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## Comparative Assessment of Biomedical Waste Segregation Practices in Public and Private Hospital of Jammu Region

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**Abstract:** *Health care is important for our life, but the waste generated from various medical activities poses a severe problem to all living forms and to our environment as well. The large amount of infectious and hazardous waste generated in various health care hospitals and facilities are a matter of significant concern not only in India but also around the world. Biomedical waste management is one of the biggest challenges of the present day times since it has a direct impact on the health of the citizen of that city. The Present Study aims to provide information about the management, Segregation, & Storage of medical wastes in Public as well as Private Hospitals in Jammu Region. A Simple random sampling technique have been used to distribute a semi structured questionnaire among IV class workers at two hospitals in Jammu Region with 30 respondents from Govt. Hospital and 30 respondents from Private hospital. The results disclosed that, Bio Medical waste Management facilities are proper in the public hospital where as private hospital still suffer from inappropriate biomedical wastes management. This study mainly focused on Training of the IV class, segregation and storage of Biomedical Waste Management.*

**Key Words-** *Biomedical waste management, Hospital, Segregation, Training, Storage.*

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### Introduction

Bio-medical waste means “any solid and/or liquid waste including its container and any intermediate product, which is generated during the diagnosis, treatment or immunization of human beings or animals. Biomedical waste poses hazard due to two principal reasons – the first is infectivity and other toxicity.”

Biomedical waste is waste that is either putrescible or potentially infectious. Biomedical waste may also include waste associated with the generation of biomedical waste that visually appears to be of medical or laboratory origin (e.g., packaging, unused bandages, infusion kits, etc.), as well research laboratory waste containing biomolecules or organisms that are restricted from environmental release. As detailed below, discarded sharps are considered biomedical waste whether they are contaminated or not, due to the possibility of being contaminated with blood and their propensity to cause injury when not properly contained and disposed of. Biomedical waste is a type of biowaste. It is distinct from normal trash or general waste, and differs from other types of Biomedical waste and may be solid or liquid. Examples of infectious waste include discarded blood, sharps, unwanted microbiological cultures and stocks, identifiable body parts, other human or animal tissue, used bandages and dressings, discarded gloves, other medical supplies that may have been in contact with blood and body fluids, and laboratory waste that exhibits the characteristics described above. Waste sharps include potentially contaminated used (and unused discarded) needles, scalpels, lancets and other devices capable of piercing the skin. Biomedical waste is generated from biological and medical sources and activities, such as the diagnosis, prevention, or treatment of diseases. Common generators (or producers) of biomedical waste include hospitals, health clinics, nursing homes, research laboratories, offices of physicians, dentists, and veterinarians, home health care, and funeral homes. In healthcare facilities (i.e., hospitals, clinics, doctors offices, veterinary hospitals and clinical laboratories), waste with these characteristics may alternatively be called medical or clinical waste.

In order to manage the biomedical waste Segregation is the very first step. Segregation refers to the basic separation of different categories of waste generated at source and thereby reducing the risks as well as cost of handling and disposal. Segregation is the most crucial step in bio-medical waste management. Segregation is very important step in bio medical waste management Because the bio medical waste contains infectious agents, toxic or hazardous chemicals or pharmaceuticals, sharps and it may be genotoxic or radioactive; it is potentially risky for persons who are exposed to it. There are health risks to several different and overlapping populations, e.g. health-care employees, dentists, patients, waste handling and treatment workers, and the general population. Effective segregation alone can ensure effective bio-medical waste management. Segregation is done through following processes :

1. Collection
2. Storage
3. Transportation
4. Disposal

Medical and health-care wastes have sharply increased in recent decades due to the increased population, number, and size of health care facilities, as well as the use of disposable medical products (Mohee, 2005) According to the United States Environmental Protection Agency (USEPA) medical wastes contain all waste materials generated by health-care facilities, such as hospitals, clinics, physician's offices, dental practices, blood banks, and veterinary hospitals/clinics, as well as at medical research facilities and laboratories (USEPA, 2013), that can include a wide range of materials, such as used needles and syringes, soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials (Ananth et al., 2010) . Where it is now commonly recognized that certain types of medical waste are among the most hazardous and potentially dangerous of emerging wastes across many communities (Bdour et al., 2006). where medical waste can be classified into two major groups: general and hazardous waste (Taghipour and Mosafieri, 2009). According to World Health Organisation (WHO, 2009) 80% of medical waste are benign and comparable to domestic waste while the remaining approximate of 20% is considered hazardous, as it may be infectious, toxic and/or radioactive. Infectious wastes together represent the majority of the hazardous waste (up to 15%) from health care activities. Sharp objects, genotoxic waste, heavy metals (1% each), chemicals and pharmaceuticals (3%) constitute the rest of the hazardous waste (WHO, 2009).(sarsour et al.,2003).

