre-test and post-test of intervention group. In a similar study conducted by Kumar et al, knowledge has increased in the intervention group from 20-25%; while in the control group only 1-3% knowledge has improved.[7]

Another study conducted by Natraj et al showed results indicating that a statistically significant improvement in waste segregation practices occurred with a prospective study of 6 months duration from August 2004 to January 2005.[4]

A study conducted by Kumar et al with a follow up after 18 months post intervention it was found that participants had statistically significantly (p<0.05) better knowledge.[12]

Another study conducted by Elnour et al in Sudan showed that the participants had knowledge regarding HCW management as 17% good, 58% fair, and 25% poor before the educational intervention program. After educational implementation the knowledge was found to be 56% good, 34% fair, and 10% poor in the immediate post-test and in the three months post-test it was 59% good, 35% fair, and 6% poor.[13]

Limitations

The study was conducted for a period of 3 months. The study emphasising on a very important aspect of biomedical segregation can be done for a longer duration emphasising on a greater number of days of training. Another limitation that we could address is the study population which could also include nurses and other health care workers in further studies.

CONCLUSION

The knowledge of interns with respect to biomedical waste is found to be low. With effective intervention of intensive training (using IHWM) the knowledge has been found to be increased among the intervention group. With no training the knowledge shows no significant improvement.

Recommendations

After a comprehensive analysis of the study conducted it is clearly evident that planning of periodic training and evaluation of hospital staff by the biomedical waste management team is of utmost importance. Also conducting combined medical education to train the interns and other staff to tackle the biomedical waste segregation at the very grass root level.

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REFERENCES

1. Park JE. Park's textbook of preventive and social medicine. 25th edition. M/s Banarasidas Bhanot publishers; 2019:301-33.
2. Kishore J, Agarwal R, Kohli C, Sharma PK, Kamat N, Tyagi S. Status of biomedical waste management in nursing homes of Delhi, India. J Clin Diagn Res. 2014;8(3):56-8.
3. Madhukumar S. Study about awareness and practices about health care wastes management among hospital staff in a medical college hospital, Bangalore study about awareness and practices about health care wastes management among hospital staff in a medical college hospital, Bangalore. Int J Basic Med Sci. 2012;3(1):7-11.
4. Nataraj G, Baveja S, Kuyare S, Poojary A, Mehta P, Kshirsagar N, et al. Report: medical students for monitoring biomedical waste segregation practices - Why and how? Experience from a medical college. Waste Manag Res. 2008;26(3):288-90.
5. Gupta S, Boojh R. Report: biomedical waste management practices at Balrampur hospital, Lucknow, India. Waste Manag Res. 2006;24(6):584-91.
6. Radha R. Assessment of Existing Knowledge, Attitude, and Practices Regarding Biomedical Waste Management among the Health Care Workers in a Tertiary Care Rural Hospital. Int J Heal Sci Res. 2012;2(7):14-9.
7. Kumar R, Somrongthong R, Shaikh BT. Effectiveness of intensive healthcare waste management training model among health professionals at teaching hospitals of Pakistan: A quasi-experimental study. BMC Health Serv Res. 2015;15(1):1-7.
8. WHO. Training modules in health-care waste management. Available at https://www.who.int/water_sanitation_health/facilities/waste/training_modules_waste_management/en. Accessed on 9 November 2019.
9. Sachan R, Patel ML, Nischal A. Assessment of the knowledge, attitude and Practices regarding Biomedical Waste Management amongst the Medical and Paramedical Staff in Tertiary Health Care Centre. Int J Sci Res Public. 2012;2(7):1-6.
10. Verma L, Mani S, Sinha N. Biomedical waste management in nursing homes and smaller hospitals in Delhi. Waste Management. 2008;28(12):2723-34.
11. Pandey A, Ahuja S. Bio-Medical Waste Managment in a Tertiary Care Hospital: An Overview. J Clin Diagnostic Res. 2016;10(11):1-3.
12. Kumar R, Somrongthong R, Ahmed J. Impact of waste management training intervention on knowledge, attitude and practices of teaching hospital workers in Pakistan. Pakistan J Med Sci. 2016;32(3):705-10.
13. Elnour AM, Moussa MMR, Borgy EMD, Fadelella NEE, Mahmoud AH. Impacts of health education on knowledge and practice of hospital staff with regard to Healthcare waste management at White Nile State main hospitals, Sudan. Int J Health Sci. 2015;9(3):315-31.

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