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Original Research Article

Compliance of bio medical waste management practices in a tertiary care teaching hospital in Northeast India

Samarpita Dutta[1], Chanda Mog[1]*, Amit Das[1], Tanusri Debbarma[2], Uma Debbarma[3]

[1]Department of Community Medicine, Agartala Government Medical College, Agartala, Tripura, India
[2]Department of Radiodiagnosis, Agartala Government Medical College, Agartala, Tripura, India
[3]Department of Biochemistry, Agartala Government Medical College, Agartala, Tripura, India

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***Correspondence:**
Dr. Chanda Mog,
E-mail: drchandamog@gmail.com

ABSTRACT

Background: The handling of medical waste has recently become a significant problem for all medical centres and healthcare organizations because of the risks it poses to both people and the environment. Objective was to evaluate the compliance of bio-medical waste management practices in different patient care areas in a tertiary care hospital of Agartala, west Tripura.
Methods: A cross-sectional study was conducted in a total of 58 patient care settings at Agartala Government Medical College for a period of fourteen days using a pre-validated checklist containing 20 items related to availability and condition of waste receptacles, segregation at source of generation frequency of removal of waste and 7 parameters for assessing needle handling practices.
Results: A total 58 patients care areas were evaluated. Maximum patient care areas (75.9 %), BMW guidelines were found displayed; in 65.5% patient care settings, location of chart was observed appropriate; and content of chart was readable in 63.7% user areas. Most of the user areas, the 4 colour coded bins were available ranging from 84.5% to 65.5%. About segregation of wastes, infected/soiled wastes were disposed of in yellow bins in 72.4% of user areas; Sharp glassware and metallic body implants were disposed of in blue bins in 81% of user areas; plastic materials were disposed of in red bins in 79.3% of user areas; and sharp wastes were disposed of in white bins in 60.3% of user areas.
Conclusions: The findings suggest that there is still need of improvement of BMW management practices in some user areas.

Keywords: AGMC, BMW management practices, Compliance, Tertiary care centre

INTRODUCTION

Medical waste is defined by the World Health Organization as waste produced by health care activities. This includes bodily parts, chemicals, medications, spent needles and syringes, soiled dressings, diagnostic samples, blood, and other items. Approximately 85% of the total trash produced by healthcare operations is classified as ordinary, non-hazardous waste and the remaining 15% is regarded as infectious material. An estimated 16 billion injections are given annually worldwide, yet not all of the used syringes and needles are disposed of correctly after use. The amount of hazardous waste produced per hospital bed per day (kg/bed/day) varies from 6 kg in low-income countries to over 11 kg in high-income countries. Nevertheless, HCW is sometimes not separated into hazardous and non-hazardous waste in low-income nations, which results in a significantly higher volume of hazardous waste being created overall.[1,2]

In developing nations, the handling of biomedical waste (BMW) is emerging as an increasing issue in cities. Yet,

the presence of pathogens and hazardous substances in BMW can lead to significant health dangers for those who collect waste, patients, and medical staff. Some of these dangers include HIV/AIDS, hepatitis B virus (HBV), and hepatitis C virus (HCV), with transmission risks of 0.3%, 1.8%, and 30%, respectively, following a single cut or puncture.[3] India was among the initial nations to establish and put into action rules for managing biomedical waste (BMWM). Despite a decade of its enforcement in India, hospitals have yet to meet the expected benchmarks for biomedical waste management practices.[4] Although various studies have been carried out on BMW management in the past, most of the studies were conducted to assess the knowledge, awareness and practices of health care workers. However, this study was conducted to evaluate the adherence of various categories of BMW management practices. Therefore, the main referral hospital was chosen as study setting for this research.

Objective

To estimate the compliance of bio-medical waste management practices in different patient care areas in a tertiary care hospital of Agartala.

METHODS

A descriptive study cross sectional was carried out for 14 days from 1st February to 14th February 2023 in a total of 58 patient care settings at Agartala Government Medical College which included 13 medicine and allied areas, 21 surgery and allied areas, 11 outpatient departments (OPDs), 6 laboratories, 4 intensive care units (ICUs), 3 minor OPERATION theatres (OT) after taking permission from competent authority before the collection of data.

So, it was census survey and all the indoor and outdoor settings from where biomedical waste generated were included in this evaluation survey.

Each site was visited by the researcher team and evaluated for adherence to BMW management practices at different patient care areas with the help of a pre-validated checklist. The checklist contains 20 parameters for recording the observation of various category of BMW management practices like availability of guideline chart, location of chart, content readable or not, type of availability of 4 colour coded containers, biohazard symbol imprinted on containers, lining the inner side of red containers, segregation at a point of generation, containers covered or not etc., segregation at source of generation, frequency of removal of waste and 7 parameters for assessing needle handling practices across different patient care areas, Each desirable observation was assigned as "yes" given "1" mark and each undesirable observation was assigned as "no" given "0" mark and mean score was calculated for parameters like availability and condition of waste receptacles (type of availability of colour coded containers, biohazard symbol imprinted on containers, lining the inner side of red containers, containers covered or not, availability of guideline chart, location of chart, content readable or not, biohazard symbol imprinted on containers), and segregation at source of generation to assess the compliance for various category of BMW management practices in different user areas. All the study areas were visited during afternoon hours from 2 to 4 pm and the chosen timings were such when maximum waste is generated in a patient care area, as this was the time when blood samples of patients were already taken and medication, injections were given. The study was conducted after taking approval from institutional ethics committee of Agartala Government Medical College.

