KNOWLEDGE, ATTITUDE AND PRACTICES AMONG HEALTH CARE WORKERS TOWARDS BIO MEDICAL WASTE MANAGEMENT IN MEDICAL AND SURGICAL SETTINGS AT A GOVERNMENT MEDICAL COLLEGE, GOA

Hospital Administration

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ABSTRACT

Background: Correct knowledge and attitude are critical towards bringing about a favourable change in practice. Medical professionals in India have always turned a blind eye to scientific management of BMW.

Objective: To assess knowledge, attitude and practices of health care workers regarding specific aspects of BioMedical Waste Rules, 2016 and its amendments.

Material & Methods: In this cross-sectional survey data was collected among 250 randomly selected doctors and nurses from an apex Government medical college hospital in Goa during the period September 2019 to December 2019 using a self-administered questionnaire. The results are expressed as percentages, and the significance of difference in percentages is expressed using chi-square test at 95% confidence level.

Results: Overall, the knowledge regarding BMW Rules was poor, especially with regards to the segregation practices and the colour coded bins, with their practices being non-concurrent with the prevailing rules. An assessment of attitudes, however, revealed their positive inclination towards proper BMW.

Conclusion: The study emphasizes the need for periodic reorientation of these health care workers in elements of BioMedical Waste Management, especially the segregation.

KEYWORDS

Biomedical Waste; Knowledge; Attitude; Practices

INTRODUCTION:

Biomedical waste is defined as any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals, or in research activities pertaining thereto, or in the production or testing of biologicals [1]. Improved practice of BMW management as envisaged in the BMW Rules, 2016 and its subsequent amendments is possible only if the health care personnel are informed about the existing Rules, and they have correct attitude to transform their knowledge in to action. This attitude should be complemented by a conducive environment- availability of colour coded bins, educational posters, personal protective equipment- that favours waste management strategy as per the rules.

Goa Medical College Hospital (GMCH) is 1160-bedded sole government tertiary level medical college hospital in Goa which generates approximately 2.2 tonnes of waste, 600 kgs of which is estimated to be BMW. Though the BMW Committee holds periodic orientation sessions emphasising segregation of BMW, the final outcome in terms of proper segregation of the waste is not forthcoming. There is indiscriminate admixture of waste with more than 1200 kgs of waste being treated at incinerator and hydroclave station, which is almost double of what is otherwise expected. Lack of posters displaying the scheme of segregation of BMW, lack of colour coded bins/bags further compound these issues. Though the latter issues are more administrative in nature on account of its financial implications, issues related to knowledge and attitude of the health care workers (HCWs) can be dealt with at the day to day level of functioning. Overall, knowledge of BMW among doctors and nurses in studies across India has been found to vary from 20% to 90% [2-7]. Studies conducted in Tehran [8] and Saudi Arabia [9] have also reported unsatisfactory knowledge among their HCWs.

This study was therefore undertaken among the medical staff of the hospital to assess the knowledge, attitude and practices of HCWs in GMCH regarding specific aspects of the BMW Rules, 2016 (amended in 2018 & 2019).

MATERIAL & METHODS:

Study Design- A cross-sectional qualitative study

Study Setting- Medical and Surgical units from Goa Medical

College, an apex tertiary Government medical college hospital in Goa

Study Period- September 2019 to December 2019

Study Sample & Sample Size- A total sample size of 250 stratified in to 85 medical interns, 85 medical PG students and 80 nurses was attained by simple random sampling from the list of names of medical interns, medical PG students and nurses.

Data Collection- The data was collected by self administering a pre-designed structured questionnaire upon a written informed consent and included the basic background demographic data of the respondents apart from the questions addressed at assessing knowledge, attitude and practices pertaining to effective BMW. The study was approved by the Institutional Ethics Review Committee of Goa Medical College Hospital, Bambolim-Goa.

Statistical Analysis- The data was entered in Microsoft Excel and analysed using Statistical Package for Social sciences for windows, SPSS version 23.0. The responses were expressed as percentages and the difference in percentages among the respondents' groups were tested for statistical significance by using a chi-square test (χ^2), with a p value of <0.05 being significant.

