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A STUDY ON KNOWLEDGE, ATTITUDE AND PRACTICE ASSESSMENT ABOUT BIO –MEDICAL WASTE MANAGEMENT AMONG HEALTHCARE PERSONNEL

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ABSTRACT

Medical care is vital for our life and health, but the waste generated from medical activities represents a real problem of living nature and human world. Improper management of waste generated in health care facilities causes a direct impact on community, the health care workers and on environment every day. Relatively large amount of potentially infectious and hazardous waste is generated in the health care hospitals and facilities around the world. Indiscriminate disposal of bio medical waste and exposure to such waste possess serious threat to environment and to human health that requires specific treatment and management prior to its final disposal. Hence, this article made an attempt to assess knowledge, attitude and performance of healthcare personnel with respect to biomedical waste management is most important as they will be in direct contact with it. It found that every staff of hospital who ever involved in bio medical waste management has good knowledge about biomedical waste

KEYWORDS

BMW (Bio medical waste), health care personnel, OOP (out of pocket).

INTRODUCTION

A hospital produces many types of waste material. Housekeeping activity generates considerable amount of trash, and the visitors and others bring with them food and other materials which must in some way be disposed off. In addition to the waste that is produced in all residential buildings, hospitals generate pathological waste—blood soaked dressings, carcasses and similar waste. These waste materials must be suitably disposed of immediately lest they putrefy, emit foul smells, act as a source of infection and disease, and become a public health hazard. While in developing countries most of the public health problems are due to industrialisation, in developing countries many of the public health problems are related to defective sewage and waste disposal.

Many of our hospitals neither have a satisfactory waste disposal system nor a waste management and disposal policy. The disposal of waste is exclusively entrusted to the junior most staff from the housekeeping department without any supervision, and even pathological wastes are observed to be disposed off in the available open ground around hospitals with scant regard to aesthetic and hygiene considerations. Hospitals are prone to create health hazards for the public at large and also for healthcare workers with unscientific disposal of biomedical waste. Management of biomedical waste assumes great significance where countless poverty stricken rag pickers expose themselves to disease and death while eking out a living out of sifting and sorting of such waste. Among all the hospital waste, the 'sharps' i.e. needles, scalpels, blades, etc. are the most dangerous culprits, mainly because of their propensity to cause accidental pricks and cuts thereby providing direct entry of pathogenic organisms into the blood stream. "Waste" can be defined as any discarded, unwanted residual matter arising from the hospital or activities related to the hospital. "Disposal" covers the total process of collecting, handling, packing, storage, transportation and final treatment of wastes.

VOLUME

Rapid mushrooming of hospitals and nursing homes has resulted in unprecedented amount of biomedical waste being generated. In Indian cities, the quantity of refuse varied from 0.48 to 0.06 kg per capita per day with total compostable matter varying from 30 to 40 per cent. The quantum of domestic waste in advanced countries is six to ten times more. So far as hospitals in advanced countries are concerned, the average refuge in hospitals in Denmark and West Germany is 3 kg per bed per day and in USA up to 14 kg per bed per day. The quantum and type of waste reflects the life-style of the society, and this must be borne in mind in the planning of waste disposal in hospital. On an average, the volume of total solid waste in hospitals in India is estimated to range between 1 kg and 3 kg per day on a per bed basis. It is estimated that about 0.5 kg out of this consists of food waste. In a study carried out in the family wing of a large hospital, the composition of waste was bandages, gauge and cotton wool waste 34.1 per cent, coal ash 31.6 percent, foliage 13.5 per cent, food waste 11.5 per cent and glass, bottles, etc. 1.8 per cent.

TYPES OF WASTE

In general, hospital waste can be classified into two major groups. The first group comprises of mainly solid or semisolid waste, and the second group mainly liquid waste.

TABLE 1

Option	Waste Category	Treatment & Disposal
Category No. I	**Human Anatomical Waste** (human tissues, organs, body parts)	Incineration /deep burial
Category No. 2	**Animal Waste** (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal)	Incineration /deep burial
Category No. 3	**Microbiology & Biotechnology Waste** (wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of 48iological, toxins, dishes and devices used for transfer of cultures)	local autoclaving / micro-waving / incineration
Category No. 4	**Waste sharps** (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	disinfection (chemical treatment) auto-claving / micro- waving and mutilation/ shredding
Category No. 5	**Discarded Medicines and Cytotoxic drugs** (wastes comprising of outdated, contaminated and discarded medicines)	Incineration /destruct ion and drugs disposal in secured landfills.
Category No. 6	**Solid Waste** (Items contaminated with blood, and body fluids including cotton dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	Incineration /autoclaving / micro-waving
Category No. 7	**Solid Waste** (wastes generated from disposable items other than the waste sharps such as catheters, intravenous sets etc).	disinfection by chemical treatment/autoclaving/micro-waving and mutilation/
Category No. 8	**Liquid Waste** (waste generated from laboratory and washing, cleaning, housekeeping and disinfecting activities)	disinfection by chemical treatment and discharge into drains.
Category No. 9	**Incineration Ash** (ash from incineration of any bio-medical waste)	disposal in municipal landfill
Category No. I0	Chemical Waste (Chemicals used in production of biological, chemicals used in disinfection, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids.

