

original article

Knowledge attitude and practice study on biomedical waste management among health care professionals and paramedical students in a Tertiary Care Government Hospital in South India

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ABSTRACT

Aims: The aim of our study was to analyze the knowledge attitude and practice (KAP) of biomedical waste management among medical, paramedical students and health care professionals in Coimbatore Medical College Hospital in South India.

Materials and Methods: Study was conducted among 400 health care professionals including doctors, nurses, nursing students, and laboratory technician course students. The results were evaluated.

Results: It was found that the doctors had the maximum knowledge and practice among health care professionals. The results also indicate that knowledge is not uniform among individual group, and there exists considerable variation within the group.

Conclusion: The results of our study revealed that the project for upgrading safety in health care initiative taken by the Government of Tamil Nadu to create awareness of biomedical waste management among health-care professionals have certainly improved the KAP on biomedical waste management. Hence, such a program is mandatory to improve the biomedical waste management in health-care centers.

Key words: Biomedical waste project for upgrading safety in health project, government hospital, Tamil Nadu

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INTRODUCTION

In India, human waste is labeled as category one in the schedule I of the biomedical waste (management and handling) rules 1998.^[1] The excavations in India by the archeological survey of India revealed the custom of segregation in human dead bodies by our ancestors.^[2] By custom, after the body is cremated, the bones are put in an urn. The mouth of the urn is covered by inverting another urn over it. This is called a “twin-pot”.^[2] There are descriptions of

Access this article online	
Quick Response Code: 	Website: www.ijehe.org
	DOI: 10.4103/2277-9183.132683

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This article may be cited as:

Sengodan VC, Amruth KH. Knowledge attitude and practice study on biomedical waste management among health care professionals and paramedical students in a Tertiary Care Government Hospital in South India. *Int J Env Health Eng* 2014;3:11.

urn-burial in the Tamil epic, Manimekhalai, which belongs to the last period of the Sangam epoch.^[3]

Health-care establishments include hospitals, nursing homes, and medical laboratories generating huge quantity of both hazardous and non-hazardous wastes.^[4] These wastes are generated as a result of diagnosis, treatment, prevention, and research on human, and animal diseases.^[4]

Owing to rapid population growth in India, the demand for health-care has increased significantly. Simultaneously, the numbers of hospitals, small and medium scale nursing homes and clinics have rapidly increased, generating large quantities of infectious waste. The problem is aggravated due to the marked increase in disposable health-care materials.^[4]

The study conducted by Mohanasundaram *et al.* in 2003 concluded that the biomedical waste management does not follow in Coimbatore Medical College Hospital.^[5]

Pasupathi *et al.* in a study conducted in 2011 concluded that the quantity of hospital waste and proportion of infection waste is definitely higher than one would expect in India due to extensive use of medical disposables.^[6]

In the tenth 5 year plan, the steering committee of health conducted by the planning commission of India have instructed that hospital infection control and waste management should be incorporated as an essential routine activity in all health care institutions at all levels of care due to the increasing incidence of hospital acquired infections and accidental infection in health-care providers and waste management workers.^[7]

Improper disposal of health care wastes transmit HIV, hepatitis B virus and other blood borne diseases. Hence an awareness program about proper handling and management of health-care wastes can prevent the spread of infectious diseases.

Proper training on biomedical waste management will certainly improve the knowledge on waste management practices resulting in better practice on biomedical waste management.

In Tamil Nadu, the biomedical waste awareness program was started by the Government of Tamil Nadu in 2008 through project for upgrading safety in health (PUSH) care project.^[8]

The objective of PUSH project is to raise awareness among all healthcare professionals in the best practices of biomedical waste management and handling rules 1998 as formulated by the Government of India.^[8]

Doctors, medical students, nursing staff, laboratory technicians, and radiographers working in government hospitals were trained in this program. The essentials of

biomedical waste management were summarized by experts in the training program.

The aim of our study was to analyze the knowledge attitude and practice (KAP) of biomedical waste management among various trained health care professionals in Coimbatore Medical College Hospital in South India.

