Descriptive Study on Evaluation of Bio- Medical Waste Management at Sankara Eye Hospital, Coimbatore

By

Ashima Gabgotra

Dissertation submitted in partial fulfillment of the requirements of the degree

MBA Hospital and Health Management

Academic year, 2018-2020

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TO WHOMSOEVER MAY CONCERN

This is to certify that Ashima Gabgotra, student of MBA Hospital and Health Management from the IIHMR University, Jaipur has undergone internship training at Sanakara Eye Hospital, Coimbatore from 3rd February 2020 to 2nd May 2020.

The candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical. The internship is in fulfilment of the course requirements.

I wish her all success in all her future endeavours.

Dean, Academics and Student affairs

The IIHMR University, Jaipur

Professor

The IIHMR University, Jaipur

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INTERNSHIP COMPLETION CERTIFICATE

The certificate is awarded to

ASHIMA GABGOTRA

In recognition of having successfully completed her Internship in the department of

QUALITY

and her successfully completed her Project on

STUDY ON EVALUATION OF BIO-MEDICAL WASTE MANAGEMENT AT SANKARA EYE HOSPITAL, COIMBATORE

3RD FEBRUARY 2020 to 2ND MAY 2020

Organization: SANKARA EYE HOSPITAL, COIMBATORE

She comes across as a committed, sincere & diligent person who has a strong drive and zeal for learning

We wish her all the best for future endeavours

Ms Srini Karthikeyan
(Chief People Officer)

Mr Bharath Balasubramania
(President – Operations)

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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled a descriptive study on evaluation of Bio-Medical Waste Management at Sankara Eye Hospital, Coimbatore and submitted by Ashima Gabgotra with Enrolment No **IIHMR-U/01/2018-20/0723** under the supervision of **Dr. Pankaj Gupta** for award of MBA in Hospital and Health carried out during the period from **3rd February 2020 to 2nd May 2020** embodies my original work and has not formed the basis for the award of my degree, diploma, associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Signature

ABSTRACT

Background: One of the most important functions of a healthcare worker is proper management of Bio-medical waste that is generated in a healthcare facility. Its improper management poses risk to both human beings and environment. Also, it may invite a legal action against the healthcare worker as well as the hospital administration. Hence it is imperative to have a scientific approach towards waste management and handling. This study was carried out to evaluate quality of BMW management in a 550 bedded hospital at Coimbatore.

Methods: A checklist with 30 parameters related to various functions to be carried out at the source of generation of waste by a Healthcare worker for BMW management was used to collect data from various departments of the hospital. Observations form 14 such departments were collected. 5 visits were made in every department and then mean percentage score was calculated for each department and each category of waste management.

Results: It was found that the mean percentage score for the category 'Mutilation of waste' was lowest. Also, when a comparative analysis of both the paying and non-paying sections of the hospital was done the score for the category 'Segregation of waste' showed significant difference. Overall analysis of the hospital also revealed a significant difference between paying and non-paying sections.

Conclusion: It is concluded that more emphasis needs to be laid on 'Mutilation of waste' and 'Segregation of waste'. Hospital administrators need to formulate and implement a plan for providing appropriate training to healthcare workers so as to work upon the deficiencies found in the study

ACKNOWLEDGEMENT

At the outset I would like to articulate this project as a small journey which was a remarkable learning experience for me. The successful completion of this project is only possible due to extraordinary support, guidance, counselling and motivation from respectable staff of Sankara Eye Hospital, Coimbatore and IIHMR University.

I would like to extend my sincere regards to Mr. Bharath Balasubramanian (President-Operations, Sanakara Eye Hospital) for providing me such a great learning opportunity.

I would like to thank my hospital mentor Ms. Srini Karthikeyan (Chief people officer, Sanakara Eye Hospital) for guiding me at each and every step and for proving me opportunities of judicious learning by allotting me projects and always being open for open discussions. I would also like to thank Dr Rhea Sethi for showing keen interest in my project and being cooperative, helpful throughout my dissertation.

I would like to extend my sincere thanks to Dr. Pankaj Gupta (President, IIHMR University) for his constant support and encouragement that helped me to complete this project. Without his guidance this work would not have been materialized.

Lastly, I wish to thank all the people and my colleagues whose insights and experiences have shaped the content of this report.

I hope I can build upon the experience and knowledge that I have gained and make a valuable contribution in the future.

Thanking you

Ashima Gabgotra

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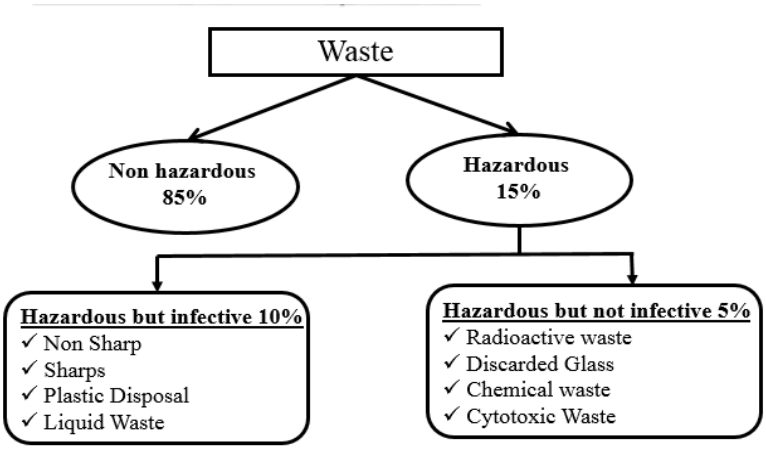
Introduction

Specific amount of waste is produced when healthcare activites are performed at different health care settings and such type of waste has the potential to harm both humans as well as the environment. This includes sharps, disposables, discarded wastes, syringes, anatomical waste, laboratory culture growths, body fluids, swabs etc. such type of waste is called as Bio-medical waste and the management of which is known as Bio-medical waste management.

