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KAP study of bio-medical waste management among health care workers in Delhi

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ABSTRACT

Background: Bio-medical waste management is vital issue not only to hospitals, but also to the environment, law enforcement agency, media and to the general public. The objectives of the study were to find out level of knowledge, attitude and practices of health care workers (HCWs) about bio-medical waste management in a rural hospital of Delhi.

Methods: A cross sectional study was carried out in rural hospital, Delhi on 155 HCWs. Pre-designed, pretested, structured questionnaire were administered on 155 HCWs of hospital. Data collected and analyzed by using SPSS-17. **Results:** Total of 155 HCWs were selected. Majority of HCWs were in the age group of 30.3 years±5.6 (mean age±SD) Almost half (54.2%) of study population comprised of female. Most of them were nursing staff. Mean years of experience in service was 4.8±3.7 (mean age±SD). Majority HCWs in this study took education up to senior secondary and they possess respective professional qualification. Statistically significant numbers of HCWs vaccinated with HBV vaccine and received training of bio-medical waste management (p<0.05). Almost all (97.4%) HCWs aware of bio-medical waste management rules and have very positive attitude. Practice of HCWs regarding bio-medical waste management was relatively poor.

Conclusions: Nursing staff have not only best knowledge and attitude but also good practices among all HCWs. Additional training have been required to Paramedics and group-D workers.

Keywords: Bio-medical waste management, KAP and health care workers

INTRODUCTION

Bio-medical waste management (BMWM) is a serious and vital issue to hospitals authority, environment, law enforcement agency, media and to the general public also. BMWM issue was first time discussed at a meeting convened by the WHO regional office in 1983. In our country, Hon'ble Supreme Court of India, thought on this crucial issue and guidelines has been led down as Biomedical Waste (Management and handling) Rules 1988. This rule directed clear methods for disposal of biomedical waste¹.

Bio-medical waste is a management issue. Hospital waste is infectious and hazardous. The problem is growing with an ever increasing medical field. However, research in this critical issue has been very limited, and there is grave need of information on this matter for planning and policy decision in the future.² It is vital to point out for a number of reasons, there is substantial uncertainty around this estimate and more research and data are needed to obtain a reliable picture of this situation.³ HCWs have an important role in managing the bio-medical waste through their knowledge, attitude and practices (KAP). In

India after 20 years of making of bio-medical waste management rules there is poor hospital waste management situation everywhere in our country. This indicates the urgent need to assess KAP of HCWs, so that we can do some intervention. Hence this study is planned to find out level of KAP of HCWs on the subject of BMWM in a rural hospital of Delhi.

METHODS

A cross sectional survey was carried out in 2011 at Maharishi Valmiki Hospital Pooth Khurd in North-West District of Delhi, Rural Health Training Centre (RHTC) of Maulana Azad Medical College, New Delhi on 155 HCWs. Structured, pre-designed, pretested, questionnaire were administered on 155 HCWs of hospital. Department-wise information of all HCWs was collected. Organizational permission was granted for this study from Medical Superintendent of the hospital. All HCWs were appealed to take part in study through hospital administrative support. Questionnaire was prepared with the help of through literature review. Structured questionnaire were designed and rationality of the questionnaire was assessed using the opinion of experts from our institute. Again trial study was carried out on 30 HCWs of different hospital to check validity and reliability of questionnaire. Questionnaires were translated into local language and were administered to all HCWs of hospital. Questionnaire was distributed in closed envelope with request letter to participate in the study and give genuine and serious response. HCWs have to filled the questionnaire and return them to investigator. Those who returned the questionnaire were considered as they were willing to participate. Questionnaires were divided in four parts as below:

- Part I, comprised of demographic data such as age, sex, designation (nursing staff, paramedical staff and group-D workers), level of general education, professional qualification, years of experience, HBV immunization status and training of BMWM received or not, if received then at what time?
- 2) Part II, included four questions of BMWM knowledge (aware BMWM Rules, know segregation principle, listen colour coding system of bags and ascertain in which bag is for which waste?)
- 3) Part III, contain four statement of attitude (BMWM Rules should be followed strictly, Colour coding system is an simple mode of segregation of hospital waste, BMWM is helpful in reducing spread of infections and BMWM system is beneficial to HCWs).
- 4) Part IV, comprises four practices of BMWM such as (Do you wear gloves while handling bio-medical waste? Do you put non-infectious waste in black container, Do you sort out bio-medical waste at source? and do you disposed sharp waste in blue bag?)