The objective of our study was to analyze the correlation between KAP of biomedical waste management among various health care professionals in Coimbatore Medical College Hospital in South India.

MATERIALS AND METHODS

The study was conducted in Coimbatore Medical College Hospital, Coimbatore.

Four hundred health-care professionals were in the study group, comprising young doctors (Interns and post-graduate students) belonging to different medical specialties, nursing students, nurses, laboratory technicians, and lab technician course students.

In our study, knowledge is defined as the written response of the health care professionals on the structured questionnaire prepared by the investigators on biomedical waste management. Attitude is defined as the written responses of the health care professionals on their feeling towards bio medical waste management. Practice is defined as the identification, segregation and packing for internal transportation of biomedical waste in the hospital. In our study, it is assumed that health-care professionals will have knowledge about biomedical waste management, especially, after the orientation course regarding biomedical waste management. It is also assumed that individuals involved in the study will cooperate and give correct information. The study is delimited to the health-care professionals who are working in Coimbatore Medical College Hospital at the time of data collection. Regarding inclusive criteria just health-care professionals involved in segregation of biomedical waste in Coimbatore Medical College Hospital are involved in our study. Individuals not involved in segregation of biomedical waste are excluded from the study.

To all the 400 candidates were given 30 questions and asked to answer them in a specified time of 30 min. Ten questions each for KAP of biomedical waste management practices. All the questions were randomly selected from the reference textbook and manual of biomedical waste management training.^[4,8] The results were analyzed with different statistical parameters like standard deviation, *P* value and analysis of variance (ANOVA). KAP were analyzed to know the relationship between each variable in each study group and between different study groups. In India, biomedical waste management is part of medical and paramedical students'

curriculum. All the health-care professionals involved in the study were trained already on biomedical waste management by PUSH project, Government of Tamil Nadu.

RESULTS

The statistical results of our study, indicate that the knowledge of biomedical waste management is more in the young doctors (interns and post-graduate students) who have scored an average of 7.99 followed by the nursing students (7.80), nurses (7.60), and lab technicians (7.55) out of 10 [Table 1].

The results revealed that young doctors and nursing students who have biomedical waste management in their curriculum have more knowledge than others.

The results of ANOVA analysis indicated that knowledge is not uniform among individual group with a mean square of 4.057 and there exists considerable variation within the groups with a mean square of 1.035 [Table 2].

There is a correlation between KAP among doctors, laboratory technicians, nursing staff and nursing students [Table 3]. From the above finding it is evident that knowledge on biomedical waste management through waste management program like PUSH project has improved the implementation of biomedical waste management in Coimbatore Medical College Hospital.

DISCUSSION

In our study, the knowledge regarding biomedical waste commensurate with the educational level of different staffs working in the hospital. This is in correlation with the study conducted by Deo *et al.* in 2006 in which the average score is highest in the medical personnel followed by the paramedical staff (nursing students, staff, and the laboratory technicians).^[9]

In 2006, Mohideen conducted a study in Karnataka in South India to assess the KAP of nurses regarding on biomedical waste management. The study revealed very negligible

Table 1: Mean and standard deviations of knowledge, attitude and practice among interns and post graduates, laboratory technicians, nursing staff, nursing students

Group	Knowledge		Attitude		Practice	
	Mean	SD	Mean	SD	Mean	S.D
Interns and postgraduates	7.99	1.15	7.55	1.08	7.34	1.08
Lab tech	7.55	1.02	7.88	0.94	6.41	0.99
Nurses	7.60	0.95	7.71	0.97	6.32	0.99
Nursing students	7.80	0.93	7.52	0.99	6.25	0.94
Total	7.74	1.03	7.67	1.00	6.58	1.09

Table 2: ANOVA test for knowledge, attitude and practice between groups and within groups