<u>According to Bio-medical Waste (Management &Handling rules) 1998,</u>

Bio-medical waste is defined as the waste that is generated during the diagnosis, treatment or immunization of Human beings or animals, or in research activites pertaining thereto, or in the production or testing of biological or in health camps.

This waste produced from these health care units depends on various factors, some of which include the type of health care industry, occupancy and specialization of the unit, the number of reusable items that are utilized, availability of infrastructure and resources[1]. There is an urgent need for the healthcare workers to understand what Bio- Medical Waste is and how can they contribute in managing it. As stated by the World Health Organisation 85% of this waste is non-hazardous which includes more of household waste, 10% of it is hazardous as well as infectious and the remaining 5% is also hazardous but non-infectious i.e. chemical waste, pharma waste and radioactive waste[2]. Therefore, our primary focus is on this 10-15% bracket of waste.



It is projected that about 1 to 1.5 kg of waste is produced by 1 bed in 1 day in developed nations. A total of 200kg of waste is generated by clinics in a year. In India, 0.5 to 1kg of waste by 1 bed in 1 day is projected to be generated[3]. A switch from recyclable supply chain system for e.g. laundry, glass syringes to a non- returnable one-use supply chain system for e.g. disposable laundry, needles and syringes and plastics is observed, which has increased the amount of waste generation. Inappropriate dumping of bio-medical waste is causing communicable diseases like gastro-enteric infections, respiratory infections either with direct or in direct contact with blood and infectious body fluids. There is a strong proof of transferral of Hepatitis C, Hepatitis B and HIV/AIDS through bio-medical waste[4].

Insufficient and improper knowledge of waste handling has caused grave health repercussions. Also, a significant amount of damage to the environment is also seen[5].

Problems related to Bio-medical waste management

- Unsatisfactory implementation of Bio-medical waste (Management & Handling rules)
- Lack of segregation practices at source of waste creation
- Inadequate training among the healthcare providers
- Inadequat**e** bio-medical waste management will give rise to uncomfortable smell, environmental pollution and growth of different microorganisms which may further cause transferral of diseases like AIDS, typhoid, cholera and hepatitis.

  As per the Bio-medical waste (Management & Handling rules) proper waste management consists of the following steps namely: segregation at source of the waste generation, collection and storage of waste, treatment of the collected waste and then final transportation and disposal. Although a significant increase of awareness about the risks and inadequate management of BMW waste is seen still data from different studies which were done in India shows breach in knowledge of providers, gaps in their attitudes and practices that they follow to a great extent.

BACKGROUND

Healthcare activites restore health as well as saves a lot of lives but at the same time these activites result in the production of large quantities of waste that possess a risk to both Human beings as well as environment. Healthcare staff of our country are still not fully aware about proper BMW handling and disposal which is a collective effort and not an individual's work. Therefore, employee's must be trained for the prevention of exposure and unsafe disposal of waste.

RATIONALE

Generation of hospital waste is an unavoidable outcome of hospital care services and practices. The amount of waste generated has increased with a swift growth of hospitals both in public as well as private sectors in order to meet the population demand. Of the total amount of waste that is produced about 75- 80% of it is general and non-hazardous whereas the remaining 20-25% is hazardous. In India 550.9 tonnes of bio-medical waste is daily generated and is likely to reach 775.5 tonnes by 2022 from the current level. At the time of waste generation incomplete or almost no segregation is done. This waste carries both hazardous and infectious characteristics so it should be handled in a proper way. Therefore, regular assessment of waste management in healthcare settings could go a long way in solving this problem hence, it is imperative to have a scientific approach towards handling and managing hospital waste. So, the present study was carried out to evaluate the Bio-medical waste management practices in the hospital.

RESEARCH QUESTION

How is the quality of Bio-medical waste management practices at Sankara eye hospital, Coimbatore?

RESEARCH PROBLEM

Poor Bio-medical waste management in a hospital leads to increased rate of hospital infection which leads to dissatisfied patients. There is a strong evidence of transmission of hepatitis C & B and HIV/AIDS through bio-medical waste. Therefore, the problem statement for the study is decreased quality of BMW practices at the hospital.

AIM OF THE STUDY

The aim of the study was to evaluate the quality of Bio-medical waste management practices at Sanakara eye hospital, Coimbatore

RESEARCH OBJECTIVE

- To evaluate the current practices for Bio-medical waste management
- To determine the differences in Bio-medical waste management practices in the Paying and Non- paying sections of the hospital

LITERATURE REVIEW

Scholar Articles

- **Rajiv Kumar, Anil Kumar Gupta, Arun Kumar Aggarwal and Ashok Kumar in 2014** conducted a study on evaluation of bio-medical waste management in a tertiary care public hospital. the tool used in this study was an observation checklist which had 29 parameters all of which were related to the waste management practices followed at the hospital. This checklist was used after proper validation in 70 different areas of the hospital. Mean percentage score was calculated after making 6 visits in each department for each category of waste management. It was observed that the Mean percentage score of different departments varied. The score of 'Treatment rooms' was significantly lower than 'Operation Theatres' and 'Central waste collection points' for the parameter 'Mutilation of waste'. Therefore, it was concluded that for the parameter 'disinfection of waste' and 'mutilation of recyclable waste' more attention is needed by the hospital staff especially resident doctor