Data analysis

Collected data compiled and enter into excel sheet. Coding of data was done. Then data was analyzed with the help of SPSS-17.

Ethical issues

Written permission was taken from the institutional ethical committee. Data was kept confidential and findings were shared only with the concerned authorities.

RESULTS

A total of 155 health care workers were filled up the questionnaire and were working in Maharisi Valmiki Hospital Pooth Khurd, Delhi.

Table 1 reveal demographic characteristics of HCWs (N=155). Out of 155, 82 (52.9%) were nursing staff, 34 (21.9%) were paramedical staff and 39 (25.1%) were group-D workers. There were significant difference in gender, professional qualification and experience except age and education among nursing staff, paramedical staff and group-D workers, (p<0.005) (Table 1).

Table no. 2 shows that statistically significant numbers of health care workers had taken HBV injections (p=0.001, df=1). Significant proportion of health workers received training ever (p=0.01, df=1) and that to within one year. (p=0.03, df=1) (Table 2)

Table 3 shows nursing staff has significantly more knowledge than paramedical and group-D workers regarding bio-medical waste rules. (p<0.05) Overall knowledge of segregation principle was average among all HCWs. There is statistically significant difference about colour coding system of bio-medical waste management guidelines among HCWs. (p<0.05) Nursing staff had significantly highest knowledge regarding disposal of general waste than paramedical staff and group-D workers (p<0.05) (Table 3).

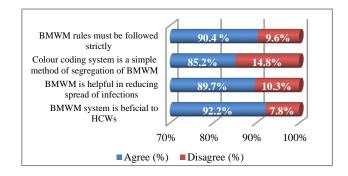


Figure 1: Attitude of health care workers towards biomedical waste management.

It was observed from figure 1 that all health care workers have good attitude towards BMWM. Nursing staff were best among all health care workers (Figure 1).

Table 1: Socio-demographic characteristics of health care workers.

	Hea	Health care workers*							T	
Characteristics		sing staff 32) (%)		amedics 34) (%)		up-D 89) (%)	Tota (n=1	al (55) (%)	Test of significance	P value
Age (in years)										
21-25	16	19.7	04	11.7	04	10.2	24	15.4		
26-30	45	54.8	14	41.1	17	43.5	76	49.0	2-1.01	
31-35	13	15.8	11	32.3	12	30.7	36	23.2	- χ2=1.01 - df=1	0.31
>35	08	09.6	05	14.6	06	15.2	19	12.1	u1-1	
Mean (30.3 yrs±5.6SD)										
Sex										
Male	12	14.6	25	73.5	34	87.1	71	45.8	χ2=81.01	0.001
Female	70	85.3	12	26.4	05	12.8	84	54.2	df=1	
Education										
Under graduate	50	60.9	18	52.8	27	69.1	95	61.3	χ2=0.007	0.93
Graduate and above	32	39.1	16	47.0	12	30.7	60	38.7	df=1	
Professional qualification										
GNM & BSc Nursing	82	100	00	000	00	000	82	52.9		
D. Pharm/Radio/Lab\$	00	000	34	100	00	000	34	22.0	Fisher's	1.0
None	00	000	00	000	39	100	39	25.1	Exact test	1.0
Experience(in years)										
0-5	27	32.9	09	26.7	10	25.6	46	29.6		
6-10	38	46.3	14	41.1	22	56.4	74	47.7	$\chi 2 = 14.35$	0.001
>10	17	20.7	11	32.2	07	17.9	35	22.5	df=1	0.001
Mean (4.8yrs±3.7SD)										

^{*}Paramedics & group-D clubbed together for purpose of analysis. \$diploma in pharmacy, radiology & medical laboratory technology.

Table 2: HBV immunisation and training of BMWM status of health care workers.

	Health care workers*								Test of	
Characteristics	Nursing staff (n=82) %			amedics 34)%		up-D 39)%	Tota (n=1	l 55)%	significance	P value
HBV taken										
Yes	65	79.2	17	50	18	46.1	100	64.5	$\chi 2 = 16.55$	0.001
No	17	20.7	17	50	21	53.8	55	35.5	df=1	0.001
Training taken										
Yes	72	87.8	20	58.8	32	82.1	124	80	$\chi^2 = 6.62$	0.01
No	10	12.2	14	41.2	07	17.9	31	20	df=1	0.01
Training received										
Within 1 yr	43	59.7	14	70.0	23	71.8	80	64.5	$\chi^2 = 4.63$	0.03
More than 1 yr	29	40.3	06	30.0	09	28.2	44	35.5	df=1	0.05

^{*}Paramedics & group-D clubbed together for purpose of analysis.

Table 3: Knowledge regarding generation of BMW among HCWs.

	Health Car	e Workers*		Total	Test of	
Knowledge (correct response)	Nurses (n=82) %	Paramedics (n=34) %	· · · · · · · · · · · · · · · · · · ·		significance	P value
Aware of Bio-medical waste management rules	80 (97.5)	32 (94.2)	34 (87.2)	146 (94.2)	Fisher's exact test	0.33
Know segregation principle	65 (79.2)	25 (73.5)	25 (64.1)	115 (74.1)	$\chi^2 = 2.34$, df=1	0.12
Identify colour coding system of bags for Bio-medical waste	69 (84.1)	27 (79.4)	23 (59)	119 (76.8)	$\chi^2 = 5.30$, df=1	0.02
Recognise in which bag infected waste should be disposed	72 (87.8)	28 (82.3)	26 (66.6)	126 (81.2)	$\chi^2 = 7.79$, df=1	0.02

^{*}Paramedics & group-D clubbed together for purpose of analysis.

Table 4.	Practices among	HCWc regard	ling RMWM
Table 4:	Practices among	TIL WS regard	IIII9 DIVI WIVI.

Statements	Health care	e workers*		Total	Test of significance	P value
	Nurses (n=82) %	Paramedics (n=34) %	Group-D (n=39) %	(n=155) %		
Do you wear gloves while handling bio-medical waste	72 (87.8)	27 (79.4)	07 (18.0)	68 (43.9)	$\chi^2 = 9.46$, df=1	0.002
Do you put non-infected waste in black container	66 (80.5)	22 (64.7)	23 (59.0)	111 (71.6)	χ^2 =6.74, df=1	0.009
Do you sort out bio-medical waste at source	47 (57.4)	15 (44.1)	06 (15.3)	68 (43.9)	$\chi^2 = 12.78$, df=1	0.001

^{*}Paramedics & group-D clubbed together for purpose of analysis.

Table 4 reveals that nursing staff had statistically significant practices than other workers in each and every respect regarding bio-medical waste management right from segregation to disposal (p<0.01, df=1) (Table 4).

DISCUSSION

In our study, maximum knowledge on bio-medical waste management (BMWM) was found to be high in younger age group i.e. in 26 to 30 years. Elder employee had comparatively lesser knowledge of BMWM. Study carried out by Motamed et al, in Mazandaran Proviences, Iran, it was found that knowledge was highest in the 30 to 40 years age group and lowest in the more than 50 years old age-group.⁴ In our study HCWs more than 40 years old had least knowledge. This difference might be due to awareness activities adequate and more accessible in India than Mazandaran Provinces. In present study, overall attitude was good in all levels of educated HCWs. But attitude of 10th pass HCWs was least. Previous study in Iran⁵ reveal diploma holder had better attitude than degree level educated workers similar to our findings (p<0.05). Our study reveals that senior secondary level educated respondents were more compliant with BMWM. Also in this study, diploma in general nursing midwifery (GNM) had high level of knowledge on BMWM than other professionally qualified workers. Technical staff had significantly less knowledge on BMWM than all nursing staff (p=0.02). Current study shows overall high knowledge, attitude and better practices on BMWM among GNM.