A	Knowledge				Attitude				Practice				
	Sum of squares	df	Mean square	F	Sum of squares	df	Mean square	F	Sum of squares	df	Mean square	F	Sig.
Between groups	12.170	3	4.057	3.921	8.250	3	2.750	2.786	78.300	3	26.100	26.025	P value 0.0000 (P<0.01)**
Within groups	409.740	396	1.035		390.860	396	0.987		397.140	396	1.003		P value 0.04053 (P<0.05)*
Total	421.910	399			399.110	399			475.440	399			

*Correlation is significant at the 0.05 level, **Correlation is significant at the 0.01 level, A; ANOVA: Analysis of variance

percentage of the nurses had high knowledge (1.7%) and more than three-quarters of the nurses had below average knowledge. The study revealed the necessity for a training program on biomedical waste management.^[10]

Gupta *et al.* in a study on biomedical waste management revealed the infectious and non-infectious wastes are dumped together in the hospital premises and disposed with municipal waste. The results of the study concluded the need for strict enforcement of legal provisions and a better environmental management system for disposal of bio medical waste.^[11]

Lakhatia in a study conducted in Ahmedabad in Western India in 2011 has observed that the hospital did not have a documented waste management policy.^[12]

KAP study conducted in northern India by Mathur *et al.* in 2011 have concluded that doctors, nurses, and laboratory technicians have better knowledge than sanitary staffs about biomedical waste management. Knowledge regarding the color coding and waste segregation at source was found to be better among nurses and laboratory staffs as compared to doctors. Regarding practices related to biomedical waste management, sanitary staffs were ignorant in all cases. The study also showed the importance of training associated with biomedical waste management and lack of proper and complete knowledge about biomedical waste management practices. The study also recommended compulsory continuous training for the healthcare personals in accredited training centers.^[13]

Proper segregation of biomedical wastes at the level of ward eliminates many of the infective diseases. This has been described previously during the Dravidian period, confirmed by the excavations near Adichanallur [Figure 1] in Tamil Nadu.^[2] Hence, biomedical waste management practices are not new to the mankind.^[2]

Our study indicated that proper training on biomedical waste management will certainly improve the knowledge on the waste management practices resulting in better practice on biomedical waste management.

Our study revealed that biomedical waste practices are managed effectively in Coimbatore Medical College Hospital due to compulsory continuous training program (PUSH) thereby improving the knowledge and attitude on biomedical waste management among health care persons. At present

Coimbatore Medical College is one of the regional centers for training on the biomedical waste management. In India our study is the only post training KAP study on biomedical waste management In India, biomedical waste management is part of medical and paramedical students' curriculum. Hence, our study is the first post curriculum KAP study on biomedical waste management among health-care students in India.

CONCLUSION

Our study revealed that the PUSH project initiative taken by the Government of Tamil Nadu to create awareness about biomedical waste management has improved the practice of biomedical waste management in Coimbatore Medical College Hospital. For effective implementation of biomedical waste management in the developing countries this type of continuous training program is mandatory to improve the biomedical waste knowledge and attitude among health care persons. The duty of the present day health workers is to follow the path of ancestors who segregated human waste excellently thousands of years ago.^[1]



Figure 1: Adichanallur, in Indian map

Table 3: Correlations of knowledge, attitude and practice among interns and post-graduates, laboratory technicians, nursing staff, nursing students

Mode	I and PG			Lab tech			Nursing staff			Nursing students		
	K	A	P	K	A	P	K	A	P	K	A	P
K	1.000	0.453 (**)	0.578 (**)	1.000	0.452 (**)	0.417 (**)	1.000	0.202 (*)	0.392 (**)	1.000	0.202 (*)	0.392 (**)
A		1.000	0.660 (**)		1.000	0.131		1.000	0.245 (*)		1.000	0.245 (*)
P			1.000			1.000			1.000			1.000

K: Knowledge, A: Attitude, P: Practice, I and PG: Intern and post-graduates, *Correlation is significant at the 0.05 level, **Correlation is significant at the 0.01 level

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Source of Support: Nil, **Conflict of Interest:** None declared.