

## SIMPLIFIED PICTORIAL IEC (INFORMATION, EDUCATION, COMMUNICATION) MATERIALS AS A TOOL FOR BEHAVIORAL CHANGE PRACTICES OF BMW (BIOMEDICAL WASTE) SEGREGATION AND DISPOSAL: A CASE STUDY FROM A TERTIARY CARE HOSPITAL OF EASTERN ODISHA

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### Abstract

**Background:** Biomedical waste (BMW) can lead to adverse health effects if not properly segregated and disposed; hence becoming a social and legal responsibility of the healthcare workers. **Materials and Methods:** This longitudinal study was conducted to study the effect of simplified IEC (Information, education, communication) display materials on BMW segregation practices, in selected areas using a pre-and-post observation checklist to record baseline data and 15 days thereafter. Data was analysed using Epi-Info software. **Result:** Obstetrics and gynaecology ward, neurosurgery ICU (Intensive care unit) and casualty had better compliance than labour room and surgery ward before the intervention. **Conclusion:** Certain areas showed improvement after the intervention. Thus, IEC materials had a significant improvement on the BMW segregation practices.

## INTRODUCTION

Medical care is vital for our life, however the waste generated from medical activities poses a real threat in today's world; management of BMW (Biomedical waste) in a safe and sustainable manner is a social and legal responsibility of HCWs (Health care workers). This will ensure environmental, occupational safety as well as play an important role in public health.<sup>[1]</sup> As per Bio-medical waste Rules (2016) of India, "Biomedical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining thereto or in the production or testing of biologicals or in health camps."<sup>[2]</sup> Proper segregation and disposal of biomedical waste need much expertise and practice in order to have a satisfactory compliance. The impact of its poor management differs from one group of workers to another depending on the training received by them and the nature of work they are involved in. The people employed for cleaning the hospital and collecting the waste are often found to be at a higher risk than the medical staff who

produce it. These workers are usually with low literacy and least trained with little attention paid to their safety.<sup>[3]</sup> The effect of "training" is also dependent on the educational status of the worker. NITI Aayog has formulated certain guidelines to encourage behavioral change amongst individuals, their households and institutions with an aim to improve and strengthen waste segregation at source (WSS). Their objective was to strengthen, deepen, facilitate and widen the adoption of WSS practices amongst various stakeholders, which would be sustainable and have a lasting impact.<sup>[4]</sup> If these wastes are segregated and disposed safely as per the BMW guidelines of 2016 and 2018, the chances of diseases resulting from the exposure to them can be reduced substantially, thereby preventing many hospital acquired infections (HAI).<sup>[5,6]</sup>

### Aim and Objectives:

This case study was planned with the objective of assessing the effect of simplified pictorial IEC (information, education and communication) display materials on BMW segregation practices at the point of generation.

## MATERIALS AND METHODS

It was an interventional study conducted as an audit by the infection control committee from November 2022- December 2022 using a validated check-list for the practices related to BMW segregation at the point of generation in ten selected areas of high BMW generation after getting approval from the Institutional Ethics Committee [Ref.no. XXXX/XXXX/IEC/1080/2022]. Permission was taken from the medical superintendent of the hospital. The practices related to WSS was assessed using an observational checklist which had been developed as per the guidelines of the State Pollution Control Board and modified as per the institutional protocol for carrying out routine audits by the infection control team. The checklist had a thirteen set of questions, which were common for all the ten sites. Apart from this, five questions each were exclusively for casualty, central laboratory, operation theatre, medicine ward and central ICU (Intensive care unit), making a total of eighteen questions for those five areas. These exclusive five questions were site specific. These questions had a dichotomous response, either yes or no, where 'yes' was marked where compliance was seen in practices (Good practice) and 'no' was marked where the practices were non-complaint (Needs improvement). This was a quality improvement initiative for the healthcare personnel as well as for the housekeeping staff directly involved in BMW handling. Initial spot analysis was done using the check-list in ten selected areas which were identified through a prior routine audit. The selected areas were assessed for compliance followed by display of simplified pictorial IEC materials in those areas and were reassessed after 15 days, by a person unrelated to the study. The intervention involving the display of simplified pictorial materials were in the form of simplified pictures of commonly used articles in healthcare centers like gloves, caps, masks, etc. along with the colour coded bins in which they need to be disposed for easy understanding even for those with low literacy status. The data was entered into Microsoft Excel sheet and analyzed using Epi-info software [version en US 7.2.4]. Chi-square and f-test were used where required as the tests of significance.

A p-value of <0.05 was considered as statistically significant.

Operational definitions:

Areas with high BMW generation: The areas generating more than three kilograms (kg) of BMW in 12 hours requiring transportation of the same at least twice a day.

Good practice: Those practices which were compliant according to the checklist were taken as 'Good practice'.

Needs improvement: Those practices which were not compliant according to the checklist were taken as 'Needs improvement'.

## RESULTS

In this pre-post interventional study in the selected areas of the current tertiary care hospital, the difference in observation of the study before and after the display of simplified IEC materials for BMW segregation is presented in [Table 1&2]. [Table 1] depicts the five sites which were assessed on the basis of eighteen question (thirteen common questions and site specific five questions). [Table 2] depicts the other five sites which were assessed on the basis of thirteen common questions only.

