Research Article

Effectiveness of poster method on the wall and pictorial method on bins on knowledge and practice regarding segregation of bio-medical waste – A comparative study

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Abstract

Introduction: The proper segregation of Bio-medical Waste at point of generation is a prime concern. It has been observed that there was poor practice among health care workers in segregating waste in different color-coded bins despite fair knowledge about it. Hence, the study was undertaken to identify effective methods to influence knowledge and practice regarding segregating bio-medical waste. **Methods:** A quasi-experimental and two groups post-test only design was adopted. The study was conducted in selected wards of NEIGRIHMS Hospital, Shillong, India. The Wards were randomly selected, of which 63 and 78 participants were exposed to pictorial and poster method respectively. The participants which comprises of PGs, JRDs, Interns, Staff Nurses, B.Sc Nursing students and Grade IV workers. Practice was assessed by using checklist tool through direct observation and knowledge was assessed by using self-administered questionnaire. **Results:** The mean score of participants in terms of practice and knowledge in pictorial method was 9.52 ± 0.61 and 11.38 ± 2.2 respectively whereas in poster method it was found to be 7.59 ± 1.46 and 8.45 ± 2.16 respectively. The pictorial group demonstrated significant improvement in knowledge (Knowledge: t =7.85,p=0.00) and practice (t=9.57, p value=0.00) than poster group at 95% of level of significance. The correlation-coefficient in terms of practice and knowledge score among the participants who were exposed to pictorial and poster method was 0.46 and 0.32 respectively. **Conclusion:** It is recommended that the use of pictures on the bins will act as ready reference and daily viewing of these pictures act as reinforcement that enhances knowledge and practice and habit formation.

Keyword: Bio-medical waste, segregation of hospital waste, pictorial method, poster method, Visual aids, knowledge, practice, health care workers, Nurses.

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1. Introduction

"Bio-medical waste is the waste generated during diagnosis, treatment or immunization of human beings or animals. It also deals with research activities pertaining there to, or in the production and testing of biological, and is contaminated with human fluids" [1]. India generates around 0.33 million tons of medical waste every year. The average quantity of hospital solid waste produced in India ranges from 0.5-2kg/day/per/bed [2].

Need for the study

Hospital waste poses greater risk to general populations in addition to patients and hospital staffs [3]. Nurses and health workers play a pivotal role in hospital waste segregation. Their Knowledge and awareness about the best practices in segregation of waste at the point of generation reduces the risk of exposure to injury, infection and morbidity among the personnel handle them.

Interestingly, Literature revealed that only 28.57% were putting their knowledge of disposing waste properly into practice despite majority had adequate knowledge

regarding color-coded bins and hazards of improper disposal of bio-medical waste [4]. Health and safety of the health care workers are cardinal features of bio-medical waste management and it cannot be achieved without the co-operation of each and every member of the health care team. Nursing personnel play a very significant role in the whole process.

The rules for management and handling of bio-medical waste were summarized by focusing on the categories which include color coding dustbins, poster directed disposal technique, treatment options, etc [5]. This is to ensure safety of health care personnel.

In spite of the fact that color coding dustbin and poster directed techniques have already been implemented and placed at strategic locations of hospital, it has been found that errors do persist in disposal of waste. The lack of proper facilitating visual aids at the point of segregation in lieu or in addition to poster is considered as one of the key factor for improper segregation of Bio-medical wastes. It is assumed that pictorials pasted on the bins may enhance practice thus reducing the chances of health hazards in segregating waste. Hence, this study is aimed to compare the poster method in the wall and pictorial method on the bins on knowledge and practice of Health workers regarding segregation of bio-medical waste.

Objectives of the Study

1. To assess the knowledge and practice of students and health care workers regarding segregation of bio-medical waste in selected wards where the poster method is displayed.
2. To assess the knowledge and practice of students and health care workers regarding segregation of bio-medical waste in selected wards where the pictorial method is introduced.
3. To compare the effectiveness of poster method and the pictorial method on knowledge and practice.
4. To determine the correlation between knowledge and practice of segregation of bio-medical waste.

Hypotheses

1. There is a significant difference between pictorial method and poster method in terms of knowledge score regarding segregation of bio-medical waste.
2. There is a significant difference between pictorial method and poster method in terms of practice score regarding segregation of bio-medical waste.
3. There is a significant co-relation between knowledge and practice regarding segregation of bio-medical waste.

2. Method

A quasi-experimental two group's post-test only design was adopted. Data collection procedure was done from 11 to 16 January 2016. The study was conducted in randomly selected general wards in NEIGRIHMS hospital, Shillong and Cluster randomization method was adopted in assigning the wards for pictorial and poster method. Convenient sampling method was adopted in selecting the participants comprising Nursing students, Staff Nurses, Internship Medical Students, Junior Residents, Senior Residents, Post Graduate Medical Students and health care workers in each selected general wards. Participants who had undergone training on bio-medical waste within 30 days prior to the day of consent were excluded from the study.