COLOUR CODING AND TYPE OF CONTAINER FOR DISPOSAL OF BMW

TABLE 2

Colour Coding	Type of container to be used	Waste Category Number
YELLOW	Non Chlorinated plastic bags	Category 1,2,5,6
RED	Non Chlorinated plastic bags/puncture proof container for sharps	Category 3,4,7
BLUE	Non Chlorinated plastic bags container	Category 8
BLACK	Non Chlorinated plastic bags container	Municipal Waste

CHARACTERISTICS OF A GOOD WASTE DISPOSAL SYSTEM

Incidents of inappropriate hospital waste disposal and the fear of HIV and AIDS have drawn medical attention to hospital waste management practices. There are conflicting views among the medical fraternity regarding hospital waste management but there is now a dire need to sensitise health administrators, especially in view of the Biomedical Waste (Management and Handling) Rules, 1998 promulgated by the Ministry of Environment and Forests, Govt. of India. Any good waste disposal system should be planned for:

i. Good appearance
i. Safety
iii. Pest control
iv. Odour control, and
v. Public health safety.

The system should also be sanitary, economical and convenient. During the planning stage, attention should be given to the routes by which garbage and infected material are to be removed. In principle, firstly, the garbage and infected material should be removed from its point of origin by a direct (and shortest) route. In large multistoried buildings, a conveniently placed special lift only for garbage will be necessary. Secondly, the movement of dirty and infected materials should be restricted to the minimum. Thirdly, handling and transportation of the waste within the hospital premises should also be minimised.

REVIEW OF LITERATURE

Rajesh K Chudasama, Matib Rangoonwala, Ankit Sheth, SKC Misra, A M Kadri, Umed V Patel made a study on Biomedical Waste Management: A study of knowledge, attitude and practice among health care personnel at tertiary care hospital in Rajkot. They found that Only 44.3% of sample participants only received training for bio medical waste management and Informed that HIV (74.47%) and Hepatitis B (56.03%) were the main infectious diseases transmitted by the bio medical waste.

Malini A and Bala Eshwar made a study on Knowledge, Attitude and Practice of Biomedical waste management among health care personnel in a tertiary care hospital in Puducherry. They found that <50% of nursing staff and <25% of MPWs (multi purpose workers) had the knowledge of colour coding and segregation. There was also poor knowledge regarding disposal of sharps among technicians and MPWs. It also brought to our notice that only 50% of the doctors (residents) and nursing staff and 26% of the laboratory technicians have undergone training in Biomedical Waste management.

Ostwal.K, Jadhav.A, More.S, Shah.P, Shaikh.N made a study on Knowledge, attitude and practice assessment of biomedical waste management in tertiary care hospital. They found that Doctors were having good knowledge followed by nurses followed by sanitary staff. *It was improved after training* programme of Biomedical Waste management.

Gyan P sInGh, PratIbha GuPta, reema KumarI, sneh Lata Verma made a study on Knowledge, Attitude and Practices Regarding Biomedical Waste Management among Healthcare Personnel in Lucknow, India.They found that 83.3% of medical and dental doctors and students had knowledge about waste management plan and its authorization. Majorities of the medical doctors (83.3%), paramedics (80%) and students (66.7%) had knowledge about place of waste disposal. On practice level, most of the healthcare personnel were using autoclave and lesser number of personnel were using dry heat sterilization.
Imaad Mohammed Ismail*, Annarao G. Kulkarni, Suchith V. Kamble, Sagar A. Borker, Rekha R and Amruth M made a study on Knowledge, attitude and practice about bio-medical waste management among personnel of a tertiary health care institute in Dakshina Kannada, Karnataka. They found that knowledge regarding colour coding and risks of handling bio-medical waste was poor across all the 4 groups (doctors, nurses, lab technicians, class IV workers) especially among class-IV waste handlers. Majority of the study participants had never undergone any training on bio-medical waste management and there was a felt need for the same.

