

# KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING APPROPRIATE MANAGEMENT OF BIOMEDICAL WASTE AMONG HEALTH CARE PERSONNEL: AN OBSERVATIONAL CROSS-SECTIONAL STUDY

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## ABSTRACT:

**Aim:** The aim of the study was to assess the knowledge, evaluate the attitude and identify the gaps in practice by health care personnel regarding appropriate management of biomedical waste.

**Material and Method:** This study was a hospital based observational cross sectional study conducted amongst health care personnel in different category in a 950 bedded private health care centre serving medical and dental colleges in Nagpur. It was questionnaire based study which included 200 samples (doctors, nurses, lab technicians and multipurpose workers- 50 each). The results were interpreted using percentage and proportions.

**Results:** The results of the current study indicated that knowledge level among doctors though adequate but were lacking in some aspects and was average among lab technicians and nurses while it was inadequate among multipurpose workers. There was also considerable variation in practice of biomedical waste management among different groups. The attitude towards the safe management of biomedical waste was average in doctors and was abysmal in other groups.

**Conclusion:** It is evident in this study that there is lack of knowledge and positive attitude in multipurpose workers towards biomedical waste management. Further interventional strategies and enhancement in knowledge may be carried out such as continued upgradation programmes, so that the safe practice of biomedical waste can be implemented across the spectrum of health care personnel.

**Keywords:** Knowledge, Attitude, Practice, Biomedical Waste, Health Care Personnel.



## INTRODUCTION

Health care centres have existed since ancient time and are getting increasingly complex in terms of services rendered both medically and surgically.<sup>[1]</sup> Consequently the amount of biomedical waste generated has also shown an asymmetric increase in the centres. Biomedical waste (BMW) may be defined as “waste product might be in any form i.e. solid, semisolid or liquid

waste, which is produced as an intermediate or end product of diagnosis, treatment or immunization process of human beings or animals, or in research relevant to, or in the production or testing of biological”.<sup>[2]</sup>

The recent inclination of using disposable surgical products as well as medicinal and dental consumables has led to a tremendous burden of health

care related waste. Unchecked handling of biomedical waste in last few decades is becoming evident as a serious peril to safety and health of humans, and many researchers consider this as a priority issue. [3,4] Blood borne infections and infections like HIV and HBsAg have intensified professional advocacy towards this issue.

Increased risk of infection due to pathogens like HIV, Hepatitis B & C virus and risk of water, air & soil pollution occurs due to improper handling of waste and consequently has a deleterious effect on community health and environment at large. [5,6]

Around three million tonnes of medical waste is generated every year in India with an expected growth of eight per cent annually<sup>[7]</sup>. The Indian Government promulgated the Biomedical Waste Management rules in 1998 and incorporated further amendments in 2003 and 2011<sup>[7]</sup>. These rules were brought into effect with the objective to improve the biomedical waste management facilities in India. Most Indian hospitals have still not achieved the required standards for biomedical waste management practices, even after many years of the implementation of the rules. [8] The purpose of biomedical waste management is mainly to consolidate generation of waste, proper collection, efficient handling and safe disposal. Only the development of laws is not sufficient but awareness among public and enforcement of laws is

necessary for proper disposal of biomedical waste. [9]

Past studies have inferred that in spite of the increase in global awareness and proper practice among health care professionals regarding appropriate management techniques, the knowledge and practice in India has been found to be less than satisfactory. [10]

This study was conducted with the primary objectives of assessing knowledge, evaluating attitude and easing out flaws in practice of efficient handling and disposal of waste amongst health care professionals in our tertiary health care centre in Nagpur, India.

## **MATERIALS AND METHODS**

This was a hospital based observational cross sectional study conducted comprising of health care personnel in different category in a 950 bedded private hospital associated with medical and dental college in Nagpur. The study was approved by the institutional ethics committee. The study group of 200 included 50 equal number of doctors, nurses, laboratory technicians and multipurpose workers (class IV).

All the health care personnel who had been working in the institute over a period of one year or more were included in the study and those who didn't wish to participate in the study were excluded from the study. The samples selection was done by stratified random sampling method. The ready study instrument was a 20 item validated

questionnaire designed by keeping each study group in mind and had all closed ended questions. The questionnaire was divided into three heads.

First part dealt with the knowledge of biomedical waste management that comprised of seven questions. Second part dealt with the attitude towards biomedical waste generation, hazards and legislation which included seven questions. The third part dealt with the biomedical waste management practices that included six questions.