- **Nabarun Karmakar, Shi Sekhar Datta, Anjan Datta, Kaushik Nag, Kaushik Tripura, Partha Bhattacharjee in 2016** conducted a study on Knowledge, Attitude and Practice on Bio-medical waste management by hospital staff in Tripura. KAP values of 310 healthcare workers was tested. A questionnaire was distributed amongst the hospital staff which had 2 different sections - Section 1: which had questions related to their socio-demographic characteristics and Section 2: which included questions on Knowledge, Attitude and Practice about bio-medical waste management. About 75.6% of the doctors, 87.3% nurses had good knowledge and had good attitude towards bio-medical waste management. The practices were best observed in doctors 80.2%, then nurses 88.7% then lab technicians 70% and finally ward boys and girls which was about 68.2%. Practice of Bio- medical waste management is directly related to Knowledge and Attitude. Since the attitude and knowledge of the hospital staff is good so this can be used to improve their practices in order to avoid injuries. Therefore, in order to have an impactful and significant performance of staff on BMW management periodic training of the staff needs to be done.

- **Amit Dumka, Dr. Preeti Khanduri in 2018** conducted a Knowledge, Attitude and Practice study on Bio-medical waste management among nursing staff in Haldwani. In this study 205 nursing professionals from different institutions were interviewed. A questionnaire which was already tested by the researcher was given to the nursing staff. Out of 205 professionals about 96.59% of them already knew about Bio-medical waste management & Handling rules, 1998. About 27% of participants had undergone training but about 90% of them felt that regular training programme should be conducted. Only 48% had knowledge of maximum time limits for storage of waste but 28% answered that record maintenance was essential for BMW management. 88% said that BMW management is teamwork and not a single person's work. There is a need for rigorous training programme for the interns and monitoring is needed.

- **Ms. Sowmya V in 2013** conducted a study to assess the current system of practice, the knowledge and problems faced by healthcare workers with respect to waste management. The sample size consisted of 78 healthcare personnel working in all the primary health centres selected through complete enumeration. The practices that were followed at the hospital were checked by a checklist. About 48.71% of the healthcare staff had moderately adequate knowledge. Significant association was found between levels and age, designation, years of experience and training attended but there was no association between knowledge and gender.58.33% of the staff didn't do chemical disinfection before final disposal of the liquid waste into drains, whereas all the sharps before disposal were first treated with sodium hypochlorite. The current system of practice was neither so satisfactory nor it was unsatisfactory but was as per the guidelines to some extent.

- **Sourya Kanti Das, Romy Biswas in 2016** conducted a study to evaluate the awareness and practice regarding hospital waste management amongst hospital staff of a multi-speciality hospital. A pretested interview schedule was conducted among 198 hospital staff in different departments like Gynaecology, Surgery and Medicine. A checklist was used to monitor the activities for waste handling and it's management. The above-mentioned study showed small differences in knowledge of staff which adversely affected their practices. Regular training programs on BMW management should be conducted for all level of workers with strict implementation on guidelines.

RESEARCH METHODOLOGY

- **Location of the study**

  Sankara eye hospital, Coimbatore

- **Study design**

  This was a cross-sectional observation type of study which was conducted with the aim to evaluate the quality of Bio-medical waste management practices in the hospital.

- **Study area**

  This study was conducted under the Quality Department of Sankara eye hospital, Coimbatore

- **Study period**

  This study was conducted from 3rd February 2020 to 2nd May 2020 during which both primary and secondary data were collected

- **Method of research**

  Observational research method was used. All the Bio-medical waste management practices that are followed in the hospital were observed

- **Type of research**

  This is a quantitative type of research

- **Sources of data**

  Primary data collection was done with the help of observation checklist and personal interviews with the staff

  Secondary data was collected through Bio-medical waste (Management & Handling) Rules, 2016. Also, internet's various data sites like PubMed, google scholar, research gate etc. were used for the review of literature.

- **Sample size**

  Patient care areas where in all the 5 (Black, Yellow, Red, Blue and Puncture proof transparent box) waste collection dustbins were located, were included in the study. A total of 14 departments in the hospital were selected out of which 7 departments each from the Paying and Non-paying sections were included. Therefore, the sample size for the study was 14.

  The areas included were as follows:

S.No	PAYING SECTION	S.No	NON-PAYING SECTION
1)	Ground floor Operation Theatre	1)	Savitri Waney ward
2)	First floor Operation Theatre	2)	Krishna Arpanam ward
3)	Occuloplasty Operation Theatre	3)	Parmacharya ward
4)	Eye Emergency Area	4)	Laboratory
5)	Retina Consultation room	5)	Paediatric ward
6)	Cornea Consultation room	6)	A- SCAN room
7)	Cataract Investigation room	7)	Non-paying Operation Theatre

- **Data collection**

  In this project, the observational research method was used for data collection. Each area of the hospital was visited from 10:00 AM to 1:00 PM in morning and from 1:30 PM to 6:00 PM in evening. A total of 5 visits each were made in every department.

  Primarily, each department was studied under 4 broad categories: -

  a) Basic requirements for BMW management
  b) Collection and storage of waste
  c) Segregation of waste
  d) Mutilation of recyclable waste

- **Instrument**

Data was collected through an observation checklist, where in all the ‘desirable observations’ were scored 1 and all the ‘undesirable observations’ were scored 0.

- **Sampling**

Convenience/Purposive sampling was used as per the location of all the 5 different coloured dustbins.

- **Processing and Analysis of data**

The collected data was analysed in MS Excel. The score / total which was obtained in the number of visits (5) for each category of waste management was then divided by the same number (5) and consequently the percentage mean score was determined. The overall score determined for all observations in a particular area was added and finally, the mean percentage score for that area was computed. Same method of calculation was done for every category of waste and for all the areas in both the sections of the hospital.