RESULTS:

Table 1 gives the background details of 250 study participants which comprised of 85 medical Interns, 80 Nurses and 85 medical PG Students. Average age of the study participants was 29.52 (SD 9.3090). Most of the Interns and PG Students belong to the age group of 20-29 years, while the nurses had predominant representation in the age group of 40-49 years. Females comprised 74% of the study population. Tables 2, 3 and 4 present the Knowledge, Attitude and Practices of the study participants. The knowledge of segregation of waste sharps was least in the PG Students, and knowledge regarding storage of yellow category waste was very poor (11.6% overall), and least among the nurses (Table 2). Almost 2/3rd (65%) of the nurses felt that their knowledge regarding BMW was adequate, while 28.2% of the Interns and 29.4% of the PG Students felt the same.

The proportion of study participants using PPE while handling BMW was only 56.4%; 67.1% among the Interns, 60% among the PG Students and 41.3% among the Nurses ($p=0.002$). Almost 86% of the

study participants felt that they complied with the BMW Rules, the proportion of nurses feeling so was significantly more compared to that of the other two groups. The proportion of respondents having taken a complete course of Hep B vaccination was 80.7%- 89.3%, 89.4% and 62.5% among the Interns, PG students and Nurses, respectively.

DISCUSSION:

Effective Biomedical Waste Management requires cooperation from various stakeholders, the most important of which are the healthcare providers- Doctors and Nurses. BMW Rules 2016 and its subsequent amendments provide the technical guidelines for effective segregation, collection, storage, transport and disposal of BMW¹. Knowledge of these rules should be complemented with the right attitude to bring about a desirable change in the practice of BMW. A predesigned questionnaire containing questions pertaining to knowledge, attitude and practices with reference to BMW was self administered to the study participants. Our study population composed of 85 Interns, 80 Nurses and 85 PG Students. Female preponderance in the respondents' group is explained by the fact that 78 of the 80 nurses were females, and a relative dominance of female sex in the other two groups as well.

Overall knowledge of the study participants on BMW was not satisfactory. Interns, Nurses and PG Students fared equally bad on the knowledge parameter except that nurses had significantly better knowledge of segregation of waste sharps, and PG Students were significantly better aware regarding the storage guidelines pertaining to yellow category waste. Segregation is the key to effective BMW and the waste has to be segregated in different colour coded bins as mentioned in the BMW Rules 2016 and its subsequent amendments. As per the scheme of segregation anatomical, microbiological and pharmacological waste should be segregated in yellow bin, contaminated plastic and rubber items in red bin, waste sharps in white puncture-proof plastic container, and glassware and metallic implants in blue bin. Less than one quarter of the study participants had correct knowledge of the different colour coded bins under the BMW Rules. Similar finding was reported in a study carried out by Deo et al[10] wherein it was found that only 20% of the medical staff had correct knowledge of colour coding. A study by Kanchi[11] in a hospital in Navi Mumbai reported that 86% had knowledge of the colour coding.

The expired medicines ideally are supposed to be disposed in yellow bin, but hardly 1/3rd of the study participants had this knowledge. Knowledge regarding segregation of sharps and disposal of yellow category waste seemed satisfactory. A study by Mohan Kumar[12] in a tertiary care hospital in Kancheepuram, Tamil Nadu found that 72.5% of the Interns had correct knowledge of waste segregation. A similar study by Basuet al¹³ in West Bengal and Kanchi[11] in Navi Mumbai found that, respectively, 78.8% and 93% of their respondents had correct knowledge of segregation. While the other studies have commented on the overall knowledge of segregation we preferred to report the responses specific to individual questions pertaining to segregation of different categories of waste as the responses were not uniform.

