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AWARENESS AND PRACTICES OF BIOMEDICAL WASTE MANAGEMENT GUIDELINES 2016 AMONG HEALTH CARE PERSONNEL IN A TERTIARY CARE HOSPITAL OF BILASPUR, CHHATTISGARH, INDIA

Microbiology

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ABSTRACT

BACKGROUND: The waste produced in the course of health-care activities carries a higher potential for infection and injury than any other type of waste. Therefore, it is essential to have safe and reliable method for its handling. With this background, the present study was conducted to assess the knowledge and practices of health-care workers regarding Bio-medical Waste Management.

MATERIAL AND METHODS: A hospital based cross sectional study was carried out among 100 health care personnel selected through stratified random sampling during September-October 2018 at government medical college CIMS, Bilaspur, Chhattisgarh. A predesigned, pretested questionnaire pertaining to biomedical waste management rules 2016 was used for data collection. SPSS 21.0 version software was used to analyze the data.

RESULTS: Out of 100 respondents consisted of 50 intern doctors, 25 staff nurses and 25 lab technicians, about 77% of health care personnel were aware about biomedical waste categories. Around 57% of the respondents knew about maximum storage time limit for untreated waste while only 43% had the knowledge regarding pre and post exposure prophylaxis. Around 64% of health care personnel were discarding sharp waste correctly in white translucent puncture proof containers while ampoules and vials were discarded by 69% staff in blue cardboard boxes. Safe injection practices and onsite treatment of waste were followed by 64% and 56% respectively.

CONCLUSION: Intern doctors and staff nurses were aware regarding biomedical waste management rules 2016 and its crucial aspect but nursing staff were better in the practical implications of the same while the lab technicians lagged behind in both. Intensive training programs at regular intervals with supportive supervision and continuous medical education are essential with special emphasis on pre and post exposure prophylaxis and time to time amendment of rules.

KEYWORDS

Biomedical waste management, Health care Personnel, Awareness, Practices

INTRODUCTION

Inadequate and inappropriate handling of health-care waste is an important cause of nosocomial infections, may have serious public health consequences and a significant impact on the environment. Appropriate management of health- care waste is a crucial component of environmental health protection, and it should become an integral feature of health-care services. According to Bio-Medical Waste (Management Handling) Rules, 1998 of India, "Bio-medical 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 biological.[1]

In India, approximately 0.33 million tons of hospital waste is generated annually and in hospital settings 0.5-2 kg of Bio-medical waste per bed every day. Government of India has initiated Bio-medical Waste (Management and Handling) Rules, 1998 which is a legal binding on all hospitals to ensure proper disposal of Bio-medical Waste.[2]

Bio-Medical Waste (Management and Handling) Rule 1998, prescribed by the Ministry of Environment and Forests, Government of India, came into force on 28th July 1998. This rule applies to those who generate, collect, receive, store, dispose, treat or handle bio-medical waste in any manner.[3] The Act was amended in 2011 and is now superceded by Bio-Medical Waste Management Rules, 2016, which came into force from 28th March 2016.[4] The amendments made in 2016 are

1. Every occupier generating biomedical waste including health camps and ayush requires to get authorization.
2. Duties of the operator are clearly listed.
3. Biomedical waste divided into 4 color coded categories.
4. Treatment and disposal of biomedical waste made mandatory for all HECs.
5. A format for annual report appended with the rules.
6. Rules – 1 to 18, Schedule I to IV, Forms I to V.
7. Provision of bar code system for biomedical waste bags and container with GPRS enabled system.

Rationale

Hospital wastes carry usually higher amount of infectious particles, toxic or hazardous chemicals, sharps, genotoxins and radioactive substances leading to different disease such as AIDS, Hepatitis B & C, carcinoma, etc. Hence a safe and a suitable strategy for the treatment of Bio-medical Waste is very much crucial. Proper knowledge about the health hazards of hospital waste, its disposal and sound practices of safety measures can lead to safe disposal and protect the community from its adverse effects and nosocomial infections as well.

With this background, the present study was conducted to assess the knowledge and practices of health-care personnel regarding Bio-medical Waste Management.