For all the quantitative variables mean, standard deviation and confidence interval was calculated.

- **Inclusion and exclusion criteria**

Inclusion criteria: only those patient care areas where 5 proper color coded dustbins were present, were selected. A total of 14 such areas from the entire hospital were selected.

Exclusion criteria: areas where any all 5 of these dustbins were not present, were not selected for the study

RESULTS

I. Overall data

- **Category wise analysis**

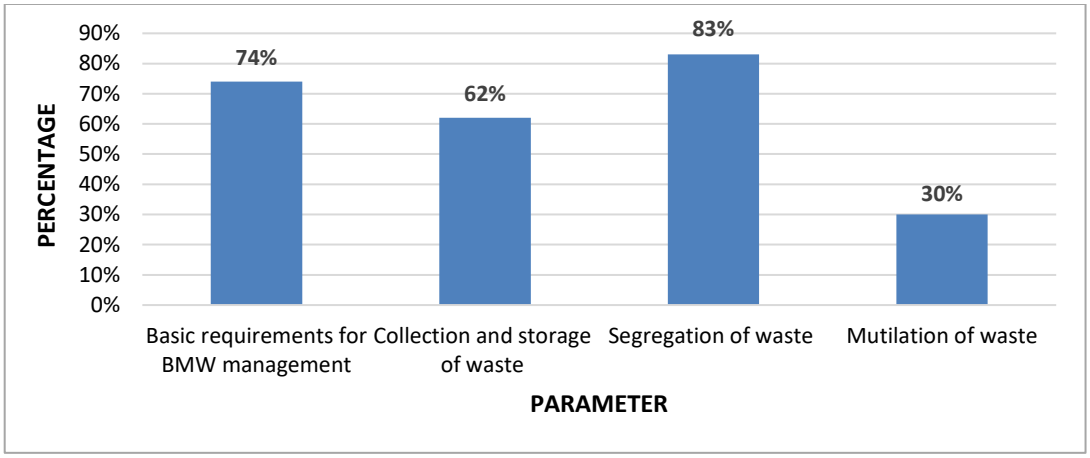


Fig.1: Category wise distribution of parameters

Out of all the 4 basic parameters for BMW management segregation of waste in the hospital was best practiced (83%) and at the same time mutilation of not well practiced (30%).

- **Overall category analysis of Paying and Non-paying section**

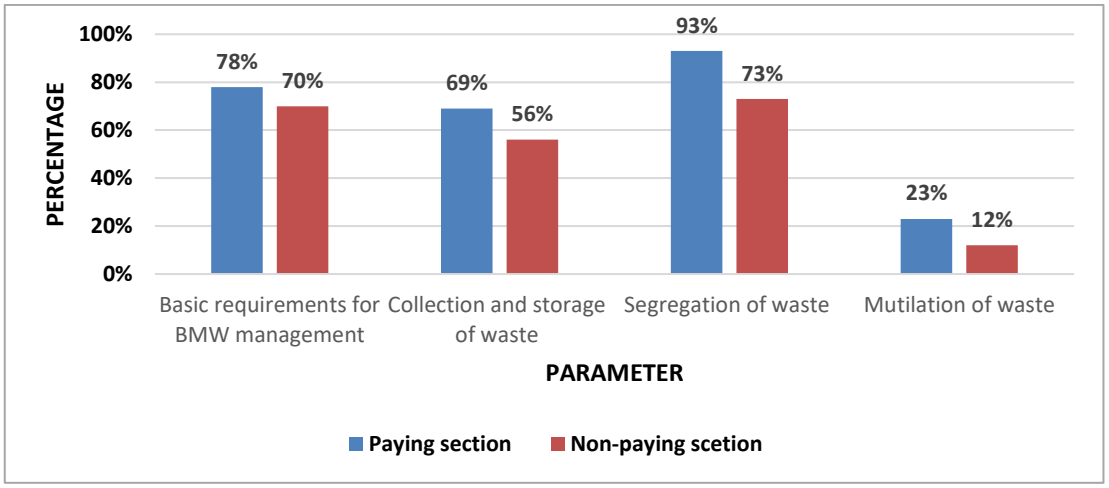


Fig.2: Category analysis of both paying and non-paying section

When examining paying and non-paying section for overall category analysis the highest difference was observed in segregation of waste in which the practices followed in paying section (93%) greatly varied than the non-paying section (73%).

- **Ward wise analysis**

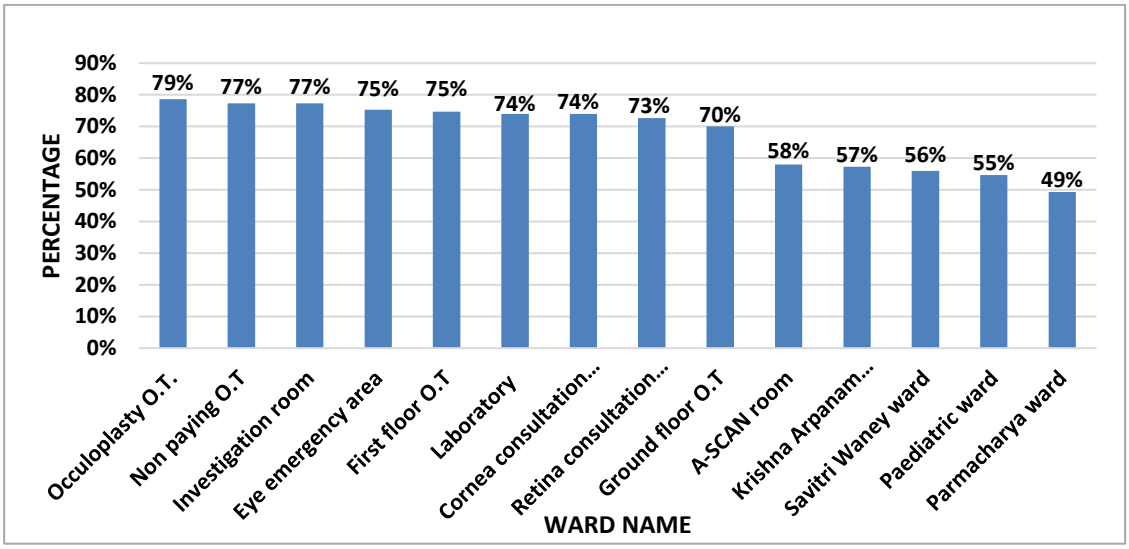


Fig.3: Ward wise comparison

In ward wise comparison Occuloplasty Operation theatre fared slightly better than other wards (79%).