### Materials and methods

A closed survey have been done by using a Questionnaire (Sarsour et al.2014) as given in international journal of Scientific Research in Environmental Sciences. This questionnaire was then served to the fourth class employees of Public Hospital & Private hospital. It includes 30 fourth class employees in Public Hospital & 30 IV class employees in private hospital. The Questionnaire has been designed to obtained information about the knowledge of assessment of hospital waste management, their Segregation and storage Issues.

Type of Hospital:

S. No.	Type of hospital	No. of beds
1.	Public	200
2.	Private	500

### Result And Discussion

The present study aims to provide information about the training , management, segregation, and storage of bio medical wastes in public and private hospital in Jammu and Kashmir .A cross sectional study have been employed and simple random sampling technique were used to distribute a semi structured questionnaire among the fourth class workers in both the hospitals.

Table 1. Training status of workers

Training status	Public	Private
Trained Workers	30(100%)	23(76%)
Untrained Workers	-	7(23%)
Training period	30(100%)	21(70%)

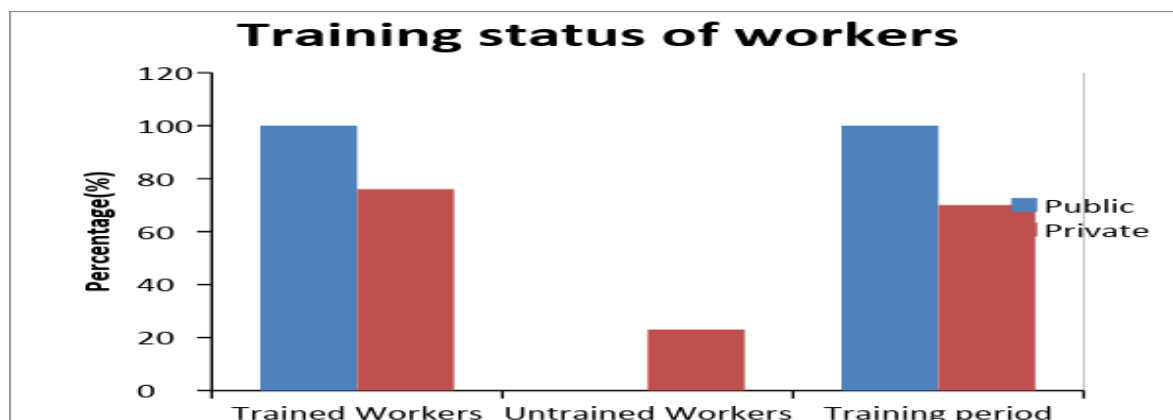


Fig. 1. Representing Training Status of workers

It has been Observed that Out of 30 workers in private hospital only 23(76%) workers have been trained and 7(23%) is untrained where as in public hospital all workers are trained i.e. 30(100%) and the training period for workers were 1-7 days and only 21(70%) workers did training for this time period so more awareness have been recorded in public hospital in comparison to private hospital (Table 1 ,Fig.1)

### Segregation Status

Table 2. Personnels involved in Segregation of Biomedical Waste in both the hospitals

Responses	Hospital	Private Hospital
Medical Staff	0	12(40%)
Cleaning Workers	28(70%)	15(50%)
Don't know	2(6.6%)	3(10%)