Ethical consideration

This project was approved by Institutional Ethical Committee (IEC), NEIGRIHMS and formal administrative permission was obtained from the competent authorities of Hospital. Data collectors were trained in order to gain an in-depth knowledge about bio-medical waste, its segregation including the protocol followed in the hospital. A written consent was taken from each and every participant. Sample size was not estimated as it may restrict the potential participants and it may likely to cause violation of ethical principles as this study involves direct observation of participants.

Intervention

In pictorial method, pictures of various wastes were pasted on the different color coded bin. In poster method, poster which had information regarding segregation of bio-medical waste was displayed in the area where the color coded bins were kept. The color coded bins were kept and practiced as per guidelines of Bio-medical waste (Management and Handling rules) 1998 in study setting.

The total of 73 participants and 90 participants had given their consent in pictorial and poster group respectively to participate in study. The total of 10 participants from pictorial group and 12 participants from poster group had withdrawn during the study. The practice of the participants was assessed through direct observation by using checklist and knowledge was assessed by using self-administered questionnaire (multiple-choice questions).

The Study was initiated by collecting the waste (cotton swabs, plastic covers, face mask, gloves, syringes, gauze pieces, IV bottles and ampoules) generated from the selected wards and every participant is asked to dispose all the items as per check list. The observations made on the first day of the study were not taken into consideration. From the second day onwards, observations were made and recorded.

The questionnaires were distributed on the last day of the data collection period to assess the knowledge regarding segregation of waste. Sixty three participants had completed the study in pictorial group and 78 participants had completed the study in poster group.

3. Results

The data were analyzed using SPSS (V.20). Among the 141 participants, about 95 (67.37%) belonged to the age group of 18-28, 36 (25.53%) belonged to the age group 29-38 and 10 (7.09%) belonged to the age group of 39-48. In terms of designation, 0.7 % were Post graduates, 2.12% were Junior Residents doctors, 24.82% were staff nurses, 4.25% were interns, 36.87% were students and 31.20% were grade IV workers. Out of the 141 participants, 22.70% were males and 77.30% were females. (Table-1)

Table no 1: Distribution of participants according to demographic characteristics

n=141

Demographic Variables		Pictorial Method n=63	Poster Method n=78
Gender	Male	16(25.39%)	16 (20.51%)
	Female	47 (74.61%)	62 (79.49%)
Designation	Post Graduate	0	1 (1.28%)
	JRD	1 (1.58%)	2 (2.56%)
	Staff Nurse	17 (26.98%)	18 (23.07%)
	Intern	4 (6.34%)	2 (2.56%)
	Bsc (N) Students	18 (28.57%)	34 (43.58%)
	Ward Boys	9 (14.28%)	8 (10.25%)
	Ward Girls	14 (22.22%)	13 (16.66%)
Age	18 -28	37 (58.73%)	58 (74.35%)
	29 -38	23 (36.50%)	13 (16.66%)
	39 – 48	3 (4.76%)	7 (8.97%)

The mean knowledge score of participants who were exposed to the pictorial method was 11.38±2.2 and the mean knowledge score of participants who were exposed to the poster method was 8.45±2.16. The independent 't' –test revealed that there was significant difference in knowledge score found between pictorial method and poster method regarding segregation of Bio-medical waste. Hence hypothesis 1 was accepted. Further, it revealed that the pictorial method was found to be more effective method in improving knowledge. (Table-2)

Table no 2: Comparison of knowledge score of the participants exposed to pictorial and poster method regarding segregation of bio-medical waste

n=141

Groups	Mean	S.D	df	Table value	Calculated 't' value	'P' value	95% Confidence limits	
							Lower	Upper
Pictorial method (n=63)	11.38	2.2	139	1.98	7.85(S)	0.000	2.18	3.65
Poster method (n=78)	8.45	2.16						

p ≤ 0.05 is significant.   (S)- Significant

The mean practice score of participants who were exposed to pictorial method was 9.52±0.62 and the mean practice score of participants who were exposed to poster method was 7.6±1.46. The independent 't' –test revealed that there was significant difference in practice score found between pictorial method and poster method regarding segregation of Bio-medical waste. Hence, hypothesis 2 was accepted. Further, it was found that pictorial method is more effective in improving practice than poster method. (Table-3)

Table no 3: Comparison of practice score of the participants exposed to pictorial and poster method regarding segregation of bio-medical waste

n=141

Groups	Mean	S.D	df	Table value	Calculated 't' value	'P' value	95% Confidence limits	
							Lower	Upper
Pictorial method (n=63)	9.52	0.62	139	1.98	9.57(S)	0.000	1.50	2.28
Poster method (n=78)	7.6	1.46						

In pictorial method group, the mean knowledge score of participants was 11.38±2.2 and the mean practice score of participants was 9.52±0.62.In poster method group, the mean knowledge score of participants was 8.45±2.16 and the mean practice score of participants was 7.6±1.46.The Pearson's correlation test was applied to find out the relationship between knowledge and practice score. It revealed that knowledge and practice were found to have moderately positive relationship in picture method group and poster method group. (Table 4)