Only 11.6% of the respondents were aware of the fact that the yellow category waste should not be stored beyond a period of 48 hours. It was a noteworthy observation that only 3.8 % of the nurses were aware of this storage guideline. An in-depth analysis of the responses pertaining to the storage of yellow category waste revealed that only 9.6% agreed that the waste could be stored beyond a period of 48 hours, while the remaining 90.4% opined in favour of removal of the waste within 48 hours. The Rules disapprove the storage of yellow category waste beyond 48 hours and encourages the speedy removal of waste from the site of generation to minimize the risk of infection to the patients as well as the HCWs. Thus the HCWs in the study setting seem to have an understanding of the hazardous nature of the yellow category waste but lack the technical knowledge of the BMW Rules.

More than 90% of the respondents across all the groups had correct knowledge of the method of disposal of BMW. Although methods of disposal of BMW are beyond the direct purview of action of the healthcare professionals, they seem to have good knowledge of this as compared to the segregation of the BMW which has immediate practical implications. This points to the fact that management of BMW has become synonymous with Incineration which could possibly explain their ignorance about the scheme of segregation. Studies done elsewhere in India[12] have assessed whether their

respondents had heard about the BMW with a positive response rate of 90-95% which means that 5% of the respondents had never heard about the BMW. Such a question was thought to be too primitive for our respondents and their knowledge about the administrative aspects of BMW was assessed by asking them whether they were aware of the existence of BMW Committee in the hospital of which more than 70% of the study participants were aware. This indicates that the respondents agree that effective BMW is a by-product of coordinated administrative and technical efforts.

Almost 40% of the study participants believed that their knowledge regarding BMW was adequate (Table 3). The nurses were significantly more likely to feel so compared to the other respondent groups. Looking at the level of knowledge of the nurses regarding BMW (Table 2) it is surprising that 65% of the nurses believed that their knowledge regarding BMW was adequate. This forms a sound platform for periodic orientation sessions on BMW, the need for which was expressed by more than 95% of the study participants. Almost all the respondents felt that segregation of waste was their responsibility. The attitude towards proper BMW was a favourable one as evident from the observations that 96% of the study respondents felt the need for periodic orientation, 96.8% acknowledged their responsibility towards waste segregation and 98.4% opined that the waste should be segregated in proper colour coded bags and not in any plastic bag. Need for ongoing training sessions in BMW for HCWs is expressed in other studies conducted in India and abroad [4-6, 9-13]. More than 75% participants agreed that BMW is a responsibility of the government as well. Making available the basic infrastructure necessary for effective waste segregation, collection, transport and disposal requires commitment from higher officials and departments like the State Waste Management Corporation in addition to the Public Health Department. Needle stick injury is an important consequence of improper management of sharp waste, and the infection control protocol calls for timely reporting of such injuries followed by its management. Only 21.2% of the respondents in this study did not perceive reporting needle stick injury as an additional burden, and had an attitude favouring reporting of such incidences.

More than 85% of the respondents felt that they complied with the BMW Rules, the nurses were significantly more likely to believe so compared to the interns and PG students. Earlier it has been pointed out that the nurses had a false perception of having adequate knowledge of BMW given the findings in Table 2. A sound knowledge forms a basis for the scientifically sound practices, and a false feeling of the former would leave no scope for behavioural change. It is only through periodic orientation sessions that a positive reinforcement of the correct principles of BMW can be done. Maintenance of the day to day log of BMW generated at each working stations is mandatory as per the rules. The practice towards effective BMW seemed far from satisfactory as only 36.4% of the respondents reported that the daily records are maintained, and only 56.4% of the respondents used personal protective equipment while handling BMW. A relaxed perception of the threat posed by unprotected handling of BMW could encourage engagement in such a dangerous practice of handling BMW without adequate PPE. This observation was further reinforced with the fact that almost 20% of the study participants had not completed their Hep B vaccination schedule. The nurses lagged significantly behind the other two groups of respondents in Hep B vaccination and almost 75% of the nurses who reported vaccination said that the last booster dose was taken more than 10 years back. A study by Batra et al[14] in Rajasthan reported that only 49.6% of healthcare workers were vaccinated against Hep B vaccine. A decline in the Anti HBs titre has also been documented with the increasing duration post vaccination making the healthcare workers more vulnerable to Hep B in the professional settings[14-16].