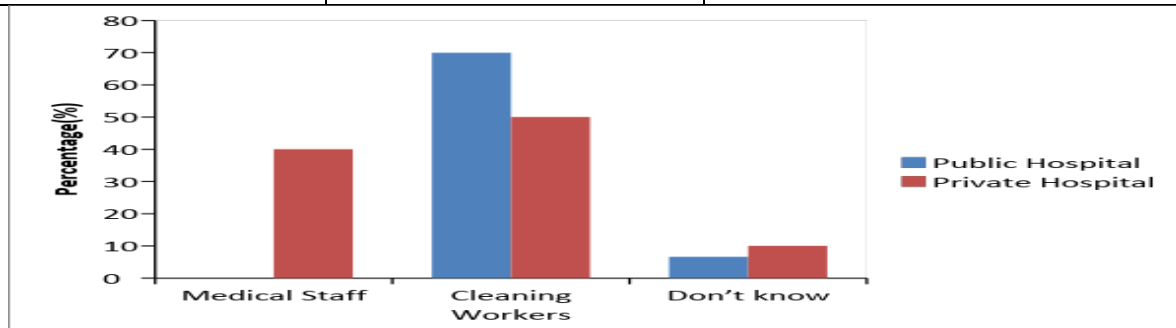


Fig. 2 Representing the segregation Status

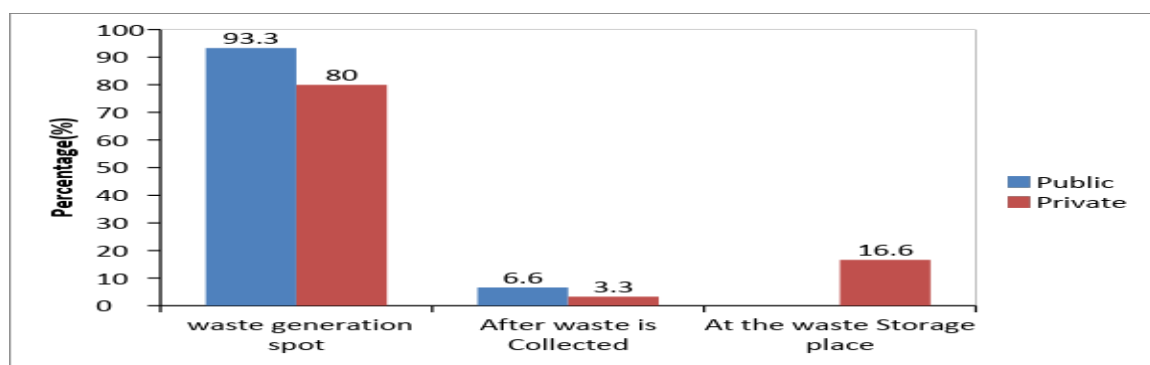
After analyzing the responses of the workers, it has been revealed that, Out of 30 workers in public Hospital about 28(70%) respondents told that cleaning Workers Segregate Medical Waste and 2 (6.6%) respondents don't know about segregation where as out of 30 workers in Private hospital 12(40%) revealed that medical

staff Segregate Medical waste, 15(50%) disclosed that Cleaning Workers Segregate medical waste and 3(10%) have no idea about Segregation. After Study it has been found that the public Hospital's workers were much more aware about Segregation as compare to workers working in Private Hospital due to their routine training.(Table 2, Fig 2).

### Segregation Place

**Table 3: Segregation place for Bio Medical Waste**

Responses	Public	Private
waste generation spot	28(93.3%)	24(80%)
After waste is Collected	2(6.6%)	1(3.3%)
At the waste Storage place	0	5(16.6%)



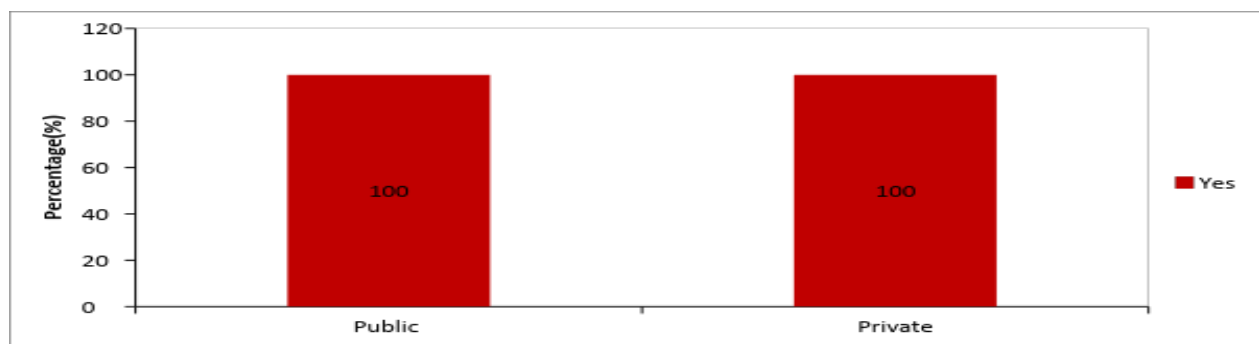
**Fig. 3 Representing the Segregation place**