Data were collected and entered into Microsoft Excel software. Data analysis was done by using SPSS software version 21.0. Descriptive statistics were expressed in frequency, percentage and mean.

RESULTS

The results showed that BMW guidelines were displayed in 75.9% patient care areas and location of chart was observed appropriate in 65.5% patient care areas. However, appropriate chart location at OPDs stands at 73% and content of chart was readable in 63.7% user areas. Yellow, red, blue and white translucent puncture-proof containers were available ranging from 84.5% to 65.5% patient care areas. About segregation of wastes in 72.4% user areas, infected/soiled wastes were disposed of in yellow bins; in 79.3% of user areas plastic materials were disposed of in red bins; in 81% of user areas, sharp glassware and metallic body implants were disposed of in blue bin; and in 60.3% of user areas, sharp waste was disposed of in white bins (Table 1).

The biohazard symbol was imprinted on red bin, yellow bin, blue and white bins were 72.4%, 77.6%, 74.1%, 48.3% respectively in different user areas. Almost 87.9% containers were observed covered with lid while only 20.7% bags removed before 3/4th full in different patient care areas. For medicine ward and allied areas, the mean score for various category of BMW management practices like availability and location of guideline chart, container availability of containers, segregation of waste across different patient care areas were 14.0. For surgical ward and allied areas, mean score of these categories were 12.9 and for OPDs, ICUs, minor OTs, and laboratories the mean score were 9.0, 13.7, 10.0, 4.0 respectively. The overall score of these various categories was 11.4.

Table 1: Compliance of BMW management practices across different patient care areas (n=58).

Category	Patient care settings					
	Medicine ward and allied areas (n=13) (%)	Surgical ward and allied areas (n=21) (%)	OPDs (n=11) (%)	ICUs (n=4) (%)	Minor OTs (n=3) (%)	Labs (n=6) (%)
BMW guidelines displayed	13 (100)	19 (90)	6 (55)	4 (100)	2 (67)	0 (0)
Location of chart is appropriate	9 (69)	15 (71)	8 (73)	3 (75)	2 (67)	0 (0)
Content readable	10 (80)	17 (81)	7 (64)	3 (75)	2(67)	0 (0)
Yellow container available	13 (100)	19 (90)	8 (73)	4 (100)	2 (67)	2 (33)
Yellow bags are placed lining the inner side of yellow container	11 (85)	19 (90)	7 (64)	4 (100)	2 (67)	0 (0)
Yellow bag contains infected, soiled waste	11 (85)	19 (90)	8 (73)	3 (75)	1 (33)	1 (17)
Red colour container available	13 (100)	19 (90)	7 (64)	4 (100)	2 (67)	1 (17)
Red bag placed lining the inner side of red container	13 (100)	19 (19)	5 (45)	3 (75)	2 (67)	4 (67)
Red bag contains only plastic waste	13 (100)	19 (90)	7 (64)	4 (100)	2 (67)	4 (67)
Blue container available	13 (100)	18 (85)	9 (82)	4 (100)	2 (67)	4 (67)
Blue bag placed lining the inner side of blue container	13 (100)	19 (90)	6 (55)	4 (100)	2 (67)	1 (17)
Blue bag contains only sharp glassware and metallic body implants	13 (100)	20 (95)	6 (55)	4 (100)	2 (67)	1 (17)
White translucent puncture proof container available	13 (100)	15 (71)	4 (36)	4 (100)	2 (67)	1 (17)
White container contains only sharp waste	13 (100)	15 (71)	3 (27)	3 (75)	2 (67)	0 (0)
Containers are covered	12 (92)	19 (90)	8 (73)	4 (100)	3 (100)	5 (83)

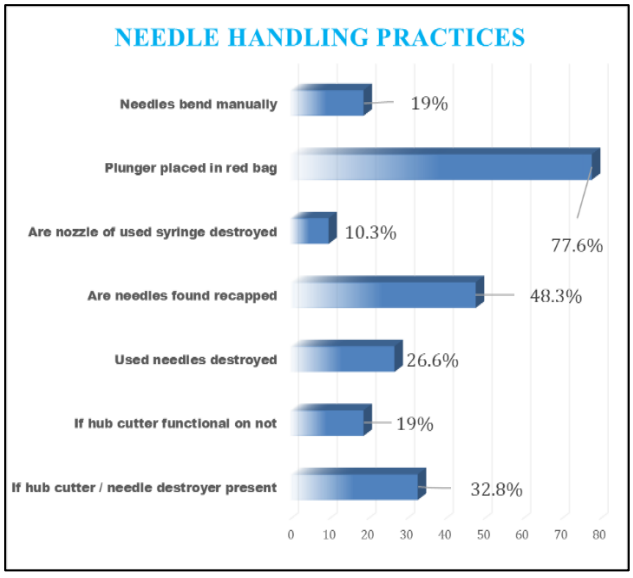

Figure 1: Needle handling practices in the study area (n=58).