CONCLUSION:

This study tried to explore knowledge, attitudes and practices of HCWs in basic aspects of BMW. While it was not possible to assess the knowledge on each parameter, the questionnaire tried to encompass the broad areas of practical importance which could serve as a surrogate marker for the overall knowledge. The level of knowledge was poor, though the overall attitude was favourable towards compliance with BMW Rules 2016. The paper reinforces the need for strengthening the knowledge area by periodic training sessions in BMW, display of posters on scheme of segregation of BMW so that the favourable attitude is complemented with a scientifically sound knowledge base, the effect of which would be

subsequently reflected in the practice of effective biomedical waste management.

Table 1: Background Characteristics Of The Study Population

Characteristics	Interns (n=85)	Nurses (n=80)	PG Students (n=85)	Total
Age (in Years)				
20-29	83 (97.6%)	19 (23.8%)	82 (96.5%)	184 (73.6%)
30-39	2 (2.4%)	19 (23.8%)	3 (3.5%)	24 (9.6%)
40-49	0	26 (32.5%)	0	26 (10.4%)
50-59	0	16 (20%)	0	16 (6.4%)
Sex				
Male	35 (41.2%)	2 (2.5%)	28 (32.9%)	65 (26.0%)
Female	50 (58.8%)	78 (97.5%)	57 (67.1%)	185 (74.0%)

Table 2: Knowledge Regarding BMW Management

	Interns (85)	Nurses (80)	PG Students (85)	Total	χ^2	p
Segregation of Expired Medicines	23 (27.1%)	21 (26.3%)	35 (41.2%)	79 (31.6%)	5.477	0.065
Colour Coded Bins	20 (23.5%)	16 (20.0%)	26 (30.6%)	62 (24.8%)	2.589	0.274
Sharps segregation	76 (89.4%)	75 (93.8%)	64 (75.3%)	215 (86%)	12.904	0.002
BMW Committee	58 (68.2%)	63 (78.8%)	61 (71.8%)	182 (72.8%)	2.371	0.306
Storage of BMW	15 (7.6%)	3 (3.8%)	11 (12.9%)	29 (11.6%)	7.988	0.018
Disposal of BMW	78 (91.8%)	79 (98.8%)	79 (92.9%)	236 (94.4%)	4.322	0.115

Table 3: Attitude Regarding BMW Management

	Interns (85)	Nurses (80)	PG Students (85)	Total (250)	χ^2	p
Adequacy of Knowledge	24 (28.2%)	52 (65%)	25 (29.4%)	101 (40.4%)	29.592	0.0001
Responsibility towards Segregation	83 (97.6%)	79 (98.8%)	80 (94.1%)	242 (96.8%)	3.1533	0.2
Need for periodic training	83 (97.6%)	78 (97.5%)	79 (92.9%)	240 (96%)	3.1403	0.2082
Reporting of Needle Stick Injury	14 (16.5%)	16 (20%)	23 (27.1%)	53 (21.2%)	2.9356	0.2283
Need for colour coded bags	1 (1.2%)	0 (0%)	3 (3.5%)	4 (1.6%)	1.5381	0.46
Government responsibility in BMWM	69 (81.2%)	58 (72.5%)	66 (77.6%)	193 (77.2%)	1.7772	0.411

Table 4: Practices Pertaining To BMW Management

	Interns (85)	Nurses (80)	PG Students (85)	Total (250)	χ^2	p
Compliance with BMWM 2016 Rules	70 (83.3%)	78 (97.5%)	66 (77.6%)	214 (85.9%)	14.793	0.0007
BMW Records	34 (40.0%)	26 (32.5%)	31 (36.5%)	91 (36.4%)	1.001	0.6
Use of PPE	57 (67.1%)	33 (41.3%)	51 (60%)	141 (56.4%)	11.8421	0.002

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