MATERIAL AND METHODS

This was hospital based cross sectional study conducted in government medical college CIMS, Bilaspur, Chhattisgarh during September-October 2018 among 100 permanent health care workers. The methodology comprised of primary data collection through direct personal interview technique using a predesigned, pretested questionnaire pertaining to biomedical waste management rules 2016. Sample size was calculated at 95% confidence level and taking the expected proportion to be 50% as it gives highest sample size and with an absolute error or precision of 10%, the sample size came out to 96 (which is rounded to 100), by using the formula $n = Z^2P(1-P)/d^2$

Where n = sample size,
Z = 1.96 value of the standard normal variant corresponding to level of significance alpha 5%
P = Expexted proportion in population (50%)
d = Absolute error or precision (10%)

Thus using this formula for categorical study variable in single sample, $n = 1.96^2 \times 50\ (100-50)/10^2 = 96$ (which is rounded up to 100) were to be considered for the study.

Stratified random sampling was used in the study. To cover up 100 sample, study subjects were divided into groups of 50 Intern doctors, 25 staff nurse & 25 lab technicians.

Verbal consent was obtained from the respondents. A self-administered questionnaire containing a set of questions pertaining to biomedical waste management rules 2016 knowledge, awareness and

practices was used for data collection. Health care personnel were assessed for their existing knowledge on various aspects like handling, segregation, collection, on-site pre-treatment etc. through multiple choice questionnaire. Also Biomedical waste management practices were verified through observation in their respected working areas.

INCLUSION CRITERIA

The health care personnel: Intern doctors, staff nurses & lab technicians who gave consent for the study.

EXCLUSION CRITERIA

Staff who were although trained, but not assessed as per the questionnaire because of their reluctance to participate in the study.

Data collected was compiled and entered into Microsoft excel sheets, doubly checked for any key board error and percentages were used to interpret and analyze the findings. SPSS 21.0 version software was used to analyze the dat

RESULTS

Awareness

The 100 respondents consisted of 50 Intern doctors, 25 staff nurses and 25 lab technicians. About 88% of Health care personnel were aware about new amendment in waste categories as per biomedical waste management guidelines 2016. Around 77% knew about biomedical waste categories, 76% of the respondents could specify about biomedical waste bags correctly while only 57 % were aware about treatment and disposal of biomedical waste. About 82% and 72% of respondents could identify the biohazard and cytotoxic symbol respectively. A good proportion 75% of respondents were able to told regarding disposal of sharp waste while only 57% knew about maximum storage time limit for untreated waste. A relatively less percentage i.e. 43% were aware regarding pre and post exposure prophylaxis of biomedical waste handlers. Interestingly only 57% of the respondents knew that non adherence to biomedical waste rules is a punishable offence. Overall knowledge score were found to be around 71.2% for intern doctors, 70.4 for staff nurses and 60.8 for lab technicians. Awareness regarding biomedical waste management among health care personnel have been tabulated in the Table 1

Practices

Around 64% of health care personnel were discarding sharp waste in white translucent puncture proof containers while ampoules and vials were discarded by 69% staff in blue cardboard boxes. 72% of the staff segregated gloves in red non chlorinated bags. Only 57% of health care personnel were seen to emptying biomedical waste bag/container within specific time limit of 72 hours. Onsite treatment and safe injection practices were followed by 56% and 64% respectively. Overall practice score were found to be around 66.2% for intern doctors, 72.4% for staff nurses and 60.4 for lab technicians. Practices regarding biomedical waste management among health care personnel have been tabulated in the Table 2

Table 1. Awareness regarding biomedical waste management among health care personnel

Parameter	Intern Doctors	Staff Nurse	Lab Technicians	Total
Aware about new amendment	44 (88)	23 (92)	21 (84)	88 (88)
Biomedical Waste Categories	40 (80)	19 (76)	18 (72)	77 (77)
Specifications of Biomedical Waste Bags	38 (76)	21 (84)	17 (68)	76 (76)
Treatment and disposal	27 (54)	17 (68)	13 (52)	57 (57)
Identifying Biohazard Symbol	42 (84)	22 (88)	18 (72)	82 (82)
Identifying Cytotoxic Symbol	40 (80)	18 (72)	14 (56)	72 (72)
Maximum storage time limit for untreated waste	34 (68)	14 (56)	9 (36)	57 (57)
Disposal of Sharp Waste	38 (76)	18 (72)	19 (76)	75 (75)
Pre and Post exposure prophylaxis	24 (48)	11 (44)	8 (32)	43 (43)
Is non adherence a punishable offence	29 (58)	13 (52)	15 (60)	57 (57)
Total	356 (71.2)	176 (70.4)	152 (60.8)	684 (68.4)

Figure in the parenthesis indicate percentage; BMW=Biomedical waste
n= 100 (50 Intern doctors, 25 Staff nurses & 25 Lab technicians)

Table 2. Practices regarding biomedical waste management amongst health care personnel