It was distributed anonymously among participants. The solved questionnaire was collected in half an hour's time. The data was calculated using MS –excel and analysis was done. The results were interpreted using percentage and proportions.

## RESULTS

The data was collected and analyzed regarding knowledge, attitude and practice of biomedical waste management among health care personnel and is represented in following tabular form:

Table-1 illustrates that 96% doctors, 86% nurses and 94% lab technicians had meticulous knowledge about colour coding of containers while only 10% multipurpose workers were aware of it. 50% doctors have precise knowledge regarding maximum storage time of biomedical waste and was found to be abysmally low in other groups. The knowledge regarding disposal of various

biomedical waste products in separate containers according to their colour coding was observed to be satisfactory in doctors and nursing staff but inadequate in lab technicians and multipurpose workers.

Surprisingly only 36% doctors and 24% nurses strongly agreed with statement that safe management of health care waste is a critical issue, while 0% lab technicians and 10% multipurpose workers considered it of importance (Table-2). Majority of doctors- 80% considered needle prick injury as an issue of concern whereas only 20% lab technicians and multipurpose workers took it as an important factor. Majority of doctors and nurses were of the opinion that upgradation programmes to enhance knowledge on biomedical waste management is much wanted. Most of the lab technicians and multipurpose workers consider safe management of biomedical waste as an extra burden of work and financial burden over the management.

Table-3 illustrates that most of the subjects in each group agreed with the option of reporting needle prick injury to the infection control officer in the institution. Only doctors practice to segregate BMW at its origin while other groups do not. Majority of subjects in each group discard needle immediately after its use and do not tend to recap the needle. Labeling of the containers is also practiced frequently by every group. Most of the subjects were fully vaccinated against hepatitis B virus. A

paradox was observed that the percentage of subjects vaccinated was greater in lab technicians and multipurpose workers as compared to doctors and nursing staff.

Table-4 and Graph-1 depicts the sound knowledge that doctors and nursing staff possess which reflects in their practice regarding the same. Their attitude contradicted their knowledge and practice as most of them felt that it is a burden. Multipurpose workers do not have adequate knowledge and have a poor attitude, still observe the rules of biomedical waste management. This might be a reflection about the tendency to follow orders blindly rather than the knowledge behind biomedical waste management.

## DISCUSSION

According to WHO, around 10-25% of waste created by health care services is highly infectious and has significant potential of spreading the infection further.<sup>[11]</sup> The basis of this study was to evaluate knowledge, attitude and practice regarding appropriate management of biomedical waste among health care personnel in a tertiary health care centre and teaching hospital in Nagpur, India. The success of a questionnaire based study mostly relies on understanding of questions framed and available options, analysis of data and interest of the subjects in participation.<sup>[12]</sup> The questionnaire consisted of closed ended questions which ultimately resulted in negligible

recall bias. The questionnaire was framed bilingually in a very lucid language. All the subjects were from similar institution where same biomedical waste management rules were followed, hence the ease of carrying of the study was possible.

The results of the study reveals that most of the doctors, nursing staff and lab technicians have substantial knowledge regarding colour coding and number of containers while the knowledge of multipurpose workers regarding this is sparse. This was in consonance to findings of the study conducted by Malini A et al in Puducherry.<sup>[13]</sup> Knowledge about recommended time of storage of biomedical waste was the point most deficient in all the groups. Knowledge regarding segregation and disposal of various biomedical waste products in separate containers according to their colour coding was found to be satisfactory in doctors and nursing staff but inadequate in lab technicians and multipurpose workers. A study conducted by M Basu et al in a tertiary care hospital of West Bengal among junior doctors concluded that only 76.4% knew about various types of colour coded bags for collection of BM waste.<sup>[14]</sup>

For majority of lab technicians and multipurpose workers safe management of biomedical waste and needle prick injury was not a matter of great concern. The study conducted by Malini A et al<sup>[13]</sup> also revealed that the nursing staff and lab technicians lack knowledge regarding

needle prick injuries and were not aware of the reporting of such incidence. Similar findings were recorded in various studies done by Chudasama RK et al in Rajkot<sup>[6]</sup>, Sharma A et al in Jaipur<sup>[15]</sup> and Ismail I M et al in Karnataka<sup>[16]</sup>. Our study which cut across all groups felt that biomedical waste management is an extra work and financial burden, the same was observed in study conducted by Sharma A et al<sup>[15]</sup> and Malini et al<sup>[13]</sup> where approximately 45% doctors and multipurpose workers felt that biomedical waste management is an extra burden of work. <sup>[13]</sup> Our study corroborated the same finding as Malini et al<sup>[13]</sup> where majority of doctors and nurses agreed with the statement that continuous knowledge upgradation programmes should be conducted to enhance knowledge regarding biomedical waste management.

