Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2014; 2(3C):1070-1074 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2014.v02i03.039

Research Article

Assessment of Knowledge of Hospital Staff Regarding Biomedical Waste Management in a Tertiary Care Hospital in Uttar Pradesh

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Abstract: Biomedical waste (BMW) is waste generated during diagnosis, treatment or immunization of human beings or animals. Approximately 10-25% of the Bio-Medical waste is hazardous and can be injurious to humans or animals and deleterious to environment. The objectives of the study were to assess the knowledge regarding hospital waste management amongst hospital staff. A cross sectional study was done primarily aimed at assessing the knowledge of the hospital staff regarding bio-medical waste management. Pre-test and Post-test assessment was carried out among the study subjects to assess their knowledge regarding Bio-medical waste management. A total of 336 hospital staff participated in the study. The knowledge about different aspects of BMW management was high among nursing in-charges as compared to other paramedical staff as evident by the scores obtained by them during pre and post assessment. The study emphasises the need to conduct regular periodic training among paramedical staff about all aspects related with Bio-medical waste management.
Keywords: biomedical waste, tertiary care hospital, knowledge, hospital staff.

INTRODUCTION

Biomedical waste (BMW) is the waste generated during diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining thereto, or in the production and testing of biologicals, and is contaminated with human fluids [1]. The Biomedical waste carries a higher potential for infection and injury than any other type of waste [2].

Approximately 75-90% of the bio-medical waste is non-hazardous and as harmless as any other municipal waste. The remaining 10-25% is hazardous and can be injurious to humans or animals and deleterious to environment. It is important to realize that if both these types are mixed together then the whole waste becomes harmful [3]. It is estimated that annually about 0.33 million tons of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day [4].

Under the Bio-medical Waste Rules 1998, it is imperative that the concerned health care personnel should have a proper knowledge and practice of handling and disposal of biomedical waste. But due to laxity in implementation of the rules and inadequate training of health care personnel, there is indiscriminate disposal of bio-medical waste. This will seriously jeopardize the health of the community and have a significant impact on the environment. Studies carried out in India showed that the awareness and practices on bio-medical waste management among health care personnel is far below the acceptable level [5-13].

In some hospital there is no proper training of the employees in hazardous waste management. This indicates the lack of even basic awareness among hospital personnel regarding safe disposal of Bio-Medical waste. Keeping in view the above scenario, the present study has been undertaken to assess the knowledge regarding different aspects of Bio-medical waste amongst paramedical staff of a tertiary care hospital in Bareilly, Uttar Pradesh.

MATERIAL AND METHODS

The present study is a Cross Sectional study carried out as a seven day training programme intended to assess and improve the knowledge of paramedical staff belonging to Shri Ram Murti Institute of Medical Sciences (SRMS-IMS), Bareilly, Uttar Pradesh.

For this purpose total staffs present in each category was included. The study subjects consisted of 336 respondents: 18 nursing in-charges, 210 nurses, 72technicians, 36 front office executives.

The training was conducted in several phases. The idea was to train the concerned staffs in a phased manner and for this a schedule was prepared in advance keeping in mind the various categories of staffs in the hospital and a date was affixed for the training of the respective staffs in the month of January. Each batch was given training by the management staff on the different aspects of biomedical waste management of the hospital. A pre-designed proforma was used for data collection. Study proforma consisted of ten multiple choice questions relating to Biomedical waste management i.e. hazards associated with biomedical waste, methods for prevention of hazards, color coding, waste segregation.

The proforma was filled by study subjects before the start of the training and the same set of proforma was given to them at the end of the training session. Thus the first was taken as pre-test and latter as a post-test. Each correct response was assigned one mark. Self made scoring system was used to categorize the participants as having Good, Average and Poor knowledge regarding the subject. Participants scoring more than 8 were graded as Good, between 5-8 as Average and those who scored less than 5 were categorized as having Poor knowledge. Data collected was compiled and entered into SPSS20 version and percentages and Z test of proportion was used to interpret the findings.

