

WILL TRAINING HELP IMPROVE KNOWLEDGE OF HEALTHCARE WORKERS ON BIOMEDICAL WASTE MANAGEMENT?

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ABSTRACT

Introduction: The Ministry of Health and Family welfare in India laid down the new Biomedical Waste Management (BMW) guidelines in 2016. This was a major milestone marked to reduce environmental pollution and encourage recycling of wastes which are non-biodegradable. These guidelines also ensure safe transport of biomedical waste by means of decontamination at user end before transport to final disposal site. The major importance in healthcare facilities were the changes made to segregation protocols. Making a change to the routine practice which was in effect from 1998 was a challenge faced by all health care facilities. The measures taken to overcome this challenge and improve knowledge are highlighted in our study.

Methods: This cross sectional study was conducted in a tertiary care health facility in South India. Study participants were divided into three broad categories: Doctors, nurses, lab professionals and phlebotomists, housekeeping staff. Knowledge on biomedical waste was assessed using a set of questionnaires, following which training was conducted separately for each category. Various different training modalities used were: Lecture on 2016 BMW guidelines, games on BMW segregation and video on BMW. Effect of training was evaluated by using similar post-test questionnaire.

Results: Improvement in knowledge among staff was calculated using percentage of difference in pre and post-test evaluation. The average difference showed a 42.45% improvement. Maximum improvement in knowledge was observed among Physician Assistants (67.5% average difference) followed by junior doctors (53.2% and 52.5% average difference among Residents and Registrars respectively). Active participation was ensured by conducting games which enhances concentration and understanding.

Conclusion: Training healthcare professionals does make a difference in knowledge on biomedical waste management. Assessments prior to and after training sessions are the best way to evaluate effectiveness of training and improvement in knowledge.

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INTRODUCTION

The hazards of bad biomedical waste management have become issues of increasing concern the world over as it affects both our health and our environment. An essential part of quality assurance and safety in our hospitals is to have a good biomedical waste management system. Waste management involves factors such as the size of the hospital, facilities offered such as specialization of the healthcare units, type of waste generated, availability of liquid waste segregation, infrastructure on site for reusability of resources etc.

As part of the Swachh Bharat Abhiyaan campaign, the Ministry of Health and Family welfare launched “Kayakalp”, an initiative to promote cleanliness and enhance the quality of public health facilities with an assessment tool to assess compliance^[1]. It is important to update ones knowledge to

incorporate national and state guidelines and implement it in practice. The Biomedical waste guidelines came out in 2016^[2], a direct observational study of waste segregation in our hospitals showed segregation was not as per norms. Further investigation showed that awareness was lacking. The project was aimed at reaching out to educate and implement practice to comply with the new guidelines across sections.

Aim

To improve compliance to new biomedical waste guidelines 2016 and assess knowledge improvement among staff.

METHODOLOGY

The Biomedical waste guidelines were updated in 2016 from the 1998 guidelines and 2 years' time was given for implementation of these rules. The laboratory generates a large component of the biomedical waste in addition to the wards

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and the operation theater. Initial self-education and awareness showed the vast majority of the concerned staff was not aware of the fundamentals of handling biomedical waste. A lack of proper segregation of the biomedical and general wastes could result in the whole process becoming hazardous leading ultimately to an incorrect method of disposal and danger to the environment. We therefore implemented BMW 2016 guidelines in the laboratory and trained our staff to follow. Once this was successfully completed we planned Project Vidya – Education on the Biomedical waste guidelines was conceptualized for the entire hospital.

This cross sectional study was conducted over a period of two months in 2017 at our tertiary care health facility in Chennai, Tamil Nadu. We based it on the well-known training acronym SMARTER: Specific, Measurable, Achievable, Relevant, Time bound, Evaluation and Review.

Step 1: Defining Learning Objectives - The initial category of staff targeted was:

- Junior Doctors and Physician Assistants
- Nurses
- Laboratory Staff including phlebotomists
- Housekeeping Staff

Focus of training was on 3 main areas:

1. Knowledge about biomedical waste guidelines
2. Segregation
3. Transport & Disposal

The segregation was made relevant to the cross section of staff being trained.

Step 2: Designing the material for the training: This included a pre and post-test using a self-structured questionnaire in English and Tamil incorporating essential components handled on a day to day basis relevant to each area. (Fig 1)

Step 3: Development of training material: The material prepared for training were Power point presentation in English, Posters for wards and lab, Interactive games – task oriented, question and answer session. Training of the trainers to all talk the same principles and clarify concepts. A separate poster was prepared for laboratory demonstrating the color coding used for lab waste segregation. Lab staff were also provided with a flowchart to familiarize them on the initial decontamination of lab waste.