Further it has been revealed that out of 30 workers in public hospital about 28(93.3%) workers told that segregation have been done on spot of waste generation, and rest 2(6.6%) disclosed that segregation have been done after waste is collected. Whereas, in private hospital out of 30 workers about 24(80%) told that segregation have been done on the spot, 1(3.3%) revealed that segregation have been done after waste is collected and rest 5 (16.6%) respondents revealed that segregation is done at the waste storage place. ( Table 3, Fig.3).

### Containers Identification status

**Table 4: Identification status of Containers**

Responses	Public	Private
Yes	30(100%)	30(100%)

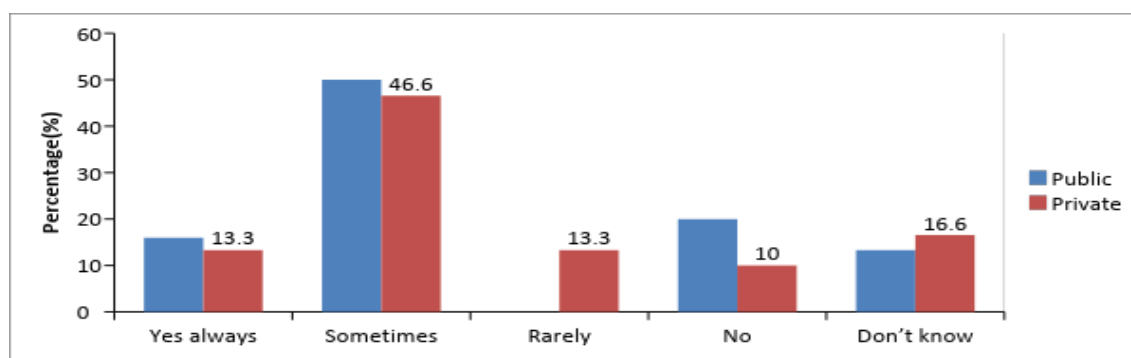


**Fig. 4 Representing Status of Waste Sacks**

After analyzing the responses of the workers, it has been revealed that in both the Hospitals containers have been distinguished according to colour coding of Bio Medical Waste Management and Handling Notification 2016. (Table 4, fig.4 ).

**Table 5: Tearing of waste sacks**

Responses	Public	Private
Yes always	5(16%)	4(13.3%)
Sometimes	15(50%)	14(46.6%)
Rarely	0	4(13.3%)
No	6(20%)	3(10%)
Don't know	4(13.3%)	5(16.6%)