RESULTS

The total number of staffs present in each categories of paramedical staff was included. The sample consisted of 336 respondents: 18 nursing in-charges, 210 nurses, 72 technicians, 36 front office executives.

Table 1 shows result in percentage of the 18 nursing in-charges who participated in the study during the pre-test and post-test assessment. In the pre-test session, majority (72.2%) of nursing in-charges scored between 5-8 (average) and only 16.7 % scored more than 8 (good). The scoring level went high in post-test assessment as 33.3% of nursing in-charges were found to score more than 80 percent.

Table 1: Pre and Post test assessment of Nursing In-charges

Marks	Pre-test (n=18)	Percentage (%)	Post-test (n=18)	Percentage (%)
<5	2	11.1	2	11.1
5-8	13	72.2	10	55.6
>8	3	16.7	6	33.3
Total	18	100.0	18	100.0

Table 2 shows the comparative analysis of pre-test and post-test assessment of the nursing staff. Out of 210 nursing staff, seven missed the pre-test assessment due to some personal reason. Majority (78.4%) of the nursing staff during pre-assessment were found to score between 5-8 marks while remarkable improvement was observed during the course of post assessment as evidenced by 51.4% scoring more than 8 as against 11.3% who scored more than 8 during pre-test assessment.

Table 2: Pre and Post test assessment of Nursing Staff

Marks	Pre-test (n=203)	Percentage (%)	Post-test (n=210)	Percentage (%)
<5	21	10.3	3	1.4
5-8	159	78.4	99	47.2
>8	23	11.3	108	51.4
Total	203	100.0	210	100.0

A total of 72 technicians participated in the study of which 79.2% of the technicians during pre-test assessment were found to score more than 8 while only 8.3% scored more than 8 during pre assessment. In the post test assessment, 26.4% of the technicians scored more than 8 while excellent results were obtained during the course of post-test evaluation where none of technicians scored less than 5 (Table 3).

Table 3: Pre and Post-test assessment of Technicians

Marks	Pre-test (n=72)	Percentage (%)	Post-test (n=72)	Percentage (%)
<5	9	12.5	0	0.0
5-8	57	79.2	53	73.6
>8	6	8.3	19	26.4
Total	72	100.0	72	100.0

Table 4 shows the analysis of pre-test and post test assessment of the front office executives. 61.1% of front office executives scored between 5-8 marks followed by 38.9% who scored <5 while none of the front office executives scored more than >8. The increase in the scoring level was remarkable during post assessment as 25 % of front office executives scored >8 (good).

Table 4: Pre and Post test assessment of Front office executives

Marks	Pre-test (n=36)	Percentage (%)	Post-test (n=36)	Percentage (%)
<5	14	38.9	2	5.6
5-8	22	61.1	25	69.4
>8	0	0	9	25.0
Total	36	100.0	36	100.0

On in depth analysis of the questions relating to various aspects of bio-medical waste management in post-test assessment revealed low awareness among all categories of staff especially among the front office executives (36.1%) and Laboratory technicians (43.0 %) with regard to waste disposal methods. Overall Nursing incharges were found to have adequate knowledge regarding most aspects of Bio-medical waste management (Table 5).

Table 5: Knowledge of Hospital staff about different aspects of Waste Disposal during Post assessment

Knowledge Assessed	Nursing Incharges (%)	Nurses (%)	Lab Technicians (%)	Front Office Executives (%)
Existence of BMW (M & H) rule 1998	93.0	91.4	84.7	77.7
Personal protective equipments	83.3	81.4	88.8	72.2
Categories of waste	94.4	95.2	97.2	91.6
Different color code used in Biomedical waste management	94.4	93.8	88.8	80.5
Waste segregation in color containers (i) Needles and blades	100.0	92.3	93.0	83.3
(ii) Plastic syringe	66.6	58.5	38.5	30.5
(iii) Cotton dressings soiled with blood	72.2	67.1	61.1	66.6
Waste disposal methods	71.1	41.4	43.0	36.1
Disease spread by improper hospital waste management	90.1	54.3	73.6	66.1
Bio-hazard symbol	98.8	96.6	95.5	94.4

Table 6 shows the comparison of knowledge level of different staffs using Z-test of proportion. The knowledge of nursing in-charges about BMW management and handling rule was greater (93.0%) compared to nurses (91.4%) and Lab-technicians (84.7%) and the difference in knowledge was not statistically significant.