Step 4: Implementation: Staff were trained in categories starting in July 2017 as the segregation were relevant to their own area. There was problems getting all staff to participate and we completed 24% of target staff.

Step 5: Evaluation

Immediate: Based on a Pre-test evaluation and after training Post-test evaluation.

Ongoing: Based on post training job behavior observed during random audits in wards.

Step 6: Review: Looking at the results and re-evaluating training needs which include creating screensaver share folder material created and hardcopy handouts.

Staff were trained in categories as the segregation was relevant to their own areas. The targeted audience were those handling the BMW the maximum which were Nurses, Junior doctors, laboratory staff and Housekeeping staff. Over a period of 2

months these staff underwent a classroom and on the job training. In the Classroom training an initial pre- test was conducted so that knowledge as well as effectiveness of training could be assessed. An intervention as a power point presentation followed by either interactive Q&A or games was done. An immediate post test was conducted.

RESULTS

The cross-section of staff covered was 24.5% i.e 138 out of 565 targeted employees. The lowest attendance was from housekeeping which needs improvement. Pre and Post-test evaluation was conducted. These category-wise scores are depicted in figure 2. The combined pre-test average was 40.31% and the post test was 82.36%. The average difference showed a 42.45% improvement before and after training (Table 1).

BIOMEDICAL WASTE MANAGEMENT - QUESTIONNAIRE

Name : _____ Date : _____

Designation :

Technical staff		Nurse		Secretary	
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1. The BMW guidelines followed in our hospital is as per year _____ guidelines.
2. Are you aware of the manual which explains segregation of BMW in our hospital? Yes/No. If yes, where is it mentioned?
3. Which is the final disposal site for BMW generated from our hospital?
4. Does our hospital campus have a sharps pit? Yes/No. If yes, where is it located?
5. Is food and stationary waste segregated from a hospital considered as BMW and sent to same disposal site? Yes/No

Mode of segregation of following waste to be marked:

Q.No	WASTE	RED	YELLOW	BLUE	SHARPS CONTAINER
6.	Glass syringe with needle				
7.	Tube with chemotherapy drug				
8.	Blood bag				
9.	Urobag				
10.	Foley's catheter				
11.	Glass ampoule with expired drug				
12.	Blood tubing / blood set				
13.	Metallic implants				
14.	PPEs				
15.	Dialysis kit				

State methods of segregating the following :

16. Container with stool sample _____.
17. Container with body fluids _____.
18. Vacutainer with blood _____.
19. Syringe with blood _____.
20. Shunt fluid/pleural fluid in plastic container _____.

Fig 1 Questionnaire for pre-test and post-test

Table 1 Category wise average pre-test and post-test scores with average difference

Designation	Number	Pre test average	Post test average	Average difference
Doctors - registrars	6	28.3	80.8	52.5
Doctors - residents	10	40.55	93.75	53.2
Physician assistants	5	24	91.5	67.5
Staff nurses	86	52.5	88.5	35.9
Anns	2	51.25	68.75	22.5
Secretaries	2	67.5	91.25	23.75
Phlebotomists	4	57.5	78.1	20.6
Technical staff	13	74	86.3	18.6
Housekeeping staff	10	34	58.5	24.5

Doctors had the lowest pretest average signifying a major lack in knowledge while laboratory staffs have the best pretest average. In the post test all staff showed significant improvement except housekeeping. The analysis was also looked at in each subcategory to review in which area training needs to be strengthened (Figure 2). Laboratory staff had a good knowledge on BMW and segregation prior to training (76.2% and 69.5%), followed by nurses (44.9% and 62.7%).