In our study subjects 64.5% HCWs were vaccinated against HBV. It means most of the staff members were concerned for their own health. Better results were found in a study carried out by AIIMS in 2003 in nongovernmental hospitals and clinics across Delhi amongst doctors revealed that 85.7% HCWs had received Hepatitis-B immunization.² This might be because of as AIIMS is a premier institute of our country, they were more cautious regarding an error, again as study done amongst doctors, they were more careful about their own protection.6

Knowledge of bio-medical waste management among health care workers

Around 3/4th of health personnel were aware of BMWM Rules whereas other study carried out by Nirupama et al, at Karimnagar, to assess KAP with reference to BMWM rules, discloses that around half of HCWs knew correctly about BMWM rules.⁷ This difference is might be due to HCWs in Delhi, capital of India, have more access to publicity of BMWM rule. Other reasons behind this difference are there was more emphasis given on the awareness regarding HIV transmission through mass electronic media, government involvement and political will in awareness generation among public including HCWs. But those workers working at primary level in rural areas may not have that much access to information.⁸ A total 70.6% HCWs were having equal idea about segregation of bio-medical waste and majority (95.8%) of HCWs have knowledge about various health problem caused by bio-medical waste. Overall knowledge of HCWs was high but nursing staff was excellent. This could be explained by the fact that most of study subject not only received superior trainings frequently on BMWM but also nearly half of the HCWs have been received training within one year. Knowledge of nursing staff regarding colour coding system of bags for bio-medical waste is statistically significant (p=0.02; χ^2 =5.30; df=1). Similar results were found in another study conducted by Shafee et al at Karimnagar. Nursing staff know very well in which bag infected waste should be disposed than other workers. This was credited to nurses because they were more involved in applied work and tasks given by higher authorities.9

Attitude of BMWM among HCWs

Attitude of all HCWs was highly positive towards BMWM. Similar level of positive attitude was found in another study conducted by Shafee et al at Karimnagar. Proportion of HCWs having positive attitude towards following BMWM rules, colour coding system of segregation of BMW, reducing spread of infections and implementation of rules and regulations was close to the findings of a survey carried out in Karimnagar (99.2%, 98.8% and 98.4% respectively). Also attitude of technicians and housekeeping staff also match with findings at Karimnagar. While compare to technicians and the housekeeping workers, nursing personnel have statistically significant attitude [p<0.05; χ^2 =6.4; df=1]. In one of the study it was found that 98% of the nurses, 79% of the housekeeping staff have positive attitude while only 59% of technical staff have positive attitude. 10 Current study shows better attitude compared to results of previous study carried out in a 512 bedded multidisciplinary teaching hospital located in rural area at Swami Ramanand Teerth Rural Medical College, Ambajogai in Beed district by Deo et al in 2005. 11 This could be due to HCWs at our hospital received regular training and know gravity of problem of bio-medical waste management.

Practices of BMWM among HCWS

Regarding BMWM practices, it was found that the nursing staff practiced BMW management better than the technical and housekeeping staff and difference was statistically significant. (p<0.05) Practices of gloves wearing while handling BMW by nursing staff were (87.8%) and paramedical staff were (79.4%). This findings are in line with results in study done at Bangalore in 2005, with the purpose of assessing KAP safety regarding occupational among professionals, where almost three fourth (72%) nursing staff took precautions while handling waste.⁶ This difference is due to training status of nurses in Delhi. Majority of nursing staff (80.5%) put non-infected hospital waste in black container but around 60% other staff doing same practices. Only 57.4% of nursing staff sort out hospital waste at source. Also segregation practices of paramedical and group-D worker was even worst i.e. 44.1% and 15.3% respectively. Whereas in Jhansi it was found that the non-infectious waste was collected separately in different containers and treated as waste.12 In Chandigarh, the establishments in the rural area and smaller ones in the urban area disposed of their biomedical waste along with municipal solid waste and no waste management system exists.¹³ In one of the district in Gujarat, there was no effective waste segregation, collection, transportation and disposal system at any hospital.¹⁴ In Karachi, it was observed that only 25% hospitals were segregating sharps, pathological waste, chemical, infectious, pharmaceutical and pressurized containers at source. 15 Only 60% of nurses and paramedical workers disposed sharps correctly in puncture proof blue bag but in Karimnagar at tertiary care hospital it was found that 100% nurses, 70% of the housekeeping staff and only 47% of the technical staff practiced adequate BMW management practices.⁷ This variation could be due to social desirability bias, nursing staff could be over reported at Karimnagar.