OBJECTIVES
1. To determine Knowledge levels among healthcare personnel about biomedical waste management.
2. To determine Attitude levels among healthcare personnel about biomedical waste management.
3. To determine practise levels among healthcare personnel about biomedical waste management.
4. Impact of knowledge levels on practise among healthcare personnel about biomedical waste management.
5. Impact of attitude levels on practise among healthcare personnel about biomedical waste management.

HYPOTHESIS
Hypothesis 1: knowledge levels of staff has less impact on their practice of biomedical waste management.
Hypothesis 2: attitude of staff has less impact on their practice of biomedical waste management.

RESEARCH METHODOLOGY
With the help of Random Sampling method, 150 samples will be collected from NTR government general hospital to do survey on healthcare personnel of hospital on doctors, nurses, housekeeping staff. Survey is done with help of predefined questionnaire.

RESULTS AND DISCUSSION
Going deeper into analysis to satisfy the objectives of study, regression analysis is done for testing the hypothesis,

HYPOTHESIS 1

TABLE 1: MODEL SUMMARY[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.407[a]	.166	.106	.49273	.166	2.765	10	139	.004

Predictors: (Constant), proposed, rules, Safe Transport, responsibility, store, regulated, Disposal Policy, described, Legislation, Separate Permit b. Dependent Variable: practice.
In the above table R is the dependent variable, R square is the coefficient of determination (level of impact on dependent variable by independent variable) It indicates R square value is 0.166 which means 16.6% knowledge on bio medical waste has impact on its practices.
Knowledge has less impact on practice levels, some unexpected knowledge variable is not covered which also have impact on bio medical waste practices. Significant difference is 0.004 which is less than 0.5. In such case it is acceptable that knowledge has impact on practice.
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TABLE 2: COEFFICIENTS[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.815	.216		13.040	.000
	Regulated	-.034	.033	-.094	-1.045	.298
	Rules	.026	.031	.068	.824	.411
	Described	-.062	.033	-.168	-1.847	.067
	Store	.025	.036	.060	.704	.483
	SafeTransport	.098	.033	.259	2.950	.004
	DisposalPolicy	.024	.037	.061	.641	.523
	Resposbility	-.023	.043	-.043	-.530	.597
	SeperatePermit	.070	.037	.213	1.864	.064
	Legislation	-.099	.044	-.257	-2.250	.026
	Proposed	.025	.035	.073	.737	.463

a. Dependent Variable: practise
From the above table, Coefficient of variation for this study is 2.815 and with significant value 0.00. Knowledge on bio medical waste is regulated by variable has negative impact on practice of bio medical waste management with an insignificant value of 0.298, knowledge on biomedical rules were amendment has less positive impact with insignificant value 0.411, knowledge on statement describing biomedical waste has negative impact with insignificant value 0.67, knowledge on waste should be disposed before certain period has less positive impact with insignificant value 0.483, knowledge on safe transport of biomedical waste is regulated by has positive impact with some significant value 0.04 (<0.05), knowledge about any biomedical waste policy in their hospital has less positive impact with insignificant value 0.523, knowledge about who is responsible for handling biomedical waste in hospital has negative impact with insignificant value 0.597, knowledge about requirement of separate permit for biomedical waste transportation has positive impact with insignificant value 0.64, knowledge to have bio-medical waste generation and legislation has less negative impact with significant value 0.26, knowledge about first proposed biomedical waste rules has less positive impact with insignificant value on 0.463 on practice of biomedical waste management. So on an overall 16.6% knowledge has positive impact on practices.

TABLE 3: ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.713	10	.671	2.765	.004[a]
	Residual	33.747	139	.243		
	Total	40.460	149			

a. Predictors: (Constant), proposed, rules, Safe Transport, responsibility, store, regulated, Disposal Policy, described, Legislation, Separate Permit
b. Dependent Variable: practice
From the above table it is clear that hypothesis 1 that is “knowledge of staff has less impact on their practice level” is satisfied because significant difference is 0.004 which is less than 0.05.
also some variable which have impact on staff practice levels are not covered.

HYPOTHESIS 2

TABLE 4: MODEL SUMMARY[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.378[a]	.143	.081	.49957	.143	2.312	10	139	.015

a. Predictors: (Constant), complaint, Extra Burden, Issue, Financial Burden, labelling, Teamwork, Voluntary Programme, Knowledge, Sterilised, Treatment Plant

b. Dependent Variable: practice

From the above table, it is clear that 14.3% staff attitude has impact on their practice levels and significant difference is 0.15 which is less than 0.5 that means more or less it has impact on their practice, clearly shown in figure and also some unexpected variables which also have impact on practice of biomedical waste management were not covered.