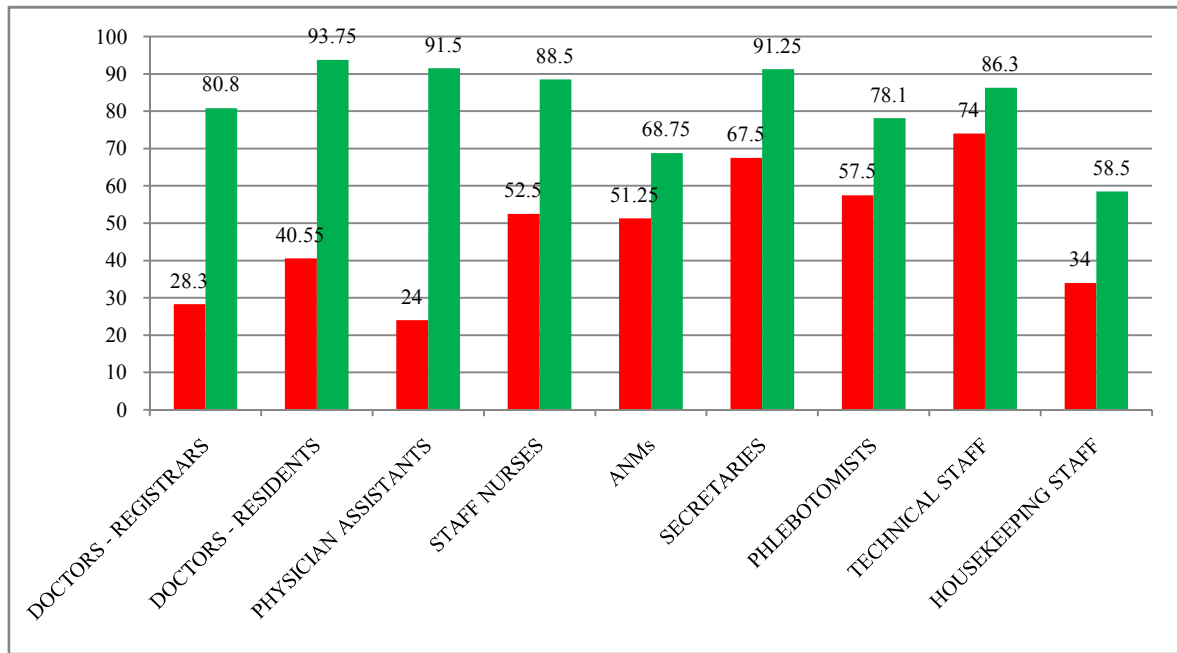


Fig 2 Distribution of mean pre and post test scores in percentage (n=138)