Regarding the needle handling practices, it was observed that hub cutter or needle destroyer was present in 32.8% patient care areas and among them only 19% of study areas hub cutter was functional. About 19% of patient care areas, health worker was seen manually bending needles before disposal (Figure 1).

In present study, most of the patient care settings, wastes were removed thrice daily (46.6%) and followed by twice daily (33.8%) (Figure 2).

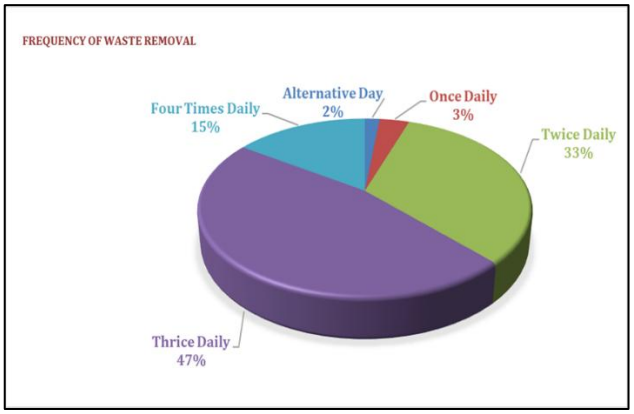

Figure 2: Frequency of waste removal (n=58).

DISCUSSION

The present study was conducted to evaluate the adherence of BMW management practices in patient care settings at tertiary care hospital in the state. Being a referral centre for the state and also a state of art clinical hub it was observed that in around three fourth of the different patient care areas, the biomedical waste

management guidelines were displayed whereas the location was found to be appropriate in around two third of patient care settings and the content of the chart was readable more than half of the study places. A study done in Uttar Pradesh by Dixit et al revealed that biomedical waste management guidelines were displayed at tertiary care centre was higher than our study.[5] This difference observation may be due to different health care settings like both government and private hospitals were included in this Uttar Pradesh study.

In our study, the yellow, red and blue coloured containers were available in more than three fourth of the user areas while the white coloured container was present only more than half of the user areas whereas Shrestha et al study reported shortage in availability of yellow bag in many study sites which was observed inconsistent with our study results.[6] The methodological difference may be one of the reasons for this variation. A study conducted by Sing et al observed that more than half of the places, the waste generation were having all four colour coded bins.[7] However, plastic bags in these bins were placed properly of respective colours only a few places of user areas but these findings were reported better in our study.

In this current research, the majority of the observation sites had all the BMW containers covered with lids, which differed from a study in West Bengal. In that study, nearly every ward had its bins left open, and various types of waste were disposed of in the open space adjacent to the radiotherapy ward.[8] Ramalingam study in South India reported most of the waste containers were kept open. The mean percentage scores related to condition of waste containers and segregation of waste was not significantly different among different user areas such as OTs, casualty, various wards and ICUs in south India study which was found inconsistent with our findings.[9] The mean score of various categories of BMW management practices was revealed high for medicine ward and allied areas, ICUs and surgical ward and allied areas in compared to others user areas in our study.

This current study has shown poor management of needle handing practices. Needle destroyer/hub cutter was present only more than one fourth of user areas and among them only few were functional and needle recapping practices were found prevalent in this present study. Similar findings were observed in the study carried out by Kumar in Goa where recapping of needles was observed very high in user areas.[10] The inconsistent observation was noted in Kumar study carried out in north Indian region.[11,12] A study conducted by Janjua reported poor disposal of sharp waste which was found similar observation with our findings and Murakami study done in China also revealed consistent observation with our study results.[13,14] This present research showed improved methods of disposing of waste which was aligning with findings from a study in Mumbai.[6]

CONCLUSION

There is overall better compliance of BMW management practices across different patient care settings, however specific areas like laboratories, OPDs areas needs to improvement. These improvements could include better adherence to BMW guidelines, ensuring appropriate chart location and readability and enhancing waste container availability. While there are commendable practices such as frequent waste removal, there are significant deficiencies in the safe disposal of needles.

Recommendations

The hospital authority needed to implement regular inspections audits to assess the adequacy of waste disposal infrastructure and identify any areas of non-compliance. Also, establishment of clear accountability measures should be there. Implementing comprehensive training programs for healthcare workers on proper needle disposal techniques, emphasizing the risks associated with manual bending, recapping and the importance of using BMW disposal equipment's.

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