Parameter	Intern Doctors	Staff Nurse	Lab Technicians	Total (n=100)
Discarding soiled linen	36 (72)	19 (76)	17 (68)	72 (72)
Discarding intravenous infusion sets/catheters	31 (62)	16 (64)	15 (60)	62 (62)
Procedure followed to discard used gloves	36 (72)	19 (76)	17 (68)	72 (72)
Discarding metals/sharps/syringes	30 (60)	17 (68)	15 (60)	64 (64)
Procedure followed to dispose needles	44 (88)	21 (84)	18 (72)	83 (83)
Discarding ampoules/vials	36 (72)	19 (76)	14 (56)	69 (69)
Emptying a BMW bag/container	27 (54)	17 (68)	13 (52)	57 (57)
Onsite treatment of wastes	26 (52)	16 (64)	14 (56)	56 (56)
Safe Injection Practices	32 (64)	19 (76)	13 (52)	64 (64)
Total	298 (66.2)	163 (72.4)	136 (60.4)	599 (66.5)

Figure in the parenthesis indicate percentage; BMW=Biomedical waste
n= 100 (50 Intern doctors, 25 Staff nurses & 25 Lab technicians)

DISCUSSION

The present study revealed that the health care workers although consisting of Doctors, nurses and technicians had insufficient knowledge and practices of biomedical waste management. Awareness about biomedical waste categories as per biomedical waste management guidelines 2016 was maximum amongst Intern doctors (71.2%) followed by staff nurses and lab technicians (70.4%) and (60.8%) respectively. In a similar study of Bhattar S et al awareness about biomedical waste categories was maximum amongst doctors (84%) followed by nurses and technicians (41%) and (37%) respectively.[5] On the contrary in an another study of Tanmay K Mehta et al awareness was (98.53%) amongst technicians followed by doctors and nurses (78.08%) and (71%) respectively.[6]

About (88%) of the nurses could identify the biohazard symbol correctly followed by (84%) of the intern doctors and least among the technicians (72%) while Bhattar S et al found that (90%) nurses identified it correctly followed by technicians and doctors (84%) and (58%) respectively.[5] Tanmay K Mehta et al found it maximum among technicians (98.52%) followed by (93.15%) doctors and least among nurses (85.5%)[6] The overall practice of discarding sharp waste in puncture proof containers was (68%) maximum amongst nurses, followed by intern doctors and technicians (60%). Bhattar S et al found overall sharp disposal accurately amongst (96%) nurses followed by doctors and technicians (80%) and (73%) respectively.[5] However in study conducted by Tanmay K Mehta et al (100%) technicians knew correctly about procedure followed to dispose needles followed by nurses and doctors (92.8%) and (89.04%) respectively.[6]

Discarding gloves in red non chlorinated bags was best practised by the nurses (76%) followed by intern doctors (72%) and least by the technicians (68%). The finding is similar to Bhattar S et al where majority of the nurse (93%) practised safe and correct method of disposal of gloves followed by doctors and technicians (80%) and (10%) respectively.[5] In contrary to these Tanmay Mehta et al found that (86.76%) technicians practice it correctly followed by nurses and doctors (63.8%) and (38.35%) respectively.[6] Discarding glass waste (ampules and vials) in blue card boxes was practised by (76%) of the nurses correctly, followed by technicians (72%) and least by Intern

doctors (56%). This is because of the revised biomedical waste management guidelines 2016 and more nurses being trained for the same. Similar findings were found by Bhattar et al in which ampules and vials were discarded correctly maximum among (96%) nurses followed by technicians and doctors (73%) and (57%) respectively.[5]

Overall knowledge were almost similar among Intern doctors and staff nurses (71.2%) and (70.4%) resectively and least among lab technicians (60.8%). Overall practices of the nurses were better than the doctors (72.4%) and (66.2%) respectively and least among technicians (60.4%) in the present study. On the contrary findings of Malini et al reported that majority of the doctors followed correct practices followed by nursing staff and lab technicians.[7] Ranu et al also reported nursing staff practices had an edge over the doctors and the lab technicians.[8]

CONCLUSION

The present study showed up that intern doctors and staff nurses were aware regarding biomedical waste management rules 2016 and its crucial aspect but nursing staff were better in the practical implications of the same while the lab technicians lagged behind in both. This study reveals that lab technicians had low level of knowledge and poor practices who are an important risk category for exposure. Thus an effective and goal oriented frequent training programme targeting them is an important way to improve their knowledge and practices. Intensive training programs at regular intervals with supportive supervision and continuous medical education are essential with special emphasis on pre and post exposure prophylaxis and time to time amendment of rules.

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