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IS BIOMEDICAL WASTE MANAGEMENT KNOWLEDGE ADEQUATE IN PARAMEDICS & SANITARY WORKERS IN HOSPITALS OF UJJAIN CITY?

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ABSTRACT

Background: Hospitals produce a byproduct which is wasteful and causes contamination of the environment, with its antecedent complications. Inadequate and inappropriate knowledge of handling may have serious health consequences.

Objectives: Present study was conducted to find out the current level of knowledge among paramedics (Lab Technicians, nursing staff) & sanitary workers in hospitals of Ujjain city regarding biomedical waste management.

Methods: A Cross-sectional study was conducted on 400 study participants in the Government and private hospital of Ujjain city from 1st January 2013 to 30 November 2013.Statistical analysis was done by SPSS 16.0 and chi-square test.

Results: **Mean age** of the total 400 study participants was 31.36 (SD=11.62) years, among them 68.5% were female, majority (64.5%) were the nurses and majority (64.7%) were working in the concerned hospital since more than 2 years. Nursing staff has adequate knowledge (36.8%) as compared to lab technician & sanitary staff (30.3%). Staff who had received medical waste management training had significantly ($p<0.05$) higher knowledge.

Conclusion: On the basis of findings we conclude that the knowledge regarding biomedical waste management is not adequate among nursing staff, lab teqnicians and sanitary workers.

Keywords: Bio-medical waste management, segregation, knowledge; practice; needle stick injury.

INTRODUCTION

Health institutions are committed to provide health care services and during the process of providing health care services and eliminating potential risks to people's health, they produce wastes which refer to remains or by products of human production and consumption processes. Improper management of biomedical waste poses significant hazardous risk to the patients, healthcare workers, the community and environment.[1] Healthcare waste has been caused 21 million hepatitis B virus (HBV) infections (32% of all new infections); 2 million hepatitis C virus (HCV) infections (40% of all new cases); 260,000 HIV infections (5% of all new cases) in 2000. [(2)] Epidemiological studies indicate that a person who experiences one needle stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively of becoming infected with HBV, HCV and HIV.[2] It is estimated that approximately 3million HCWs (health care workers) experience percutaneous exposure to blood borne viruses (BBVs) each year. This results in an estimated 16,000 hepatitis C, 66,000 hepatitis B and 200-5000 HIV infections annually. [3] Inadequate knowledge

of handling of health care waste may have serious health consequences. Hence, the health care workers (HCW) have to be aware of biomedical waste management. This study was performed to investigate current levels of knowledge of health care workers regarding bio-medical waste management.

METHODS

Present cross-sectional study was conducted between January to November 2013 in the Government and private hospitals of Ujjain city to find out the current level of knowledge among lab teqnicians, nursing & sanitary staff in hospitals of Ujjain city regarding biomedical waste management. On anticipated population proportion of 35% [4, 5] and absolute precision of 5% and at 95% confidence interval the sample size was calculated by the formula $N = 4PQ/L^2$ where P (Anticipated population Prevalence) was 35%; Q (100-P) was 65%; L (absolute precision) was 5%. The minimum sample size 364 has been derived, which is rounded off to the next highest number & final sample size of 400 was Calculated.

Ethical clearance for the study was sought from the institutional ethics committee. Permissions for the study were obtained from the medical director/medical superintendent of concerned hospital. Study subjects (all nursing staff, lab technician & sanitary workers) were selected by the convenience sampling method. Out of the total 30 hospitals of the Ujjain city, six hospitals (two government hospitals and four private hospitals) were selected using convenience sampling method. Study participants were selected from the list of employee in concerned hospital record; those working since last six month and consenting to participate were enrolled in the study. Self-administered semi structured questionnaire modified as per the biomedical waste management & handling rule 1998 and pretested by pilot study was used to collect information. This modified questionnaire was translated and back translated in Hindi language. The information was collected from nurses, lab technicians& from sanitary staff using both English and Hindi version of questionnaire. Questionnaire was divided into two parts, A and B. Part A Includes background variable like age, sex, educational level, income, designation and pervious training regarding biomedical waste management. Part B containing questions for types of biomedical waste, Storage, segregation, transport, disposal & hazards of biomedical waste. Each question or statement in the section B carry one mark for correct response & zero mark for incorrect response. Total score of correct response was 15 and study participants who will have score 60% or above the total score is considered as having adequate knowledge. The data collected was entered in Microsoft excel 2007, 10% of the data was re-entered by another person to check for the data entry errors. The data was analyzed using Epi-info software. The quantitative data was summarized as mean and standard deviation, while qualitative data as percentage and proportion. To show the association and difference between two independent categorical variables chi-square test was used. We considered the statistical test to be significant when the P-value is less than 0.05.

RESULTS

Out of the 400 study participants, 274 (68.5%) were female & 126 (31.5%) were male. Mean age of the study participants was 31.36 (SD=11.62) years with 63.0% participants below the age of 30 years and 37% study participants above the age of 30 years. 65.8% were educated below higher secondary (12th class), none of the study subject was illiterate. 63.7% of study participants were previously trained in biomedical waste management. Majority of the study participants were the nurses (64.5%) and 64.7% of the study participants working in the concerned hospital since more than 2 years **(Table 1)**. Out of the 400 study participants, 36.8% nurses had adequate knowledge (score >60%) as compared to lab technicians & sanitary workers (30.3%) (p=0.18) (**Table 2)**.

Table –1 Demographic features of the study participants

Background variable	Male (%)	Female (%)	Total (%)
Age			
<30years	86(34.1)	166(65.9)	252(63)
>30years	40(27.0)	108(73.0)	148(37)
Education*			
Below 12th class	74(28.1)	189(71.9)	263(65.8)
12th class & above	52(38.0)	85(62.0)	137(34.2)
Previous training			
Trained	76(29.8)	179(70.2)	255(63.8)
Untrained	50(34.5)	95(65.5)	145(36.2)
Job distribution			
Nurses	44(17.1)	214(82.9)	258(64.5)
Lab technicians	55(69.6)	24(30.4)	79(19.8)
Sanitary workers	27(42.9)	36(57.1)	63(15.8)
Working period			
6 months -2 years	41(29.1)	100(70.9)	141(35.2)
> 2 year	85(32.8)	174(67.2)	259(64.8)
Total	**126(31.5)**	**274(68.5)**	**400(100)**

Figures in parenthesis indicate percentage.

History of previous training status revealed that 255 (63.7%) staffs were trained on bio-medical waste handling earlier, while remaining 36.3% were never received any such training. Significant

difference in adequate knowledge was found among study participants who had previously trained in biomedical waste management (p=0.04). 38.0% of trained study participants having adequate knowledge, whereas 28.2% of the untrained study participants having adequate knowledge.40.1% of study subjects. Educated above class 12th having adequate knowledge, whereas 68.5% of study subjects educated below class 12th showing inadequate knowledge.

Table-2 Distribution of knowledge among study participants according to selected variables

Study participants	Adequate Knowledge (Score >60%)	Inadequate Knowledge (Score <60%)	p-value
Nurses (n=258)	95 (36.8)	163 (63.2)	0.18
Others# (n=142) ()	43 (30.3)	99 (69.7)	
Trained (n=255)	97 (38.0)	158 (62.0)	0.04*
Untrained (n=145)	41 (28.2)	104 (71.8)	
Education up to class 12th (n=263)	83 (31.5)	180 (68.5)	0.08
Education Above 12th class (n=137)	55 (40.1)	82 (59.9)	

Figures in parenthesis indicate percentage; *significant; #Includes lab technicians & sanitary workers

DISCUSSION

Distribution of sample according to their educational background shows that majority (65.8%) of the study participants had education below class 12th and only 34.2% of the study participants were educated above class 12th.