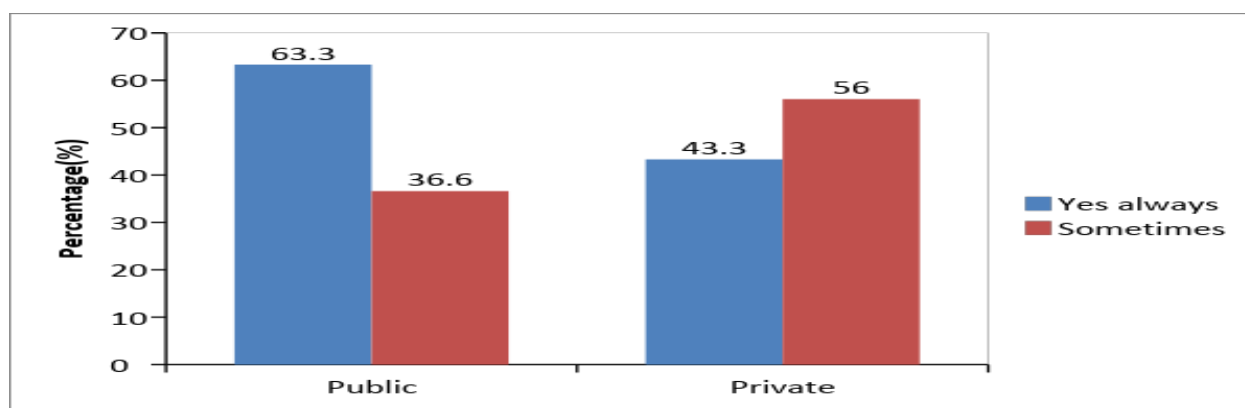


**Fig 5. Representing Tearing of Waste Sacks**

After analyzing the responses of the workers, it has been revealed that out of 30 workers in public Hospital 5(16%) revealed that waste always sacks to tear , 15(50%)disclosed that sometimes waste sacks to tear , 6(20%)told that there is no waste sacks to tear and and 4(13.3%) respondents don't have any idea about tearing of waste sacks .whereas in private hospital 4(13.3%) revealed that waste always sacks to tear, 14(46.6%)disclosed that sometimes waste sacks to tear , 4(13.3%) respondents disclosed that they rarely do this activity, 3(10%)told that there is no waste sacks to tear and 5(16.6%) respondents don't have any idea about tearing of waste sacks.(Table 5, Fig.5)

**Table6. Provisions for Liquid Waste Released**

Responses	Public	Private
Yes always	19(63.3%)	13(43.3%)
Sometimes	11(36.6%)	17(56%)



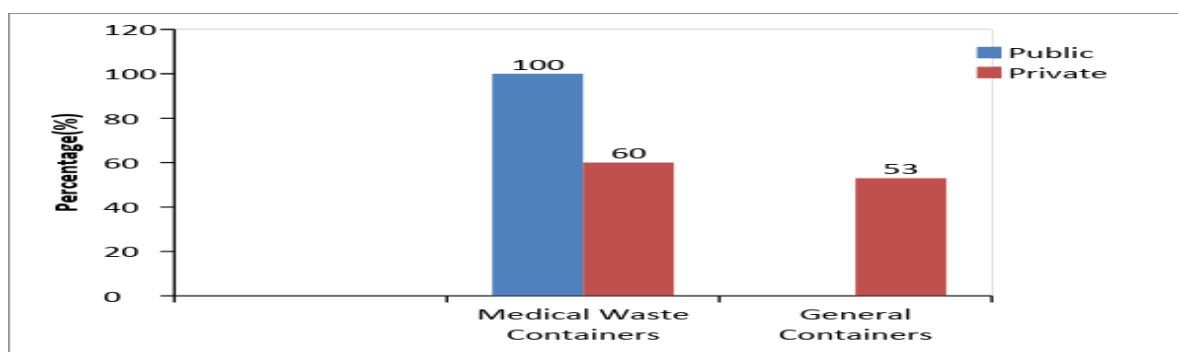
**Fig. 6 representing the provision of nickel waste**

After analyzing the responses of the workers, it has been revealed that out of 30 workers in public Hospital 19(63.3%) revealed that there are some alternatives for liquid running out from waste, 11(36.6%) respondents disclosed that sometimes there are provisions for liquids running out from Waste whereas in Private Hospital 13(43.3%) revealed that there are some alternatives for liquid running out from waste and rest 17(56%)% respondents disclosed that sometimes there are provisions for liquids running out from Waste(Table 6, Fig.6)

### Storage Practices

**Table7. Medical waste storage Practices in Public and Private hospitals**

Responses	Public	Private
MW Containers	30(100%)	18(60%)
General Containers	0	16(53%)

