



Knowledge, attitude and practices of bio-medical waste management among staff of institutional trauma center level II

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Abstract:

Back Ground: Today about one fourth of biomedical waste is considered as hazardous and may affect the health of both medical personnel and general community. As medical students are going to be one of the important components of health care system, they should have proper and sufficient knowledge on biomedical waste management. So awareness about various aspects of biomedical waste management has to be assessed frequently. **Objective:** To know the existing awareness and knowledge about biomedical waste management among medical students of a tertiary care hospital, Tirupati. **Material and Methods:** Cross-sectional study was done in 127 students of 7th semester from Sri Venkateswara Medical college, Tirupati, by pre-designed questionnaire. The responses were analyzed using epi info software 3.5.1 version. **Results:** Majority (74.8%) of the students are between 21-22 years. 114(89.8%) students are not aware of BMW legislation. It was found that knowledge regarding handling and safe disposal biomedical waste management among 54(42.5%) medical students was inadequate. Majority has deficient in knowledge and awareness regarding categories of bio medical waste (73.2%) and its disposal in colour bags (71.3%). **Conclusions:** Frequent awareness campaigns and classes may be conducted to improve the knowledge about safe handling and disposal of bio medical waste among medical students for future practical application.

Key words- Awareness, Bio medical waste, health care waste, Medical students

Introduction

The modern 'culture of consumerism' has aggravated the waste problem. The culture of 'disposable' where added a large number of goods in the society are being manufactured for 'one time use' and to be discarded as waste after use [1]. These waste products create particularly serious problems for the municipalities and its safe disposal is becoming a serious environmental problem and an ecological crisis is slowly brewing up, threatening to choke the earth and its life supporting systems. The data available from developed countries suggest that approximately 1-5 kg of waste is generated per bed per day, with significant inter country and inter specialty differences. The data from developing countries also indicate that the range is essentially similar but the figures are on a lower side with 1-2 kg per day per bed. In India, it is estimated to be 2.0 kg/bed/ day [2]. A number of studies have been carried out by various organizations which provide an estimate about the quantity of waste generated in various cities.

According to Asokan et al. (2007) about 960 million tones of solid waste are being generated in India annually. Out of these, 350 million tonnes are organic waste from agricultural sources, 290 million tones are an inorganic waste of industrial and mining sectors and 4.5 million tones are hazardous in nature [3].

The problem of waste management has arisen recently in developing countries where there is little history of the implementation of formal and informal community environmental education awareness program [4]. The concern regarding the medical waste is mainly due to the presence of pathogenic organisms and organic substances in hospital solid wastes in significantly higher concentrations. The substantial number of organisms of human origin in solid waste suggests the presence of virulent strains of viruses and pathogenic bacteria in undetected numbers. Therefore improper handling of solid waste in the hospital may increase the airborne pathogenic bacteria, which could adversely

affect the hospital environment and community at large. Improper Hospital Waste Management has serious impact on our environment. Apart from risk of water, air & soil pollution, it has considerable impact on human health due to aesthetic effects [2]. It is the man behind machines / technology that matters. Therefore, a number of national and local seminars, workshops and symposia have been organized by number of Institutions to develop methodology for BMW management and its understanding. However, the ground realities are far from ideal and need a lot of effort and commitment at the top level for effective implementation. The current scenario in the country reveals partial or no segregation at the time of generation, which at times is done by the contractors, or the rag pickers [2].

The scenario is no different in a metropolitan city of India. Therefore, the Department of Hospital administration of a super specialty tertiary hospital in Delhi designed a Hospital Waste management manual to create awareness amongst the waste generators. To ensure implementation of the waste management system in accordance with the biomedical waste (Management and Handling) rules, 1998, the department of hospital administration circulated manuals and memoranda amongst the concerned staff. However, the improper practice of segregation at the site of origin has been observed which causes mixing of infectious and non-infectious waste. It was observed in that study that there is a big gap between knowledge and attitude of the medical workers and their status or qualification has no role in that [5]. Environmental attitude of young people appears to be crucial as they ultimately play a direct role in providing knowledge based solutions to in coming environmental problems. The few studies conducted regarding children and young people show that the level of environmental awareness is relatively low. The information acquired is mostly factual in nature and is not systematized. Begum et al. (2008) found that the majority of the doctors, nurses, and housekeepers have unsatisfactory knowledge and inadequate practice related to health care waste management [6].