TABLE 5: COEFFICIENTS[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.911	.190		15.298	.000
	Knowledge	.044	.039	.129	1.115	.267
	Teamwork	-.035	.041	-.095	-.857	.393
	ExtraBurden	.112	.045	.241	2.520	.013
	Sterilised	-.023	.042	-.066	-.553	.581
	Labeling	-.046	.037	-.120	-1.228	.222
	Issue	.056	.037	.167	1.513	.133
	TreatmentPlant	.056	.046	.161	1.224	.223
	VoluntaryProg	-.045	.040	-.142	-1.143	.255
	FinancialBurden	-.098	.038	-.244	-2.580	.011
	Complaint	-.007	.049	-.018	-.139	.890

From the above table it is clear that coefficient of variation should be 2.911 with significant value 0.00. Attitude of staff about knowing generation and legislation of biomedical waste management has less positive impact on practice with insignificant value 0.267, attitude about bio medical waste handling is a teamwork or not has negative impact on practise with insignificant value 0.393, attitude of staff about biomedical waste management is extra burden of work has positive impact on practice with significant value 0.013 (<0.05), attitude of staff on compulsory sterilising waste before disposing it has negative impact on practice with insignificant value 0.581, attitude of staff on labelling of biomedical waste containers is for clinical significance has negative impact on practice with in significant value 0.222, attitude of staff on safe management of biomedical waste has less positive impact with insignificant value0.133, attitude of staff whether to have a separate treatment plant for biomedical waste has less positive impact with insignificant difference 0.223. Attitude of staff on participation of volunteer programmes on biomedical waste has negative impact on practise with insignificant value 0.255, attitude of staff whether biomedical waste management is financial burden to hospital has negative impact on practice with significant value 0.011 (<0.05), attitude of staff whether when they need to complaint on any organization to pollution control board on not following biomedical rules has negative impact on practice with insignificant value 0.890. This shows more or less 14.3% of staff attitude has impact on their practice.

TABLE 6: ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.770	10	.577	2.312	.015[a]
	Residual	34.690	139	.250		
	Total	40.460	149			

a. Predictors: (Constant), complaint, Extra Burden, Issue, Financial Burden, labelling, Teamwork, Voluntary Programme, Knowledge, Sterilised, Treatment Plant

b. Dependent Variable: practice

From the above table it is clear that hypothesis 2 that is “Attitude of staff has impact on their practice levels” is satisfied as significant value is less than 0.05 it is 0.015 and also some un expected variables which have impact on practice are not considered.

FINDINGS

- From this research it is found that practice level of respondents is good compared to knowledge levels of respondents in government general hospital Vijayawada.
- And also found knowledge levels of doctors and nurses are high compared to housekeeping and laboratory staff.
- When comparing practice level among staff doctors of NTR GGH has less practice level compared to housekeeping and nursing staff.
- Knowledge levels of staff has less impact on their practices of handling biomedical waste.
- Attitude levels of staff has less impact on their practices of handling biomedical waste.
- Maximum staff has positive attitude on biomedical waste management but they were actually not practicing them.
- Doctors have poor knowledge about colour coding system of biomedical waste which is one of the important factor where doctors failed.
- In NTR government general hospital biomedical waste is segregated by outsource company who takes care of disposing biomedical waste.

SUGGESTIONS

- Training should be provided to staff by hospital administration.
- All containers having different coloured plastic bags should be located at the point of generation of waste i.e. near diagnostic services areas so that waste can be easily segregated
- It should be ensured that waste bags are filled upto only three fourth capacity, tied securely and removed from the site of the generation regularly and timely
- Certain categories of waste, which may need pre-treatment (decontamination / disinfection) at the site of generation such as plastic and sharp materials, etc., should be removed from the site of generation only after treatment
- Housekeeping staff collects waste in closed container by wearing personal protection equipment
- No untreated BMW should be stored beyond 48 hours
- Waste routes should be designated and separate time should be earmarked for BMW to reduce chances of its mixing with general waste
- Dedicated wheeled trolleys are used and they should be cleaned and disinfected in case of any spillage. Trolleys should not have any sharp edges and should be easy to clean.
- Special team should be administering the practices of biomedical waste.
- BMW shall be transported only in vehicles authorized by competent authority as specified by government
- Create awareness among staff about safe a management of biomedical waste.
- There should be a biomedical waste policy to be implemented in hospital.

CONCLUSION

Hence this study concludes that every staff of hospital who are involved in bio medical waste management should possess good knowledge about biomedical waste legislation, positive attitude toward biomedical waste handling, and should follow right way of practice. But actually staff are lacking with good knowledge levels and positive attitude which leads to right practice, so by proper training programmes, hospital should create awareness among its staff.

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