Knowledge regarding waste segregation in color containers especially with regard to segregation of plastic syringe was more among nursing in-charges compared to Lab technicians and was found to be statistically significant($p<0.05$).

The knowledge of nursing in-charges about disease spread by improper waste management and waste disposal methods was better compared to nurses and Lab-technicians and the difference in knowledge was found to be statistically significant (p value<0.05).

DISCUSSION

Knowledge regarding health care waste is essential for appropriate management of biomedical waste. The present study was conducted in tertiary care hospital in Bareilly to find out the knowledge regarding biomedical waste management in the hospital. The overall awareness about biomedical waste management was highest among nursing in-charges observed during the pre- and post test assessment and the differentials in the knowledge was observed across the various groups with the lowest knowledge observed among the front-office executives.

It was noted in the present study that Knowledge regarding different aspects of Bio-medical waste management was inadequate across all the groups especially among the front-office executives. Knowledge of the Bio-medical waste management rules among paramedical staff is essential as they are primarily involved in the waste disposal process. 23.2% of the front-office executives were unaware of the bio-medical waste management rules that governs proper disposal of bio-medical waste which is similar to a study carried out by Basu *et al*. [9] in Kolkata who noticed that majority of the participants were unaware

of the Bio-medical Waste management and Handling Rule,1998.

Correct knowledge regarding color coding of bio-medical waste was adequate across all four groups especially among nurses (93.2%) and laboratory technicians (88.8%) which is similar to the finding observed in a study by Mathur V *et al*. [5] in Lucknow which reported 92% and 85% for nurses and lab-technicians respectively.

In the present study it was noticed that many study participants were not aware of the correct combination of the bags used for segregation purpose especially with regard to segregation of plastic syringe and cotton dressing soiled with blood. This may be attributed to lower level of education. Saini *et al*. [10] also found that persons with higher education were more aware of the issue.

Table 6: Comparison of Knowledge level of Hospital staff

Knowledge Assessed		Nursing Incharges v/s Nurses	Nursing Incharges v/s Lab Technicians	Nurses v/s Lab Technicians
Existence of BMW (M & H) rule 1998	Z Value P Value	0.2339 0.8181	0.9177 0.3575	1.613 0.107
Personal protective equipments	Z Value p Value	0.1994 0.8414	0.6355 0.5221	1.4524 0.1470
Categories of waste	Z Value p Value	0.1514 0.8807	0.5896 0.5552	0.7228 0.4715
Different color code used in Biomedical waste management	Z Value p Value	0.1017 0.9203	0.7058 0.4777	1.392 0.1645
Waste segregation in color containers (i) Needles and blades	Z Value p Value	1.2214 0.2224	1.155 0.2460	0.1943 0.8493
(ii) Plastic syringe	Z Value pValue	0.6709 0.5028	2.147 0.0315*	2.935 0.0032*
(iii) Cotton dressings soiled with blood	Z Value p Value	0.4434 0.6570	0.874 0.3843	0.9246 0.3575
Waste disposal methods	Z Value p Value	2.437 0.0146*	2.133 0.033	0.2375 0.8103
Disease spread by improper hospital waste management	Z Value p Value	0.8438 0.0031*	2.8758 0.0039*	1.595 0.1118
Bio-hazard symbol	Z Value p Value	0.507 0.610	0.6517 0.5157	0.4278 0.6672

*Statistically Significant

CONCLUSION

The nursing incharges were found to have good knowledge about certain aspects of Biomedical waste management especially regarding legislation such as Biomedical waste management and handling rule 1998 and waste segregation of needles and blades in blue container. On the other hand laboratory technicians had better knowledge regarding personal protective equipments and categories of waste than nurses.

RECOMMENDATION

There is a need to conduct regular periodic training and retraining at regular intervals among paramedical staff involved at all levels of biomedical waste management right from waste generation to waste disposal.

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