The objectives and rationale of BMW management are mainly to reduce waste generation, efficient collection, handling and disposal in such a way that it controls infection and provides safety for employees working in the system and ensure cost effectiveness by avoiding penalties and fines imposed by regulatory authorities. Accordingly, waste is required to be treated and disposed of in accordance with schedules prescribed. The essentiality is to recognize the waste, identify where waste is generated and determine the

reason of generation, and final plan disposal of the waste in a scientific manner so as to render it environmentally non-hazardous and eliminate the source of infection [7].

When the concern about the medical waste, there is a need for the health care workers to understand what is actually Biomedical waste and the waste connected with the hospital. Hospital waste refers to all waste, biological or non-biological that is discarded, and is not intended for further use in a hospital. According to a WHO report around 85% of the hospital wastes are actually nonhazardous, 10% are infective (hence, hazardous), and the remaining 5% is noninfectious but hazardous (chemical), pharmaceutical and radioactive [8]. Bio-medical waste has been entirely differs from hospital waste in the sense that it is “any solid, fluid or liquid waste, including its container and any intermediate product. These products could be generated during the diagnosis, treatment of immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biological and the animal waste from slaughter houses or any other like establishments [9].

This study was therefore, conducted to understand the awareness amongst the employees of trauma center if our institution as regards to BMW management practices to study the Knowledge, Attitude and Practice of the respondent. The hospital (trauma center) chosen for the study is a premier tertiary level referral center of north India. Therefore, the current status of employee’s awareness regarding BMW management will help the authorities to develop the strategy for improving the situation in future.

Material and Methods

This study was conducted in 290 bedded trauma center of C. S. M. Medical University, Lucknow. This trauma center is associated with 3000 bedded Gandhi Memorial and Associated Hospital and is a tertiary referral center. About 75% of all patients attending it, are direct (non-referred patients). There is an administrative team headed by Trauma Center Incharge, is looking after the routine administrative affair of the trauma center. Trauma Center Incharge is assisted by one co-faculty incharge and two assistant faculty incharge. Trauma center has one clinical wing and other diagnostic wing. There is a 17 bedded casualty room, where all emergencies and patients lend first. After the primary treatment and stablisation of the condition, patients are sent to the respective units for definitive management. The trauma center has 05 units, which are orthopaedics

(47 bedded), surgery (77 bedded), neurosurgery (25 bedded), general medicine (32 bedded) and paediatrics (30 bedded). Beside these, it has 22 bedded traumatic ventilator unit (TVU) and 24 bedded exclusive disaster ward. There are 04 major operation theaters, two minor rooms and one plaster room.

There is no exclusive independent staff, including doctors, residents, nurses and paramedics meant for the trauma center. So every day, there is a change in the 'on call' team of doctors and residents in these units and that of anesthetists on call team. Trauma center has a definite, very acute and serious shortage of nursing and paramedical staff. The majority of class IV staff is provided by contracting agency. So there is a very fast change of faces occurs in the trauma center. Sisters incharge of various wards and operation theaters are basically responsible for the sanitation and biowaste management. To assist them and supervise these activities, we have one sanitary inspector. The university BMW team took a regular round of the trauma centers and they took regular training programs of these staffers.

The present KAP study enrolled 256 respondents, representing doctors, residents, nurses and paramedics from patient care areas of trauma center. The staff includes consultants, Residents, Nurses, O.T. Staff, Sanitary staff and Laboratory staff and was grouped as Group I to Group VI accordingly. Total 500 structured validated questionnaires, were distributed. We received 256 feedbacks out of these 500. Out of these 256 respondents, there were only 28 consultants (10.9%), 33 residents (12.9%), 28 nurses (10.9%), 14 OT staff (5.5%), 10 laboratory staff (3.9%) and 143 sanitary staff (55.9%). The responses on attitude were classified into less favorable, favorable and most favorable. Those who had good practices were assumed to be managing the waste in the proper manner and be able to protect themselves and environment from the negative impact of waste.

Before it was used, the questionnaire was pretested in the pilot study. Split half method was used to calculate the reliability. Reliability of the questionnaire was .96, .94 and .96 for knowledge, attitude and practices questionnaire respectively. Information collected through questionnaire included (1) General information on respondents including age, education, family type and size etc. (2) knowledge regarding waste management (3) attitude regarding waste management (4) practices regarding waste management.

Ethical approval has been taken from the Institutional Ethical Committee Board. The respondents were well informed about the purpose of the study and about the questionnaire by the research investigator prior to data collection. After collecting data, data were edited and tabulated before data analysis. Descriptive statistics i.e. percentage, mean and standard deviation was used to describe studied variables. 't' test and correlation tests were used according to the objective of this study.