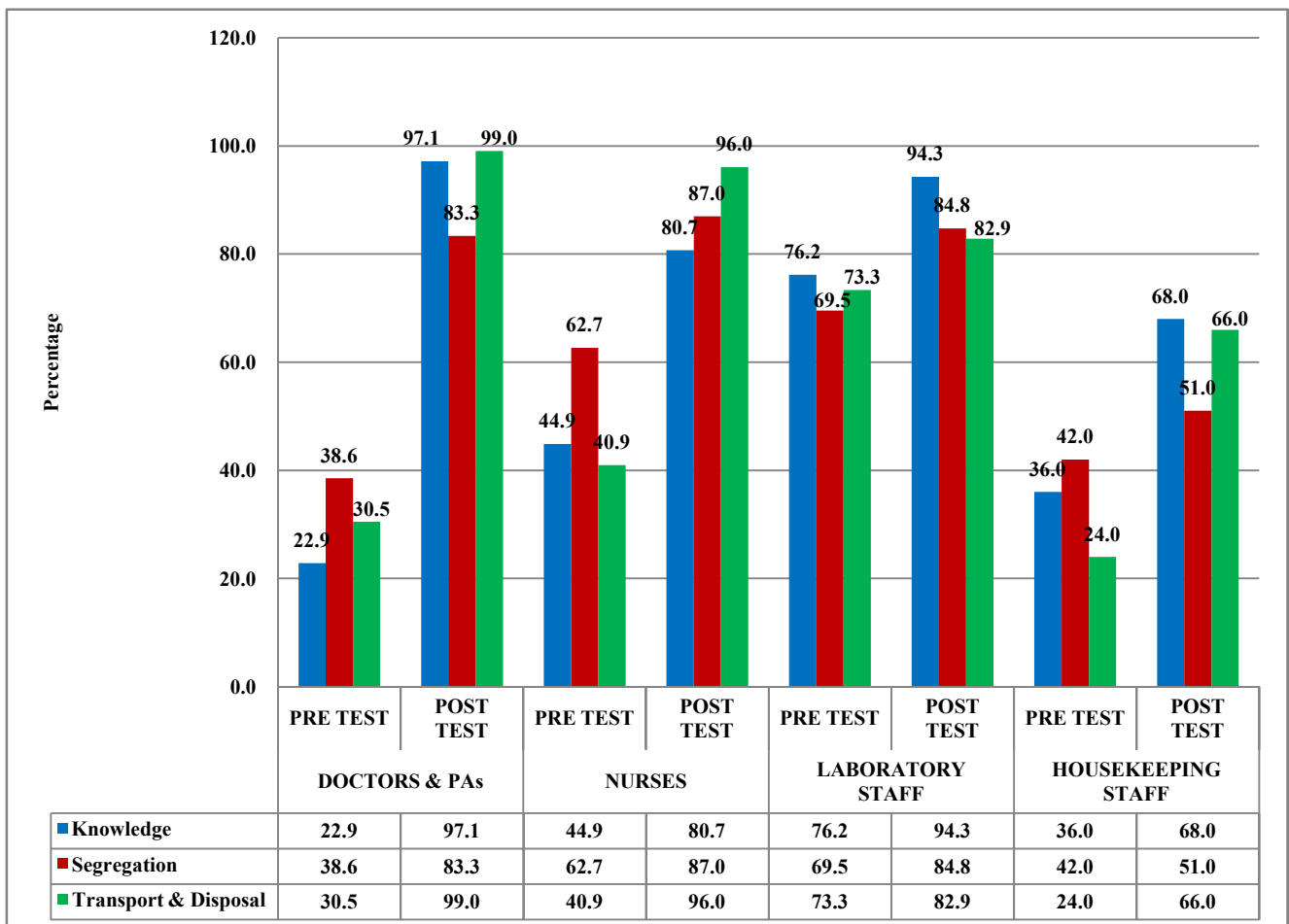


Fig 3 Section wise comparison of training effectiveness

It was seen that knowledge on segregation needs focus for doctors and transport for housekeeping staff. Good improvement in knowledge was observed in the following order: Physician assistants, Doctors, Nurses. Minor improvement was observed among Housekeeping staff, Secretaries, Laboratory staff.

DISCUSSION

Project Vidya is an ongoing project for training of staff for awareness on biomedical waste management 2016 guidelines .Our experience up to now has shown that so far only 24.4% of the target staff have attended the training programme. Additional interventions have been planned based on the evaluation of results already at hand. A more structured

training focusing on housekeeping staff has been planned and will continue. Language barrier in this group needs focus and strengthening. In the other cross-sections also additional training is necessary to ensure complete compliance. With the current data we have a fair idea on the pre-test awareness and success of the intervention.

This study on knowledge assessment was very cost effective since this involved training using in house – trainers with already available resources such as power point presentations, handouts and practical demonstrations.

Challenges & difficulties in implementation of the new biomedical waste guidelines:

1. Motivating staff to attend the programs
2. Trainers to educate themselves on grey zones on disposal on the new guidelines
3. Language barriers in training for housekeeping staff
4. Poor retention of training as seen by wrong segregation practices during periodic audits

Pretest average among doctors was poor indicating the need to strengthen knowledge on biomedical waste during their undergraduate and postgraduate training in colleges. These findings were consistent with findings from other studies across the country.^[3,4]

Another major way of improving and monitoring effectiveness of training is by conducting regular audits periodically. On the job monitoring will also help in improving compliance to biomedical waste management.^[5] Challenges among housekeeping staff are similar in most places as also reported by authors from Haryana.^[6] This needs rectifying efforts since housekeeping staff play a major role in segregation as well as transport of biomedical waste to temporary storage area.^[7]

We encountered maximum attrition rates among nurses highlighting the need for repeated training in this group due to this reason as well as their major role in segregation of waste from critical areas in the hospital. Continuous training in biomedical waste management has also been reiterated by authors from various other studies across the country.^[8,9] In our health care facility, efforts being taken to ensure continuing education of staff on BMW management are: repeated lecture based training, stalls to display BMW practices, poster competition during infection control week etc. Training and creating awareness on biomedical waste management is therefore a continuous process and we ensure the same to decrease violation of BMW rules within our hospital to the best of our ability.

CONCLUSION

Knowledge is Empowerment and by providing training through project Vidya we hope to make a small difference for the hospital and ultimately the environment. Project Vidya can easily be adapted in other hospitals as it is mainly a training tool followed by which direct observation and audit practice can be used for monitoring, evaluation, analysis and retraining as per the needs. This uses in house resources and hence is cost effective. We finally conclude by saying that the answer to our research question in this study was “Yes, training healthcare workers does improve their knowledge on biomedical waste management”.

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