Table no 4: Relationship between knowledge and practice score among participants exposed to pictorial method and poster method regarding segregation of bio-medical waste.

n=141

Groups	Variables	Mean	S.D	'r' value
Pictorial Method n=63	Knowledge Score	11.38	2.2	0.46
	Practice score	9.52	0.62	
Poster Method n=78	Knowledge Score	8.45	2.16	0.32
	Practice score	7.6	1.46	

Discussion

The study to compare two methods of aids that facilitate in segregation of Bio-medical waste at point of generation is the first of its kind in India. The objectives of the study were to assess the practice and knowledge of students and health care workers regarding segregation of Bio-medical waste. To compare the effectiveness of the pictorial method on bins and the poster method on the wall regarding segregation of Bio-medical waste and to find out the correlation between knowledge and practice score of both methods.

Consent was taken from 163 participants out of which only 141 subjects could complete the study. The remaining 22 participants were unable to complete the study as they were, probably, apprehensive of being directly observed or due to lack of confidence in completing the task. Majority of the participants (77.30%) were females, that is, 109 (77.30%) and 32(22.70%) were males. Similar findings reported by Dr. Shishir Basarkar stated that out of the total 184 participants 132 (71.7%) were females and 52 (28.2%) were males [6].

In this study it was found that from among 141 participants, majority of the participants belong to the age group of 18-28 years (67.37%). Similar characteristics were reported by Rajesh K. Chudasama et al (2013) [7] and Nagaraju B. et al (2013) [8]. According to the designation, majority of the participants were BSc Nursing students (36.87%).

It was evident through the findings that most of the participants (92.3%) have difficulty in disposing used face mask and cannulas in proper bins. It was also found that due to busy schedules, the participants tended to throw waste without looking at the poster, as it is a cluster of words and images which is confusing and time consuming, especially during rush hours whereas in pictorial method, participants can discard the waste by directly looking at the pictures which have been pasted on bins. Due to different protocols regarding colour coded bins followed for segregation of Bio-medical waste in different hospitals, the newly recruited staffs have problems in segregation of bio-medical waste.

It was interesting to see that with an increase in knowledge there was subsequent fall in the practice level in studies done by Vettivel Chezlan Sengodan et al (2014) where the knowledge mean score was 7.74 ± 1.03 and practice mean score was 6.58± 1.09, as well as in Sanjeev R. et al (2015) where knowledge mean score was 4.35± 1.63 and practice mean score was 4.43± 0.78, which are in contrast with our findings that showed that there was an increase in practice with an increase in knowledge [9,10]

In this study, 82.05% of participants using the poster method sought more help than those who were exposed to the pictorial method (76.2%). It has been observed that in spite of the presence of posters on the wall, they tend to ask for help. The study also showed a varying difference in disposing off face mask in appropriate color-coded bin in pictorial method (87.3%) and poster method (7.69%).

While 100% of the participants burned the needles and separated the plunger and barrel before disposing in the solution in the pictorial method where as in the poster

method only 73.07% participants burned the needle and 60.25% participants separated the plunger and barrel. Nosheen Arshad et al (2010) found a similar result in which 60% of the hospitals used needle cutter before discarding the syringe [11].

Surprisingly, in the poster method, 83.3% of the participants did not discard IV bottles in blue bins whereas in the pictorial method 100% of the participants correctly disposed of them.

This study showed that the participants who were exposed to the pictorial method made fewer mistakes and sought lesser help in segregation of bio-medical waste than those who were exposed to the poster method. This may be due to direct visualization of simple and clear images as compared to poster which is a cluster of both words and images. Hence, pictorial method is found to be most appropriate aid in facilitating segregation of bio-medical waste than poster method.

This study too had some limitations. The checklist could have included all the Bio-medical waste which is usually generated in the ward. The subject could have been selected by using stratified random sampling instead of convenient sampling method as it ensures representative sample in heterogeneous population. Pre-test could have been conducted in order to assess the knowledge of the participants regarding segregation of bio-medical waste. The duration of observation of the participants could have been longer. Direct observation could have been avoided. Instead, the study could have adopted technological methods like videotaping, CCTV recording and so on in order to prevent Hawthorne effect. .

Conclusions

The findings revealed that pictorial method on the bins was more effective in enhancing practice and knowledge than poster method in wall in segregation of bio-medical waste. This study also showed that there was moderately positive correlation in practice and knowledge between pictorial and poster method in segregation of bio-medical waste. It is recommended that the use of pictures on the bins will act as ready reference and daily viewing of these pictures act as reinforcement that enhances knowledge and practice and habit formation. This study also leaves few questions for further research

1. Whether any other audio visual aids will enhance practice of proper segregation of Bio-medical waste in addition to Pictorial and Poster?
2. What is the role of multiple observations at frequent interval in practice of proper segregation of Bio-medical waste?

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