- **Overall hospital analysis**

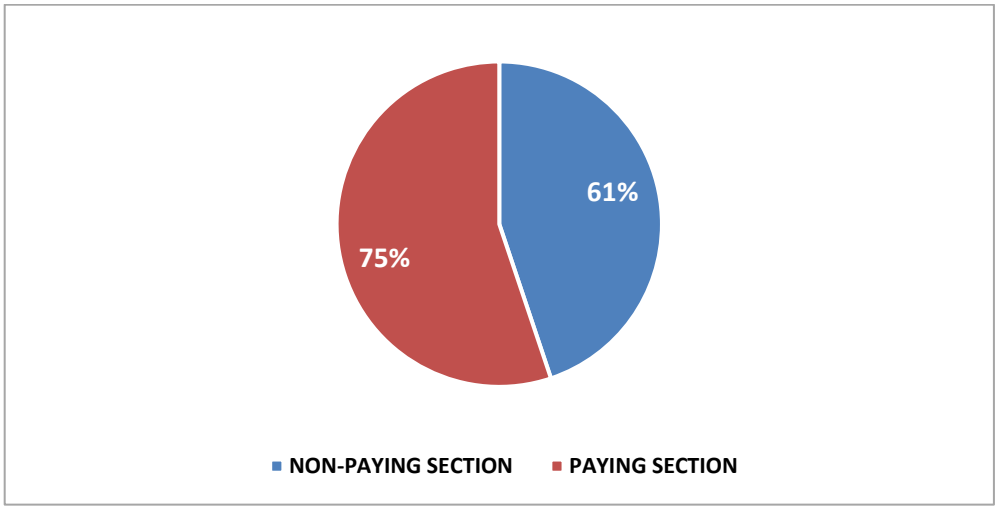


Fig.4: Overall hospital analysis

The BMW management practices followed in the paying section (61%) of the hospital were better than the non-paying section (75%).

- **Overall individual parameter analysis**

Sno	PARAMETER	TOTAL	SUM	PERCENTAGE
1)	Is the stored waste disposed in less than 48 hours ?	70	0	0%
2)	Is a calibrated weighing machine for BMW management available ?	70	0	0%
3)	BMW record register available?	70	0	0%
4)	Are used hypodermic needles destroyed?	70	0	0%
5)	Are the bins cleaned with soap and desinfectant solution regularly?	70	16	23%
6)	Are the waste bags well labelled and tied ?	70	21	30%
7)	Are used needles found bent ?	70	25	36%
8)	Are personal protective equipments like gloves, mask, cap etc worn by cleaners ?	70	26	37%
9)	Are used needles found re-capped?	70	27	39%
10)	Are the bins overfilled?	70	38	54%
11)	Does red bag contain only eye drop vials, IV sets and IV fluid bootles, plastic syringe without needle , gloves, Vacutainers and laboratory cultures ?	70	57	81%
12)	Does blue bag contain glassware (broken/discarded), Vials/ampules ?	70	57	81%
13)	Are posters to guide users displayed near the waste bins?	70	60	86%
14)	Does yellow bag contain only cotton dressings, tissues used for wiping eyes, contaminated linen, discarded medicines, ear buds , cap & mask ?	70	61	87%
15)	Is it scurely covered with yellow colored bag ? (YELLOW DUSTBIN)	70	61	87%
16)	Is it securely covered with blue colored bag ? (BLUE DUSTBIN)	70	62	89%
17)	Does black bag contain only general waste ?	70	62	89%
18)	Is a different box available? (WHITE BOX)	70	63	90%
19)	Is it puncture, leak and tamper proof ? (WHITE BOX)	70	63	90%
20)	Is it available in that area? (BLACK BOX)	70	63	90%
21)	Is it securely covered with black colored bag ? (BLACK BOX)	70	63	90%
22)	Is the container for sharps, needles, scalpes and blades puncture proof and is it covered ?	70	65	93%
23)	Is it available in that area ? (RED DUSTBIN)	70	69	99%
24)	Is it securely covered with red colored bag ? (RED DUSTBIN)	70	65	93%
25)	Is it available in that area ? (YELLOW DUSTBIN)	70	65	93%
26)	Is it available in that area? (BLUE BOX)	70	65	93%
27)	Is there any separate room for the storage of all the collected waste ?	70	70	100%
28)	Is the room properly ventilated?	70	70	100%
29)	Is bio hazard symbol imprinted over the bags?	70	70	100%
30)	Are the bags non chlorinated ?	70	70	100%

Fig.5: Score of individual parameters in descending order (overall hospital)

The summated mean score of each of the 30 observation parameters showed that it was 100% for parameters like " bags being chlorinated, bio hazard symbol being imprinted over them and for the presence of a separate room for storage of collected waste " and it was 0% for parameters such as " if the stored waste was disposed within 48 hours, if the hypodermic needles were destroyed".