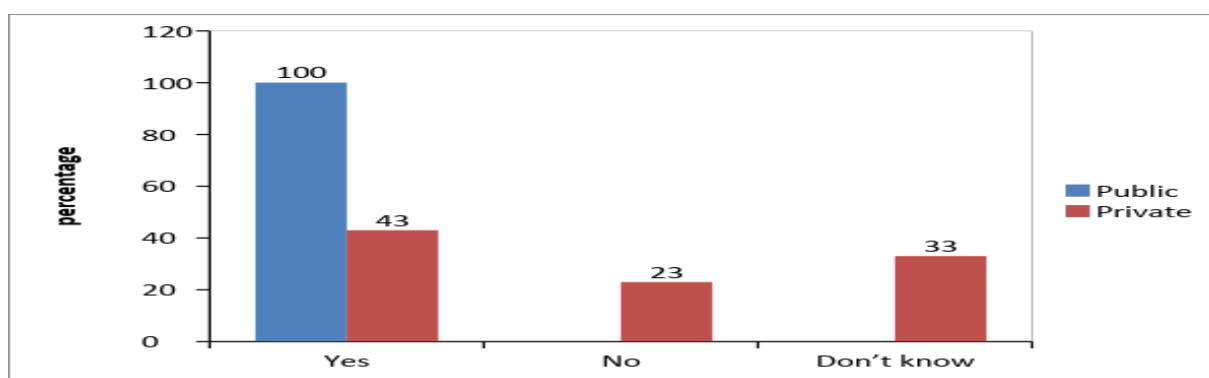


**Fig.7: representing storage practices**

It has been observed that, In Public Hospital waste have been stored in Medical Waste Containers Where as in Private Hospital Out of 30 Respondents, about 18(60%)revealed that waste have been stored in Medical Waste Containers and rest 16(53%) revealed that waste have been collected in General Containers. Storage of Biomedical Waste in Public hospital is much better than the Private Hospital.(Table7 fig .7 )

**Table8: Special Mark on Storage unit of Bio Medical Waste**

Responses	Public	Private
Yes	30(100%)	13(43%)
No	0	7(23%)
Don't know	0	10(33%)



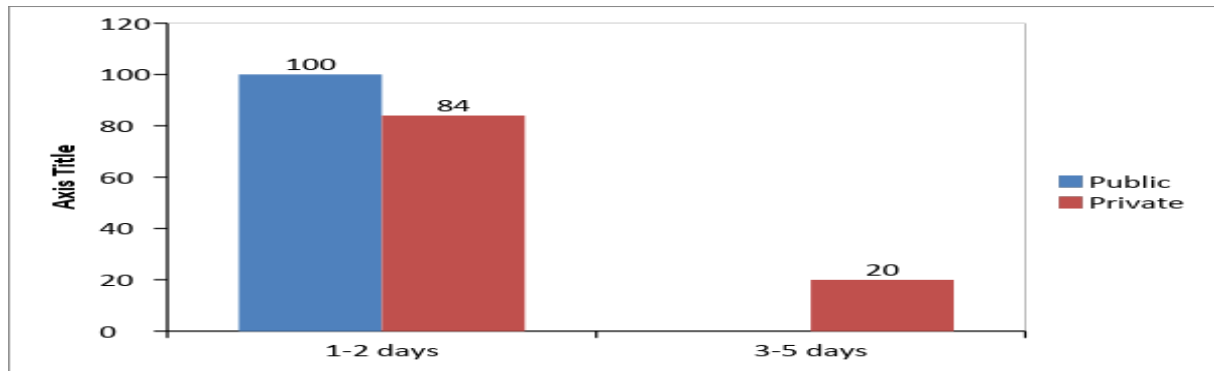
**Fig.8 status of Special mark at Storage Place**

It has been Observed that workers of public hospital were aware about the special mark at the storage place whereas in private Hospital it has been found that about 13(43%) workers know about special mark used to

express storage place ,7(23%) workers revealed that no special Mark is used for Storage Place and rest 10(33%) have no idea about the Special mark at the storage Place. (Table 8, Fig8 )