The practice of discarding of used needles, avoiding recapping of used needle and proper labeling of colour coded containers was precisely followed by majority of subjects in each group. Most of the subjects were fully protected against hepatitis B virus but paradoxically lab technicians and multipurpose workers had a higher percentage of protection by vaccination in distinction to doctors and nurses which was opposite to the observation in the study by Malini A et al where about 35% of nurses and technicians and 43% of Multipurpose Workers were not vaccinated against Hepatitis B<sup>[13]</sup>.

The results of the current study indicated that knowledge level of participants among doctors group was adequate, average among nurses and lab technicians while inadequate among multipurpose workers. There is a considerable variation in practice of biomedical waste management among different groups. The attitude towards the safe management of biomedical waste could be rated as average in doctors while grossly inadequate in other groups.

The effectual and safe disposal of biomedical waste is a legal necessity as well as a social responsibility. Regular upgradation programmes and refresher courses on biomedical waste management should be made mandatory to enhance the knowledge and modify the attitude of various health care personnel towards the safe disposal of biomedical waste. <sup>[17]</sup>

**Limitation:** The limitations of the current study were the fact that the entire domain of biomedical waste could not be assessed with this questionnaire based study. Also the suggestions and problems faced by various subjects could not be addressed at this stage.

It is recommended that multicentre studies be carried out in greater number of hospitals and cities involving greater number of subjects, so that the knowledge, attitude and practice of biomedical waste management can be assessed in the whole country and appropriate measures can be taken to

augment the safe disposal of biomedical waste.

## CONCLUSION

This study shows that there is frightening lack of knowledge and positive attitude in multipurpose workers towards biomedical waste management who are at the end of the chain of the effective disposal of biomedical waste. Further intervention and enhancement in knowledge needs to be done by providing continued upgradation programmes, so that the safe management of biomedical waste can be improved.

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**TABLES AND FIGURES:**

Table: 1- Correct answers (in percentage) for questions based on knowledge regarding biomedical waste management:

Sr. No.	Question	Doctors n= 50	Nurses n= 50	Lab technicians n= 50	Multipurpose workers n= 50
1	Number of colour coding containers	96	96	96	54
2	Colour coding for containers	96	86	94	10
3	As per BMW rules waste should not be stored beyond 48 hours	50	10	10	6
4	Bandages, gauzes and cotton are disposed in Yellow bags	76	74	46	20
5	Catheters, syringes and injections are disposed in Red bags	70	76	40	56
6	Materials to be disposed in blue bags	70	56	44	14
7	Materials to be disposed in black bags	76	50	44	10

Table: 2- Correct answers (in percentage) for questions based on attitude regarding biomedical waste management:

Sr. No.	Question	Doctors n= 50	Nurses n= 50	Lab technicians n= 50	Multipurpose workers n= 50
1	Safe management of health care waste is an issue at all	36	24	0	10
2	Waste management is a team work	66	44	36	24
3	Is needle prick injury a concern	80	60	20	20
4	Knowledge upgradation programmes are required to enhance knowledge on BMW	66	64	10	34
5	Safe management of health care waste is not an extra burden of work	24	16	0	4
6	Infectious waste should be sterilized from infection by autoclaving before shedding and disposal	56	46	50	16
7	Safe management by hospital does not increases the financial burden on management	34	26	4	24



Table: 3- Correct answers (in percentage) for questions based on practice regarding biomedical waste management:

Sr. No.	Question	Doctors n= 50	Nurses n= 50	Lab technicians n= 50	Multipurpose workers n= 50
1	To whom you report the needle injury	96	74	86	64
2	Segregation of hospital waste takes place at its origin	66	20	0	0
3	Do you discard the used needle immediately	94	86	86	66
4	Do you recap the used needle	84	56	50	6
5	Do you label the container before filling it with waste	94	70	86	90
6	Have you been fully vaccinated for hepatitis-B	84	74	96	96

Table: 4- Overall Correct answers (in percentage) regarding knowledge, attitude and practice of biomedical waste management:

	Doctors	Nurses	Lab technicians	Multipurpose workers
Knowledge	76.28	64	53.42	24.28
Attitude	51.71	40	17.14	18.85
Practice	86.33	63.33	67.33	53.66

Graph 1: Overall Correct answers (in percentage) regarding knowledge, attitude and practice of biomedical waste management:

