

Where Lies the Grey Zone in Implementation of Biomedical Waste Management? A KAP Study

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ABSTRACT

Background: Biomedical waste is the most hazardous and potentially dangerous of all the wastes arising in the community. Health care personnel are expected to have proper knowledge, practice and capacity to guide others for waste management. On this background this study was undertaken to assess the knowledge and practice on Bio-Medical Waste management (BMWM) and to identify gaps in the BMWM practices in our hospital.

Objectives: To assess knowledge, attitude and practices of various categories of Health Care Workers (HCW) regarding BMWM and to analyse the correlation between knowledge, attitude and practices.

Materials and Methods: This was a cross-sectional study conducted among HCWs (n=196) working at tertiary care hospital. An assessment tool was prepared to include various

aspects of BMWM. The association between the knowledge, attitude and practice was analysed by Spearman's rank correlation and p value were calculated.

Results: Maximum number (69%) of subjects were females. Age of participants ranged from 17 to 32 years. Training on BMWM has been undertaken by 78% of study subjects. Majority of participants (64%) scored good and 36% scored average in knowledge assessment. Spearman's rank correlation showed a weak positive correlation between knowledge score and attitude score ($r=0.195$) ($p=0.001$) and knowledge score and practice score ($r=0.037$) ($p=0.745$)

Conclusion: The present study highlights the gap between knowledge, attitude and execution in practice by HCW regarding BMWM. Periodical evaluation and regular training is necessary to improvise the current status of practice.

Keywords: Bio-medical waste, Health care workers, Knowledge, Practice, Tertiary care hospital

INTRODUCTION

Bio-medical waste management has recently emerged as an issue of major concern not only to hospitals and health care authorities but also to the environment. Infections, injury and toxic effects to public, flora and fauna of the environment are the important harmful effects of improper BMWM. The potential of the problem is such that at anytime, anywhere, anybody can be a victim of improper BMWM. The Government of India has enacted the Bio-medical Waste - BMW (Management and Handling) Rules 1998, in July 1998 [1] under which it is mandatory for all health care facilities to ensure that the bio-medical waste be handled and managed without any harm to the human health and the environment.

As health care workers are the primary personnel involved with the generation of BMW they should take the lead role in safe and proper disposal of it. And they should possess a proper knowledge and right attitude to guide the others in issues regarding BMWM. In a national wide study conducted in 25 districts spread over 20 states of India including urban and rural area highlights that the status of BMWM was alarming across the study sites; 82% (318/388) of primary care, 60% (15/25) of secondary and 54.2% (13/24) of tertiary

care facilities were in the RED category indicating need for major efforts to improve the BMWM across the country [2]. On this background this study was undertaken to assess the knowledge and practice among the HCW and to identify gaps in the BMWM practices in our hospital.

Objectives

1. To assess knowledge, attitude and practices of various categories of HCWs regarding BMWM.
2. To analyse the correlation between knowledge, attitude and practices.

MATERIALS AND METHODS

This cross sectional study was carried out for a period of four months in the year 2013. After obtaining a written consent HCW of various categories like medical officers, interns, staff nurse, nursing student, male & female hospital workers, laboratory technicians etc were included in the study randomly. Calculated sample size was 196.

Ethical approval was obtained from the Institutional Ethics Committee Board. An assessment tool, questionnaire with 30

questions was prepared to include various aspects of BMWM on the basis of local state government standards for BMWM and to reflect the knowledge, attitude and practice aspects of participants. The respondents were well informed about the purpose of the study and about the questionnaire by the research investigator prior to data collection.

The first ten questions were used to evaluate knowledge and second ten questions were used to evaluate attitude regarding BMWM. Practice aspect of respondents was assessed by the last ten questions. For each correct response '1' mark was awarded and for incorrect response zero mark was awarded.

STATISTICAL ANALYSIS

The collected data were entered in excel sheet and analysed. Percentage of correct response of participants to each questions was calculated and analysed. The association between the knowledge, attitude and practice was analysed by Spearman's rank correlation and p value was calculated.

RESULTS

A total of 196 HCWs were included in the study. Distribution of study population is given in the [Table/Fig-1]. X-ray technician, pharmacist, administrative staffs were included in

| Respondents | Frequency (%) |
|------------------|---------------|
| Interns | 30 (15.3) |
| Hospital workers | 33 (16.8) |
| Lab technicians | 31 (15.8) |
| Nursing students | 30 (15.3) |
| Doctors | 30 (15.3) |
| Staff nurses | 31 (15.8) |
| Others | 11 (5.6) |
| Total | 196 (100) |

[Table/Fig-1]: Distribution of study population

| Domain | Good (8-10) Number (%) | Average (5-7) Number (%) | Poor(0-4) Number (%) |
|-----------|------------------------|--------------------------|----------------------|
| Knowledge | 125(63.8) | 71(36.2) | 0(0) |
| Attitude | 130(66.3) | 60(30.6) | 6(3.1) |
| Practice | 63(32.1) | 115(58.7) | 18(9.2) |

[Table/Fig-2]: Distribution of knowledge, attitude and practice score of subjects regarding BMWM

| | | | Attitude score | | | Total |
|-----------------|---------|--------------------------|----------------|---------|-------|--------|
| | | | Poor | Average | good | |
| Knowledge score | Average | Count | 2 | 31 | 38 | 71 |
| | | % within knowledge score | 2.8% | 43.7% | 53.5% | 100.0% |
| | Good | Count | 4 | 29 | 92 | 125 |
| | | % within knowledge score | 3.2% | 23.2% | 73.6% | 100.0% |

[Table/Fig-3]: Association between knowledge score and attitude score
p-value -0.001 (Fisher's exact test) Spearman correlation – 0.195

the others category. Training on BMWM was undertaken by 78% of study subjects and 22% of them were not trained. Maximum number (69%) of subjects were females. Age of participants ranged from 17 years to 32 years. The mean age of respondents was found to be 32 years and the standard deviation was 10.5.

[Table/Fig-2] shows the distribution of knowledge, attitude and practice score of subjects regarding BMWM. Level of knowledge was graded as good, average and poor for the score range of 8-10, 5-7 and 0-4 of correct response respectively. Level of attitude and practice was graded similarly. Association between knowledge score and attitude score is discussed in [Table/Fig-3]. Out of the subjects who scored good in knowledge assessment, 73.6% of them scored good and 23.2% of them scored average for attitude assessment.

Similar analysis of average knowledge score showed 53.5% good and 43.7% average score in attitude assessment. Spearman's rank correlation showed a weak positive correlation (r=0.195) and the p value was significant (p=0.001). Association between knowledge score and practice score is tabulated in [Table/Fig-4] and the correlation was very weak (r=0.037) and no significant (p=0.745) association was found.

The correlation between attitude and practice was analysed [Table/Fig-5] by Spearman's rank correlation method and it was found that there was weak positive correlation between attitude and practice (r=0.298). The p value was significant (p=<0.001).

DISCUSSION

Proper implementation of BMWM is not only important for the control of infection inside the hospital but more importantly, it also addresses the problem of spread of infection in the general community through waste discarded from hospitals and other healthcare establishments.

Of the study subjects 78% had undertaken training on infection control and BMWM. This is in contrast to a study, in which only 17% had attended in-service education regarding BMWM [3].

The knowledge about the risk involved in handling BMW was found in 98.5% of respondents. The majority of the study participants 91.3% were aware of disease transmission while handling BMW. This percentage is well above than another study which had reported, that only 77.5% of participants were aware of this fact [4].

| | | | Practice score | | | Total |
|-----------------|---------|--------------------------|----------------|---------|-------|--------|
| | | | Poor | Average | Good | |
| Knowledge score | Average | Count | 8 | 41 | 22 | 71 |
| | | % within knowledge score | 11.3% | 57.7% | 31.0% | 100.0% |
| | Good | Count | 10 | 74 | 41 | 125 |
| | | % within knowledge score | 8.0% | 59.2% | 32.8% | 100.0% |