Results and Discussion

The results of questionnaire analysis show that about 85% and 81% amongst the consultant and resident respondents respectively, have relevant knowledge of BMW management. Out of these there were 12 consultants of medical departments and rest 16 were of surgical side. Though all the consultants were having the relevant knowledge but they were having varying attitude and practices. There was a significant difference amongst them, as far as attitude and practices of BMW were concerned. The details of these data have been shown in table no 2. This shows that the people with higher education have more awareness about the environmental issues, national and international activities in Biomedical waste management and the rules prescribed there in; significantly the professional status and higher education were not having a direct positive impact on their attitudes towards the facts and thus their practices were also not corresponding.

The nursing staff is the backbone of the patient management. Though the trauma center has been a high pressure area of patient care, there is a significant and acute shortage of nursing staff in the trauma center. The other significant fact regarding nursing staff is concerned that as there is no independent staff marked for trauma center, so whatever nurses in ward are there, many of them are temporary with not much and appropriate training. There is a very serious complaint that these nurses are being very frequently transferred from their place of work. This fact is directly relevant and significant as this may directly affect the training of these nurses about BMW management. Despite of these facts, there was very significant high knowledge and attitude of BMW management amongst the nursing staff of the trauma center. There were significantly low practices of biowaste management.

Table 1: Positive answers of questionnaire by staff of different groups

Group	I (Consultant)		II (Residents)		III (Nurses)		IV (OT Staff)		V (Sanitary Staff)		VI (Laboratory Staff)	
	N = 28		N = 33		N = 28		N = 14		N = 143		N = 10	
	No	%	No	%	No	%	No	%	No	%	No	%
Knowledge	28	100	24	72.7	27	96.4	14	100	102	71.3	06	60
Attitude	26	92.8	13	39.4	26	92.8	14	100	122	85.3	10	100
Practice	12	42.8	11	33.3	24	85.7	10	71.4	55	38.5	03	30

Table2: Showing KAP amongst positive respondent consultants and residents

Group	Consultants (n=28)				Residents (n=33)			
	Medical Faculty		Surgical Faculty		Medical Side		Surgical Side	
	No.=12	%	No.=16	%	No.=20	%	No. =13	%
Knowledge	12	100	16	100	11	55	13	100
Attitude	12	100	14	87.5	09	45	04	30.7
Practice	04	33.3	08	50	09	45	02	15.4

Operation theaters were one of the most pressure areas of biomedical waste was concerned. The biowaste management in this area may be directly having an impact on theater and patient management. The results showed that the knowledge of the subject and attitude towards the facts were significantly higher amongst the operation theater staff. Though only 71.4% of them were practicing the 'do and do not' of BMW management, but their higher attitude was much more significant.

The sanitary staff of a trauma center is contractual and made available by a service agency. This fact leads to higher turnover of these workers. So the training of these staffers may not be off the mark. The results showed that there was a poor knowledge of the matter amongst them, but their relative attitude was higher and significant. As of other groups, the practices were not being followed amongst them, with an attitude these may be modified. The comparison of Knowledge, with an Attitude and Practice of groups shows that the people with higher education, as consultants, Residents and Scientists though have very good knowledge but a

relatively low percentage of people having the same kind of attitude and practice habits. At the same time if we compare the nurses or Operation Theatre staff, we find that they too have a good percentage of people with good knowledge, almost similar in all the three groups I and II and therefore, attitude and practice percentage is also very high. It has been mainly attributed to the instruction manual and the responsibility given to the nursing staff for implementation of rules by the authorities.

Sanitary staff though has very poor knowledge about the BMW Act and rules, but a good percentage of this category has a positive attitude and practice habits. The laboratory staff was found to have recorded lowest in all the three aspects. This indicates that neither authority informed them in the form of instructions nor they supervised their Biomedical waste management practices. While processing further it is observed that the laboratory staff showed least of interest to know more about the system of BMW management and they expressed that it is the responsibility of hospital management providing direct patient care facility only.