**Table9: Storage Time**

Responses	Public	Private
1-2 days	30(100%)	24(84%)
3-5 days	0	6(20%)
7 days	0	0

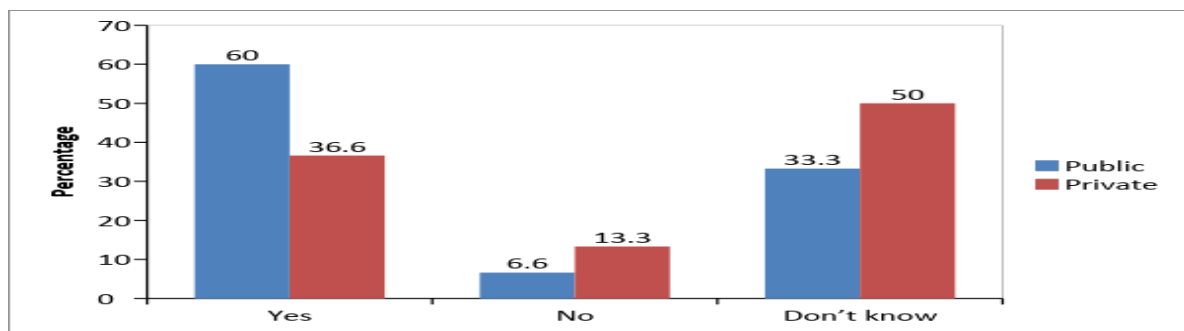


**Fig.9 Representing the Waste Storage time.**

Further ,it has been observed that in Public Hospital biomedical waste is Genuinely stored for 1-2 days Where as in Private Hospital 24(84%) respondents revealed that waste is Stored for 1-2 days and rest 6(20%) revealed that waste is Stored for 3-5 days which is not Genuine according to Bio Medical Waste Management and Handling rules.(Table9, Fig9)

**Table10: Protection of Storage Area**

Responses	Public	Private
Yes	18(60%)	11(36.6%)
No	2(6.6%)	4(13.3%)
Don't know	10(33.3%)	15(50%)



**Fig.10 Representing the Storage Area**

Further ,it has been observed that Out of 30 Workers in public hospital 18(60%) revealed that storage area is away from the hospital, 2(6.6%) respondent have no idea about the storage area, rest 10(33.3%) don't know about the protection of storage area where as in private hospital 11(36.6%) disclosed that storage place is away from hospital area , 4(13.3%) revealed that there is no proper protection for Medical Waste. (Table10, Fig.10)



#### 4. Conclusion

The present study aims to provide information about the management, segregation, and storage of medical wastes in public and private hospital of Jammu & Kashmir. A study have been conducted by simple random sampling technique and a semi structured questionnaire among IV class workers in both the hospitals. The results disclosed that, Bio Medical waste Management facilities were proper in the public hospital where as private hospital still suffer from inappropriate biomedical wastes management. This study mainly focused on Training of the IV class, segregation & storage of Biomedical Waste Management. The waste in the Public hospital is collected in three shifts morning, afternoon and night and everywhere there are timetables showing the frequency of collection in public hospital. The same procedure have also been followed by private hospital but no time table showing frequency of waste collection. In public hospital procedure of Segregation takes place properly whereas it is variable in private hospital. Due to careless attitude and untrained workers of private hospital segregation practices are not up to mark. The Public hospital segregate and store the bio medical waste properly as compare to private hospital. So for Proper Waste Management, the Segregation should be done near the generation point.

In public hospital, proper care is taken about the health of the workers. Employees are properly vaccinated against diseases and are fully aware about consequences of infectious Waste. The private hospital lack the facility of providing training to the staff who are at the greater risk of diseases but in public hospital there is proper facility of providing training to the staff as well as workers. This means that public hospital have training provision for newly hired members where as private hospital haven't proper provision for training and The public hospital aware the workers about diseases that can take place during handling and collection of waste. They provide the safety measures like gloves, masks, vaccines to workers so that they remain free from the diseases. But it is observed that due to non-training of the workers, they have carefree attitude about the diseases in private hospital. However, from this study it can be said that in private hospital there is an urgent need for proper training, Segregation and storage practices on Hospital waste issues and biomedical Waste used to be stored for minimum 1-2 days. It is also important that Govt. Authorities Should make sure that all Public hospital and private hospital should strictly follow the Biomedical management and handling rule. Proper Timely inspection of Public and Private Hospital is also important by the Govt. Authority.

In order to combat the menace of ever increasing problem of biomedical waste, waste following suggestions can be given

- Segregate waste at a point of generation as infectious, non-infectious and sharps.
- Waste should be collected in colour coded containers i.e. yellow –infectious waste for incineration, black-garbage for dumping in municipal bins, blue sharps/needles. Covered waste collection containers should be used for storage of waste
- All sharps and plastics/glass waste should be sterilized by autoclaving and other methods.
- Use of syringe and needle destroyer should be made compulsory.
- Waste should be transparent through cover trolleys and vans,
- The attendants Of the patient Should be advised to put infectious and non infectious waste into different dustbins.
- There should be Change in the old mind set and attitude of people concerned with biomedical waste through knowledge and training.
- Health Education, Motivation, Sensitization and awareness among the Health Care Workers Should be Enhanced. Frequent mass Awareness Activities regarding the Hazard of Hospital Waste Should be organized for the hospital staff and general public.

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