II. Section analysis

A. Paying section

- **Mean percentage score of different categories**

Category of BMW managemnt	Ground floor O.T	First floor O.T	Occuloplasty O.T.	Eye emergency area	Retina consultation room	Cornea consultation room	Cataract investigation room
Basic requirements for BMW management	81%	87%	81%	71%	76%	81%	79%
95% Confidence Interval	72% to 90%	72% to 90%	72% to 90%	62% to 84%	65% to 85%	72% to 90%	66% to 88%
Collection and Storage	68%	50%	73%	73%	68%	85%	73%
95% Confidence Interval	53% to 83%	35% to 67%	61% to 89%	55% to 83%	52% to 82%	65% to 91%	59 to 87%
Segregation of waste	100%	92%	100%	84%	84%	92%	100%
95% Confidence Interval	100% to 100%	71% to 93%	100% to 100%	69% to 99%	69% to 99%	70% to 92%	100% to 100%
Mutilation of recyclable waste	40%	33%	40%	47%	53%	47%	60%
95% Confidence Interval	14% to 64%	8% to 58%	15% to 67%	27% to 79%	27% to 79%	21% to 73%	34% to 86%

Fig.6: mean percentage score of different categories of waste management in paying section at source of waste generation

In Ground floor O.T the scores for basic requirements for BMW management, collection and storage, segregation and mutilation of waste was 81%,68%,100% and 40%. For First floor O.T the score for these categories was 87%,50%,92% and 33% respectively; for Occuloplasty O.T the score was 81%,73%,100% and 40%, for Eye emergency it was 71%, 73%,84% and 47%; for Retina consultation room it was 76%, 68%,84% and 53%; for Cornea consultation room the score was 81%, 85%, 92% and 47% and for Cataract investigation room the score was 79%, 73%, 100% and 60% respectively

- **Individual parameter analysis of Paying section**

Sno	Parameter	N*	Mean score	% Mean score
1)	BMW record register available?	0	0	0%
2)	Is a calibrated weighing machine for BMW management available ?	0	0	0%
3)	Is the stored waste disposed in less than 48 hours ?	0	0	0%
4)	Are used hypodermic needles destroyed?	0	0	0%
5)	Are personal protective equipments like gloves, mask, cap etc worn by cleaners ?	12	0.34	34%
6)	Are the bins cleaned with soap and desinfectant solution regularly?	16	0.46	46%
7)	Are the waste bags well labelled and tied ?	19	0.54	54%
8)	Are used needles found re-capped?	19	0.54	54%
9)	Are used needles found bent ?	20	0.57	57%
10)	Are the bins overfilled?	23	0.66	66%
11)	Is it available in that area? (BLACK DUSTBIN)	32	0.91	91%
12)	Is it scurely covered with yellow colored bag ? (YELLOW DUSTBIN)	32	0.91	91%
13)	Is it available in that area ? (YELLOW DUSTBIN)	33	0.94	94%
14)	Is it securely covered with black colored bag ? (BLACK DUSTBIN)	33	0.94	94%
15)	Is a different box available? (WHITE BOX)	33	0.94	94%
16)	Is it puncture, leak and tamper proof ? (WHITE BOX)	33	0.94	94%
17)	Is it available in that area? (BLUE DUSTBIN)	34	0.97	97%
18)	Is it securely covered with blue colored bag ? (BLUE DUSTBIN)	34	0.97	97%
19)	Is it available in that area ? (RED DUSTBIN)	35	1.00	100%
20)	Is it securely covered with red colored bag ? (RED DUSTBIN)	35	1.00	100%
21)	Are posters to guide users displayed near the waste bins?	35	1	100%
22)	Is bio hazard symbol imprinted over the bags?	35	1.00	100%
23)	Are the bags non chlorinated ?	35	1.00	100%
24)	Is there any separate room for the storage of all the collected waste ?	35	1.00	100%
25)	Is the room properly ventilated?	35	1.00	100%
26)	Does black bag contain only general waste ?	35	1	100%
27)	Does yellow bag contain only cotton dressings, tissues used for wiping eyes, contaminated linen, discarded medicines, ear buds , cap & mask ?	35	1	100%
28)	Does red bag contain only eye drop vials, IV sets and IV fluid bootles, plastic syringe without needle , gloves, Vacutainers and laboratory cultures ?	35	1	100%
29)	Does blue bag contain glassware (broken/discarded), Vials/ampules ?	35	1	100%
30)	Is the container for sharps, needles, scalpes and blades puncture proof and is it covered ?	35	1	100%

Fig.7: Score of all parameters in descending order (for paying section)

The summated mean score of 30 observed parameters showed that it was 100% for parameters like “the placement of basic requirements leading to proper segregation of waste and if the posters to guide users were displayed properly” whereas it was 0% for parameters such as “ if the used needles were destroyed and if the waste was disposed of in 48 hours”.

- **Level of significance in difference of scores**

S.no.	Category	Level of significance of differencec in scores
1)	Basic requirements for BMW management	Not significant (p value: 0.99)
2)	Collection and storage	Not significant (p value: 0.86)
3)	Segregation of waste	Not significant (p value: 0.13)
4)	Mutilation of waste	Not significant (p value: 0.98)

Fig.8: Level of significance of difference in scores amongst different categories of BMW management amongst different areas

The difference between scores of different departments in the paying section showed that in all the 4 categories i.e. Basic requirements of BMW management, collection and storage, segregation of waste and mutilation of waste the score was not significantly different amongst various areas.