Table3: Showing grades of KAP amongst the positive respondents

Variables	Category	Numbers	%
Knowledge (n=201)	Low	52	25.9
	Medium	64	31.8
	High	85	42.3
Attitude (n=211)	Less Favourable	101	47.8
	Favourable	42	19.9
	Most Favourable	68	32.3
Practices (n=115)	Poor	60	52.2
	Moderate	20	17.4
	Good	35	30.4

Table 4: Showing demographic characteristics of the study

		Consultants	Residents	OT Staff	Sanitation Staff	Laboratory Staff
Age (Avg in Years)		48.2	26.7	31.4	23.8	25.3
Sex	Male	25	26	12	100	10
	Female	03	07	16	43	0
Type of Job	Permanent	28	NIL	20	08	09
	Temporary	NIL	33	08	135	01
Formally Trained	Yes	02	Nil	24	58	06
	No	26	33	04	85	04

Hebel-Ulrich et al. (2005) has found that many responses regarding knowledge indicate that the awareness about hygiene exists, but is not being practiced. Also the observation of several risk behaviors, such as open defecation, lack of personal hygiene and irresponsible waste management suggests the need for hygiene educational program [10]. According to Ehrampoush et.al. (2005) the knowledge of the students

regarding waste management was not appropriate. About 66% of students did not participate in segregation and recycling of solid waste [4]. Paengkaew et.al. (2006) observed that the majority of Asian students appeared to have lack of environmental consciousness and attitude needed to protect their environment. Therefore it is important to develop skills, awareness, and attitude and put into practice [11]. As per the study done by Saini et

al. (2005) measured the attitude regarding biomedical waste management of doctors, nurses, and other support staff. They found that the people with higher education and knowledge have better attitudes towards the subject [2]. Grodzinska et al. (2002) also found that a correlation between the level of students' knowledge and their activities was found regarding waste management [12]. Wai et al. (2005) that there was a significant association between knowledge and practices with a correlation coefficient of 0.39 and knowledge and attitude with a correlation coefficient of 0.289. But there was no significant association between attitude and practices for environmental sanitation [13].

Lalita et al. (2011) in her study concluded that majority of the respondents have unsatisfactory knowledge attitude and inadequate practices related to waste management. This study has shown a need to improve the knowledge about waste management to protect the environment from the negative impact of waste. It is recommended to implement the need based training program for students at their school hostels and work places [1]. Suchitra et al. (2007) concluded in her study that education has a positive impact on retention of knowledge, attitudes and practices in all categories of staff. There is a need to develop a system of continuous education for all categories of staff [14]. Hesse et al. (2006) also concluded that good knowledge, attitude and practices are important to prevent HIV infection spread [15]. Saini et al. (2005) in her study observed a significant gap in the knowledge, attitude and practice of the consultants, residents and scientists with regard to biomedical waste disposal, to their knowledge/understanding on the subject [2].

Conclusion

This study showed that knowledge, attitude and practices have no correlation with each other. The definite callous attitude of intellectuals towards the operational aspects of the BMW management system can be attributed to the microscopic vision of these professionals that is mainly focused on the curative aspects of the patient care services, with probable failure in understanding the role of support services in the overall context of comprehensive health care delivery. Nursing professionals on the other hand, had an upper hand over the clinicians as far as attitude and practice of BMW management is concerned although their depth of knowledge on the subject was relatively low. This can be attributed to their accountability and commitment in ward management and the predominance of female workforce, which is by and large more disciplined. The para-medical staff including laboratory and housekeeping staff had less understanding on the

subject, but had a higher positive attitude with more practical habits, which may be attributed to strict instructions by authorities and fear for any punitive action.

Key Messages:

- Medical professionals have tubular vision regarding patient care, and lack attitude to this statutory provision
- Nurses have better understanding and are more responsible in the implementation
- Paramedical staff has less understanding but better practical application of various aspects
- Motivation and change of mindset in key functionaries like a doctor is essential for successful implementation of the BMW management program.

Some suggestions which would act as remedial measures include:

- Intensive training programs at regular time interval for all the staff with special importance to the new comers.
- Need for orientation programs for newcomers to understand the hospital function.
- The entire waste management practices should be a part of total hygiene practice of the society rather than confining to hospital and health facility.

Limitations:

This study has limitations but is also a good starting point for more extensive future research with the aim of giving our patients optimal care whilst being careful not to compromise our own health in the process.

1. The sampled population is small making it difficult to generalize the findings
2. A few of the respondents are medical students (sub-interns) with limited clinical experience
3. Respondents did not answer every question which limited comparisons of responses
4. There is limited literature available on previous studies involving doctors and nurses in similar developing countries

Source of Funding: Nil

Source of Conflict: Nil

Acknowledgement

Authors are thankful to all working staff of institutional trauma centre for their co-operation in the study.

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Access this article online

Website: www.ijrhrs.com

Submission Date:16-08-2013

Acceptance Date:27-08-2013



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