With regard to the previous exposure to the training program related to biomedical waste management, 63.8% of the study participants had received special training on biomedical waste management. Exposure to previous training among study participants was higher as compared to other studies by Nandana et al[6], and Kende V at el[7] where 33.33% and 40% of the study participants respectively had a previous exposure related to biomedical waste management.

Distribution of study participants according to their job shows that majority (64.5%) of the study participants were nurses, followed by lab technicians (19.8%) and sanitary workers (15.8%).In study by Shafee M et al[8] 47.4% of the study participants were nurses, 26.4% were lab technicians and 26.2% were housekeeping staff. In another study by Ismail, Imaad Mohammed, et al[9] four groups of participant's doctors, nurses, lab-technicians and class-IV waste handlers were taken and each group had equal number of study participants (25% in each group).Similar four groups were also taken by Mathur V et al[10] in their study.

Majority of (87.2%) of study participants were given the correct response in the area of "infectious waste". Knowledge also observed in the area of Personal protective measures, disposal, color coding and hazards of biomedical waste and it was found 54.2%, 50.5%, 42.2% and 28.5% respectively.

Findings revealed that (87.2%) of the study participants had responded correctly to the item 'knowledge regarding **infectious waste**". Finding in this area was higher than the study by Nandana et al[6] Where 53.9% of the respondent had adequate knowledge regarding infectious waste. In another study by Rajesh K Chudasama et al[11] 40.4% of the respondent had proper knowledge regarding infectious waste. Higher knowledge in this area in our study might be because of previous training regarding biomedical waste management.

Knowledge regarding **personal protective measures** among study participants was 54.2%.Similar finding were observed in the study by Nandana et al [6] where correct knowledge regarding Universal Precautions was found among 57.14% health care personnel. Lower education status of the study participants, age difference could be the reason for lower knowledge on this issue among study participants in our study.

Knowledge of study participants regarding **disposal of biomedical waste** was found in 48.8%, this finding was consistent with the study conducted by Grimmond T et al[12], Where 45% of the staff were aware of proper waste disposal and lower than the present study by Y.Saraf.M et al[13] (2006) at Gandhi Medical College and Hamidia Hospital of Bhopal, where 81.0% of the respondents had correct knowledge regarding disposal of biomedical waste. The difference in the knowledge regarding disposal in our study could be due to difference in the study setting and lack of regular training & supervision by the regulatory body. Various other studies from different part of India reported knowledge regarding disposal of biomedical waste between 30-56.6%.[14,15,16]

Different **color-coding** bags for segregation were one of the most important parts of BMW management rule. Knowledge of study participants regarding color coding of biomedical waste among study participants was found in 42.2%. Very low knowledge was reported by some other studies.

Deo et al[4] Showed that only 28.62% of paramedical and 20.23% of medical staff knew about this issue, whereas 74% of Puducherry study participants did not know about color coding of the BMW bags. The difference in awareness regarding color coding could be due to difference in the study setting, non-availability of different type of containers according to the guideline and low enforcement by the regulatory body.

Knowledge of study participants regarding **hazards of biomedical waste** among study participants was 28.5%, in this area knowledge of the lab technicians and sanitary workers was found in 26.1%, this finding was found slightly lower than the finding by S Sharma et al[5] where 33.33% of waste handlers were aware about the health hazards of biomedical waste. In the study by Nandana et al[6] 41.2 % of the study participants were aware about the hazards of biomedical waste. The reason for higher level of awareness on this issue could be the previous training among study participants, higher level of education and difference in the job category as compared to our study.

Majority of study participants 262(65.5%) were not having adequate Knowledge. Knowledge regarding biomedical waste is higher among nurses as compared to lab technicians & sanitary workers. Higher percentage of adequate knowledge was found among study participants who had previously trained in biomedical waste management as compared to the untrained study subjects. (p=0.04)

CONCLUSION

Study results demonstrated a lack of awareness in several aspects of BMW management among study participants. Knowledge regarding biomedical waste is higher among nurses as compared to lab technicians & sanitary workers. Knowledge was found to be inadequate among majority of study participants.

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