It was seen that there was improvement in most of the areas following the display of simplified IEC materials but the difference in the observation in the medicine ward in the pre and post interventional period was found to be statistically significant ( $p=0.04$ ). The following table depicts the results in the pre and post interventional period in the remaining areas.

Among the selected areas, O&G (Obstetrics and Gynaecology), neurosurgery ICU and casualty had better compliance in BMW practices and labour room and surgery ward noted low compliance prior to the display of the pictorial IEC materials. It was observed that, in Casualty, the good practices increased from 66.67% to 88.89% in the post interventional period. Similarly, in central laboratory and ICU; compliance improved from 50% to 83.33% and 61.11% to 77.78%, respectively. The O&G ward and paediatrics ward also showed improvement in compliance in the post interventional period. Surgery ward and labor room were the areas which had poor compliance and needed more improvement.

**Table 1: Pre and post intervention analysis at five selected areas**

Area of observation	Observation of BMW Practices	Pre-intervention Number (%)	Post-intervention Number(%)	P-value
Casualty*	Good practices	12 (66.67%)	16 (88.89%)	0.22
	Needs improvement	6 (33.33%)	2 (11.11%)	
Central* laboratory	Good practices	9 (50%)	15 (83.33%)	0.07
	Needs improvement	9 (50%)	3 (16.67%)	
Operation# theatre	Good practices	9 (50%)	11 (61.11%)	0.74
	Needs improvement	9 (50%)	7 (38.89%)	
Medicine ward*	Good practices	11 (61.11%)	17 (94.44%)	0.04
	Needs improvement	7 (38.89%)	1 (5.56%)	
ICU*	Good practices	11 (61.11%)	14 (77.78%)	0.47
	Needs improvement	7 (38.89%)	4 (22.22%)	

\*f-test was used

#Chi-square test was used

**Table 2: Pre and Post intervention analysis in the remaining five selected areas.**

Area of observation	Observation of BMW Practices	Pre-intervention Number (%)	Post-intervention Number(%)	P-value
Surgery ward*	Good practices	5 (38.46%)	9 (69.23%)	0.24
	Needs improvement	8 (61.54%)	4 (30.77%)	
Labor Room*	Good practices	4 (30.77%)	7 (53.85%)	0.42
	Needs improvement	9 (69.23%)	6 (46.15%)	
O & G ward*	Good practices	10 (76.92%)	12 (92.30%)	0.59
	Needs improvement	3 (23.08%)	1 (7.70%)	
Neuro ICU*	Good practices	10 (76.92%)	11 (84.61%)	1.00
	Needs improvement	3 (23.08%)	2 (15.39%)	
Pediatrics Ward*	Good practices	9 (69.23%)	12 (92.30%)	0.31
	Needs improvement	4 (30.77%)	1 (7.70%)	

\*f-test was used

## DISCUSSION

The present study assessed the effect of simplified pictorial IEC material on BMW segregation practices in selected sites as a whole and not the compliance of any particular group of healthcare personnel. In a study conducted by Narayan et al.<sup>[7]</sup> It was reported that virtual teaching tool was found to be effective in enhancing the knowledge and practice of housekeeping staff, where the post-test mean practice score was higher than pre-test mean practice score. In a similar study by Kumar et al.<sup>[8]</sup> It was reported that training, practical demonstrations and reminders on standard waste management were given to health and sanitary workers and significant improvement was seen in their practices in the post interventional period. In a study by Barathalakshmi J. et al., it was seen that after a training programme on BMW, there was improvement of practice about the same among the nursing and lab technicians in the tertiary care hospital.<sup>[9]</sup> Another study done in community health centres (CHCs) in Tabriz, by Tabrizi et al. revealed that there was 30% improvement in Medical waste management (MWM) standards adherence in Tabriz CHCs after the implementation of intervention designed for four dimensions of MWM (management and training, separation and collection, transportation and temporary storage, and sterilization and disposal).<sup>[10]</sup> They also found great improvement in separation and collection of medical wastes, which was up to 28.5%.

Subsequently, an analysis in the areas which didn't show much improvement was done and it was found that there were newly recruited staff who had not received any training for BMW management. The proper and appropriate management of BMW depends on both technical workers and nontechnical staff and adequate and continuous training.

## CONCLUSION

With the simple intervention, the BMW segregation practices saw a significant improvement; although, the areas with poor compliance needed further training and observation. With the continuous training of the staff which is already a practice, the results from the present study may be used to modify the BMW training manual and methods to improve

compliance among those handling them. The intervention being simple in nature, similar steps can be taken to improve the overall compliance on BMW management, which will help in improving the practices in hospitals.

**Recommendation:**

As a routine improvement procedure, re-orientation and repeated training of staff for the same was done in every three months. In this way, the freshly recruited staffs were also trained. This has been continuing as a routine assessment, monitoring and training process.

**Limitation of the study:** This was a single centre study done in a tertiary care set up. Hence a good level of compliance cannot be generalized to all the healthcare facilities.

**Relevance of the study:**

It was depicted that with minimal intervention, BMW segregation practices in many areas improved significantly. Hence, such simplified IEC materials can be used along with the routinely used materials and trainings so that there are improved practices among the HCWs.

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