B. Non- paying section

- **Mean percentage score of different categories**

Category of BMW managemnt	Savitri Waney Ward	Pediatric Ward	Krishna Arpana ward	A- scan room	Parmacharya ward	Non paying O.T.	Laboratory
Basic requirements for BMW management	66%	73%	69%	66%	57%	81%	83%
95% Confidence Interval	55% TO 77%	63% to 83%	58% to 80%	56% to 78%	45% to 69%	73% to 89%	73% to 91%
Collection and Storage	55%	50%	55%	58%	53%	68%	55%
95% Confidence Interval	39% to 71%	34%to 66%	40% to 72%	38% to 78%	33% to 73%	54% to 80%	40% to 72%
Segregation of waste	60%	44%	68%	72%	64%	100%	100%
95% Confidence Interval	45% to 83%	24% to 64%	45% to 83%	54% to 90%	45% to 83 %	100% to100%	100% to 100%
Mutilation of recyclable waste	0%	0%	0%	0%	0%	47%	40%
95% Confidence Interval	0% to 0%	0% to 0%	0% to 0%	0% to 0%	0% to 0%	26% to 76%	14% to 66%

Fig.9: Mean percentage score of different categories of waste management in non-paying section at source of generation

In Savitri Waney ward the scores for basic requirements for BMW management, collection and storage, segregation of waste and mutilation of waste was 66%,55%,60% and 0% respectively. For Paediatric ward the score for these categories was 73%,50%,44% and 0% respectively; for Krishna Arpana ward the score was 69%,55%,68% and 0%, for A-SCAN room it was 66%, 58%,72% and 0%; for Parmacharya ward it was 57%, 53%,64% and 0%; for Non-paying O.T the score was 81%, 68%, 100% and 47% respectively and for Laboratory the score was 83%, 55%, 100% and 40% respectively.

- **Individual parameter analysis of non-paying section**

Sno	Parameter	N*	Mean score	% Mean score
1)	Are the bins cleaned with soap and desinfectant solution regularly?	35	0	0%
2)	BMW record register available?	35	0	0%
3)	Is a calibrated weighing machine for BMW management available ?	35	0	0%
4)	Is the stored waste disposed in less than 48 hours ?	35	0	0%
5)	Are used hypodermic needles destroyed?	35	0	0%
6)	Are the waste bags well tied ?	35	2	6%
7)	Are used needles found bent ?	35	5	14%
8)	Are used needles found re-capped?	35	8	23%
9)	Are personal protective equipments like gloves, mask, cap etc worn by cleaners ?	35	14	40%
10)	Are the bins overfilled?	35	15	43%
11)	Does red bag contain only eye drop vials, IV sets and IV fluid bootles, plastic syringe without needle , gloves, Vacutainers and laboratory cultures ?	35	22	63%
12)	Does blue bag contain glassware (broken/discarded), Vials/ampules ?	35	22	63%
13)	Are posters to guide users displayed near the waste bins?	35	25	71%
14)	Does yellow bag contain only cotton dressings, tissues used for wiping eyes, contaminated linen, discarded medicines, ear buds , cap & mask ?	35	26	74%
15)	Does black bag contain only general waste ?	35	27	77%
16)	Is it securely covered with blue colored bag ? (BLUE DUSTBN)	35	28	80%
17)	Is it scurely covered with yellow colored bag ? (YELLOW DUSTBIN)	35	29	83%
18)	Is it securely covered with black colored bag ? (BLACK DUSTBIN)	35	30	86%
19)	Is it securely covered with red colored bag ? (RED DUSTBIN)	35	30	86%
20)	Is a different box available? (TRANSPARENT BOX)	35	30	86%
21)	Is it puncture, leak and tamper proof ? (TRANSPARENT BOX)	35	30	86%
22)	Is the container for sharps, needles, scalpes and blades puncture proof and is it covered ?	35	30	86%
23)	Is it available in that area? (BLACK DUSTBIN)	35	31	89%
24)	Is it available in that area? (BLUE DUSTBIN)	35	31	89%
25)	Is it available in that area ? (YELLOW DUSTBIN)	35	32	91%
26)	Is it available in that area ? (RED DUSTBIN)	35	34	97%
27)	Is bio hazard symbol imprinted over the bags?	35	35	100%
28)	Are the bags non chlorinated ?	35	35	100%
29)	Is there any separate room for the storage of all the collected waste ?	35	35	100%
30)	Is the room properly ventilated?	35	35	100%

Fig.10: Score of all parameters in descending order

The summated mean score of each of the 30 observed parameters showed that it was 100% for parameters such as“ is bio hazard symbol imprinted over the bag, if the bags are non-chlorinated and if a separate room was present for storage of waste” whereas it was 0% for parameters like “ if the dustbins were cleaned with soap and disinfectant regularly and if the stored waste is disposed of in 48 hours”

- **Level of significance in difference of scores**

S.no.	Category	Level of significance of differencec in scores
1)	Basic requirements for BMW management	Not significant (p value: 0.52)
2)	Collection and storage	Not significant (p value: 0.99)
3)	Segregation of waste	Significant (p value: 0.0064)
4)	Mutilation of waste	Not significant (p value: 0.068)

Fig.11: Level of significance of difference in scores of different categories of BMW management amongst different areas

The comparison of scores of different areas showed that scores related to 'basic requirements for BMW management', 'Collection and storage' and 'Mutilation of waste' was not significantly different amongst various areas.

However, the score regarding 'Segregation of waste' was significantly different amongst various areas.

S.no	Category	Area	Level of significance using unpaired t-test
1)	Segregation of waste	Paediatric ward v/s Non-paying Operation Theatre	p value 0.0046
		Paediatric ward v/s laboratory	p value 0.0046

Fig.12: Level of significance of lower score in Paediatric ward v/s O.T and Paediatric ward v/s laboratory regarding segregation of waste

The score regarding segregation of waste was found significantly different between Paediatric ward and Non-paying O.T. The score in O.T(n:1, mean: 100%, 95% CI: 100% to 100%) was significantly higher than the paediatric ward (n:1, mean: 44%, 95% CI: 24% to 64%).