[Table/Fig-4]: Association between knowledge score and practice score
p-value -0.745, Spearman correlation-0.037

| | | | Practice score | | | Total |
|----------------|---------|-------------------------|----------------|---------|-------|--------|
| | | | Poor | Average | Good | |
| Attitude score | Poor | Count | 3 | 3 | 0 | 6 |
| | | % within attitude score | 50.0% | 50.0% | 0.0% | 100.0% |
| | Average | Count | 9 | 40 | 11 | 60 |
| | | % within attitude score | 15.0% | 66.7% | 18.3% | 100.0% |
| | Good | Count | 6 | 72 | 52 | 130 |
| | | % within attitude score | 4.6% | 55.4% | 40.0% | 100.0% |

[Table/Fig-5]: Association between attitude score and practice score
p<0.001 Spearman correlation – 0.298

While answering to a question on standard work precautions, 71.4% of respondents had an opinion that it has to be followed only for HIV or high risk groups. Knowledge about the proportion of infectious waste generated from a hospital was found only in 39.3% of respondents. The knowledge about the minimum contact time of the disinfectant sodium hypochlorite and persons requiring post exposure prophylaxis was found in 65.3% and 68.4% of respondents respectively.

While analysing the attitude, only 36% of the respondents had correctly answered the question on personnel involved with risk of improper BMW. The study revealed that only 62% of respondents agreed on segregation of BMW at the point of generation. This is in contrast to a study in which 87.5% of the respondents agreed on segregation of BMW at the point of generation [5].

55% of respondents had experienced needle prick injuries in their work life. Of them only 55 % had reported the incident to higher authority. This is in contrast to the study in which only 19.9% of the needle prick injured respondents did not report to the hospital authority [4].

Majority of participants (64%) scored good in knowledge assessment, 36% scored average and none of the participant had poor score. This is similar to a study in which overall knowledge of study participants was good [6].

In the overall score for attitude assessment 66% scored good, 31% scored average and 3% scored poor. Majority of respondents (59%) had scored average, 32% scored good and 9% of subjects scored poor in the assessment of practice aspect of BMW. In spite of having good knowledge (64%) and good attitude (66%) only 32% of respondent scored good for practice. A study on tertiary care hospitals in India found that people with higher education such as consultants,

residents and scientists had good knowledge of biomedical rules but that was not reflected in the practice [7].

Spearman's rank correlation showed a weak positive correlation between knowledge score and attitude score ($r=0.195$) and the p-value was significant ($p=0.001$). Correlation between knowledge score and practice score was very weak ($r=0.037$) and no significant ($p=0.745$) association was found.

In a study by Wai et al. showed that there was a significant association between knowledge and practice with a correlation coefficient of 0.39 and knowledge and attitude with a correlation coefficient of 0.289 [8]. Another study showed that knowledge, attitude and practices regarding BMW had no correlation with each other [9].

LIMITATION

The reason for average score (59%) and poor score (9%) of practice in this study has to be analysed by detailed qualitative studies and research activities. Multivariate modelling in a national wide study revealed several important predictors for achieving acceptable scores for the BMW system. Significant predictors were: presence of guidelines or charts at point of waste segregation (system capacity), accountability of a dedicated person, availability of appropriate containers or bags for waste segregation, availability of functional needle destroyers, personal protective equipment for waste handling staff (resources), segregation of wastes at point of generation, availability of register for record maintenance and disinfection of plastic wastes or sharps at point of waste generation (processes) [2].

The recent update on Indian BMW rule also emphasized the above components as an integral part of waste management system [10].

CONCLUSION

The present study highlights the gap between knowledge, attitude and execution in practice by HCWs regarding BMWM. Correlation between attitude and practice is better than knowledge and practice. Periodical evaluation of the BMWM practices is essential to reveal the existing status and regular training is necessary to improvise the current status of practice.

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FINANCIAL OR OTHER COMPETING INTERESTS:

None.

Date of Publishing: Jul 01, 2015