CONCLUSION

The present study highlights the better knowledge, attitude and practices regarding BMWM in nursing staff as compare to housekeeping and technical staff. This study also reveals that group-D workers had low level of knowledge and poor practices but good attitude. They are the most important risk categories for exposure, as they usually handle hospital waste. An effective and goal oriented frequent training programme targeting them is an important way to improve knowledge, attitude and practices of group-D workers and also paramedical staff.

Recommendations

Training of health care workers should be conducted at the regular interval, so that knowledge, attitude and practices of HCWs on BMW management are maintained and quality of patient care is improved.

Limitations

The study did not collect direct observational data on BMWM practices among providers, but relied on self-report and this may result in over reporting of correct responses. Actual knowledge, attitude and practices on BMWM might be low, but due to social desirability bias it came out to be high.

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REFERENCES

- 1. Kishore J, Gopal P, Sagar B, Joshi TK. Awareness about Biomedical Waste Management and Infection Control among Dentists of Teaching Hospital in New Delhi, India. Indian J Dent Res. 2000:11(4):157-61.
- Vincent S, Pablo B, Marina N. Management of chronic hepatitis B and C in HIV-coinfected patients. J Antimicrob Chemother. 2006;57(5):815-8
- CDC NIOSH alert: preventing needle stick injuries in health care settings. Cincinnati OH: Department of Health and Human Services, CDC;1999. DHHS publication no. (NIOSH) 2000:108.

- 4. Technical Guidance for round 8 global Fund HIV Proposal Prevention of Blood safety and universal precautions working document, 2008.
- 5. Parmeggiani C, Abbate R, Marinelli P, Angelillo IF. Healthcare workers and health care-associated infections: knowledge, attitudes, and behavior in emergency departments in Italy. BMC Infect Dis. 2010;10:35.
- Saini S, Nagarajan SS, Sarma RK. Knowledge, attitudes and practices of bio-medical waste management amongst staff of a tertiary level hospital in India. J Acad Hosp Admin. 2005;17:1-12.
- 7. Nirupama N, Shafee M, Jogdand GS, Rao CA. Knowledge, Attitude & Practices Regarding Biomedical Waste Management. IJCM Institute of Medical Sciences, Karimnagar, Andhrapradesh. 2010;35(2):369-70.
- 8. Patil GV, Pokhrel K. Biomedical solid waste management in an Indian hospital: A case study. Waste Manag. 2005;25:592–9.
- 9. Singh K, Arora SK, Dhadwal PJ, Singla A, John S. Biomedical waste management in the U.T., Chandigarh. J Environ Sci Eng. 2004;46:55–60.
- 10. Rasheed S, Iqbal S, Baig LA, Mufti K. Hospital waste management in the teaching hospitals of Karachi. J Pak Med Assoc. 2005;55:192–5.
- 11. Centers for Disease Control, Prevention Perspectives in disease prevention and health promotion update: Universal precautions for prevention of transmission of human immunodeficiency virus, hepatitis B virus, and other

- blood borne pathogens in health-care settings. MMWR. Morbidity and Mortality Weekly Report. 1988;37(24):377–88.
- Motamed N, Mahmoodi FB, Khalilian A, Peykanheirati M, Nozari M. Knowledge and practices of health care workers and medical students towards universal precautions in hospitals in Mazandaran Province. Eastern Mediterranean Health J. 2006;12(5):653-61.
- 13. Naveed ZJ, Mahreen R, Subhash C, Shafquat R, Bushra M. Poor knowledge predictor of non adherence to universal precautions for blood borne pathogens at first level care facilities in Pakistan BMC Infect Dis. 2007;7:81.
- Deepali D, Tak SB, Munde SS. A Study of Knowledge Regarding Biomedical Waste Management among Employees of a Teaching Hospital in Rural Area. J of ISHWM. 2006;5(1):12-5.
- Sham Sundar SD, Chetan BB, Gopinath D. Knowledge, Attitude, and Practice of Universal Precautions and Occupational Safety among nursing professionals in tertiary centers in Bangalore. Journal of ISHWM. 2006;5(1):27-30.

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