Also, the scores in segregation of waste was found significantly different between Paediatric ward and Laboratory. The score in Laboratory (n:1, mean: 100%, 95% CI:100% to 100%) was significantly higher than Paediatric ward (n:1, mean: 44%, 95% CI: 24% to 64%).

FINDINGS

- **Basic requirements for BMW management**
  - ✓ The basic infrastructure for proper management of waste at the source of generation was well established in the hospital
  - ✓ Adequate number of posters to guide users about waste management were located near waste collection points
  - Usage of personal protective equipment like gloves, mask and head mask by the house keeping staff was unsatisfactory

Fig 13. (a) PPE not worn by staff Fig 13. (b) PPE not worn

In the above figures (Fig 13. (a) and Fig 13. (b)) it can be seen that the house keeping staff were not wearing proper PPE while handling waste

- **Collection and storage**
  - ✓ All the bags that were used in the hospital had Biohazard symbol imprinted over them and they were non chlorinated
  - The bins were not cleaned with soap and disinfectant regularly, once the bags were full, they were emptied and without cleaning the dustbin a new bag was kept inside it.

    Dustbins were properly washed only when deep cleaning was done

- The bags were not tied once they were full and were fitted inside one another

Fig.14: Overloaded bags

- The dustbins were observed to be overfilled which often lead to littering

Fig.15: overfilled dustbins and spillage of waste

- # Mutilation of waste

  - Hypodermic needles were not destroyed and were found re-capped after each use
  - Rarely the needles were found bent

- **Segregation of waste**

  - The waste segregation practices were not followed particularly in the non-paying section of the hospital
  - Mixing of infected waste with general waste was observed

Fig. 16(a) Improper segregation **Fig.16 (b) Improper segregation**

Fig. 16(c) Improper segregation

It was observed that the hospital waste was not segregated in appropriate waste bags (Fig. 16 (a), 16 (b) and 16 (c)).

CONCLUSION

The current study was done to assess the practices followed for bio-medical waste management in different areas of the hospital with the help of an observation checklist. It was found that more importance needs to be given to the categories of ‘mutilation of waste’ and ‘segregation of waste’. Additionally, in the non-paying section better practices are to be followed by the staff for ‘segregation of waste’ specially in Paediatric ward and Savitri Waney ward. In order to work upon the gaps that were found in the study hospital administrators need to compose and process a plan to provide adequate training to the healthcare workers.

RECOMMENDATIONS

- Establishing a bar code system for waste bags or containers which are to be sent out of the hospital premises
- Electrically operated needle cutters can be used to mutilate needles and nozzle of used syringes
- BMW bins should be marked to indicate the level till where they should be filled so as to avoid spillage of waste
- Specific labels can be put on the waste bins to specify the type of waste to be put into them
- A checklist can be placed at every ward, and the time when the waste is collected at source it should be marked by the ward in charge. And by the end of every week these lists can be collected and then analysed by the committee
- A manual can be prepared specifying the DO'S and DONT'S of waste management which can be circulated in all the waste generation areas. This manual should follow the recent norms as set by the Central Pollution Control Board for Bio-medical waste (Management & Handling)
- Compulsory training should be frequently conducted for the staff who are directly or indirectly associated with management and handling of waste

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APPENDIX

Observation checklist

Name of ward/area			Time of observation
S No.		Parameters	Date of observation
A)		BASIC REQUIREMENTS FOR BMW MANAGEMENT	
1)	BLACK DUSTBIN	Is it available in that area?	
2)		Is it securely covered with black colored bag ?	
3)	YELLOW DUSTBIN	Is it available in that area ?	
4)		Is it scurely covered with yellow colored bag ?	
5)	RED DUSTBIN (recyclable)	Is it available in that area ?	
6)		Is it securely covered with red colored bag ?	
7)	BLUE DUSTBIN	Is it available in that area?	
8)		Is it securely covered with blue colored bag ?	
9)	WHITE box (TRANSLUCENT)	Is a different box available?	
10)		Is it puncture, leak and tamper proof ?	
11)		Are posters to guide users displayed near the waste bins?	
12)		Is a calibrated weighing machine for BMW management available ?	
13)		BMW record register available?	
14)		Are personal protective equipments like gloves, mask, cap etc worn by cleaners ?	
B)		COLLECTION & STORAGE	
15)		Is bio hazard symbol imprinted over the bags?	
16)		Are the bags non chlorinated ?	
17)		Are the bins cleaned with soap and desinfectant solution regularly?	
18)		Are the bins overfilled?	
19)		Is the stored waste disposed in less than 48 hours ?	
20)		Is there any separate room for the storage of all the collected waste ?	
21)		Is the room properly ventilated?	
22)		Are the waste bags well labelled and tied ?	
C)		SEGREGATION OF WASTE	
23)		Does black bag contain only general waste ?	
24)		Does yellow bag contain only cotton dressings, tissues used for wiping eyes, contaminated linen, discarded medicines, ear buds , cap & mask ?	
25)		Does red bag contain only eye drop vials, IV sets and IV fluid bootles, plastic syringe without needle , gloves, Vacutainers and laboratory cultures ?	
26)		Does blue bag contain glassware (broken/discarded), Vials/ampules ?	
27)		Is the container for sharps, needles, scalpes and blades puncture proof and is it covered ?	
D)		MUTILATION OF RECYCLABLE WASTE	
28)		Are used hypodermic needles destroyed?	
29)		Are used needles found re-capped?	
30)		Are used needles found bent ?	