Part 1

INTERNSHIP REPORT

INTRODUCTION

About the organization

Dr. Baba Saheb Ambedkar Hospital is a 500 bedded multi-disciplinary multi specialty general hospital with facilities of super specialties. The hospital is located on 29.4 acres of land, and is situated at Sector-6, Rohini for providing health care services to the residents of North and North West Delhi. This hospital is biggest hospital in North-west Delhi catering to the population of 10 lacs. This hospital started in august 1999 under Directorate of Health services but now working directly under ministry of Health and family welfare, Govt. of NCT, Delhi since 01.08.2003. This hospital provides free medical care to all patients who seek for the same.

Figure 1: Dr Baba Saheb Ambedkar Hospital, Sector-6, Rohini , New Delhi

Service provided

1. **Ambulance sevice**

   The hospital has ACLS Ambulance to transport seriously ill patients. Two Ambulances (Maruti Vans) transferred from DHS and one for Blood Bank. The ambulances are used for transferring patients to higher centers.

2. **Diagnostic services**

The hospital has following services:

a. Micro-Biology Bacterial Culture and sensitivity, serology
b. Pathology and Bio-Chemistry Blood Test
c. X Ray
d. Ultra sound
e. Color Doppler
f. Pulmonary Function Test
g. ECG
h. TMT
i. Echo Cardiography
j. Holter monitoring
k. Audiometry
l. Physiotherapy and Occupational Therapy
m. NIBP - Diagnostic service to assess and monitor patients and blood pressure in ambulatory situations
n. Uro dynamics System

3. **Contractual services**

Many services have been outsourced as per the guidelines of the government from time to time. These are

a. Security
b. Kitchen
c. Sanitation
d. Laundary
e. Pest control

4. **Public Health Service**

The hospital takes an active part in implementation of the public health programmes of the government namely

a. Leprosy
b. Pulse polio
c. Immunization

d. Stree Sakti
e. Cancer Control and Awareness

5. OPD

This Hospital has various departments to provide quality care, smart and innovative healthcare to the patients in a friendly environment.

a. Medicine
b. Surgery
c. Gynecology
d. Pediatrics
e. Orthopedics
f. Chest Clinic
g. Eye
h. ENT
i. Dermatology
j. Psychiatric
k. Dental
l. ART
m. VCTC (ADIC CLINIC)
n. Ayurvedic
o. Homeopathic
p. Malaria clinic
q. PPCT
r. Introduction
s. Family planning
t. Urology
u. Forensic

6. Blood Bank

Following services are available under blood bank

a. Blood Collection
b. Blood & Components preparation & Storage (FFP, Packed Redcells, Platelets)

c. Issue of Blood & Components. (24 hrs X 7 Days)
d. Platelet – Pheresis
e. Testing of all blood units for infectious markers against – HbsAg, HCV, HIV I & II Abs, Syphilis & Malaria
f. Voluntary Blood Donation camps.

7. Operation Theatre

12 OTs are functional in the main OT block out of which 9 OTs for routine elective surgeries. For Maternity services, Two dedicated OT tables are available in Maternity block and two dedicated OT tables are available for emergency services.

8. Forensic Medicine

The Department of Forensic Medicine has become fully functional with effect from 21-2-2011. The department handles all sorts of medico legal cases like postmortems, injury evaluation, age estimation etc.

9. Public utility services

a. Parking
b. Chemist Shop
c. Canteen
d. Future plan to provide space for the bank.

10. CCU

People with life-threatening HEART CONDITIONS like heart attack (MI) heart failure (HF) rhythm disturbances require isolated personalised and intensive coronary care units. A specially trained health professional give constant attention to the patients in critical condition. It is located at the second floor of this Hospital.

11. **ICU**

The intensive care unit (ICU) is a specialized department in this hospital that provides intensive care medicine. This hospital has designated intensive care areas for certain specialities of medicine. The ICU team of this hospital is highly qualified with experience and is capable of dealing with complicated surgical cases. It is located at the second floor of this Hospital.

12. Educational activities

This Hospital is actively participating in the Education and Training activities. Medical Council of India has recognized Dr. BSA Hospital for internship training and the same has been started w.e.f. July, 2004. Fresh accreditation from National Board of Examination has been obtained to start DNB courses in Dr BSA hospital

13. Special clinic

This Hospital has various departments to provide quality care, smart and innovative healthcare to the patients in a friendly environment.

14. Emergency service

The Emergency department of this hospital is providing emergency healthcare to all those who present with acute emergencies. The objective of this Department is to assess the patient satisfaction in Emergency Unit by evaluating the health care delivery system.

Table 1: Average Daily workload handled by hospital

OPD Attendance	3850
No. of X-Rays	250
No. of Lab Tests	2500
Total number of operation (minor + major)	150
Casualty Attendance	350
MLC	25-50
Ultrasound	40
ECG	85

Dr. Baba Saheb Ambedkar Hospital

Figure 2: Organisation Chart

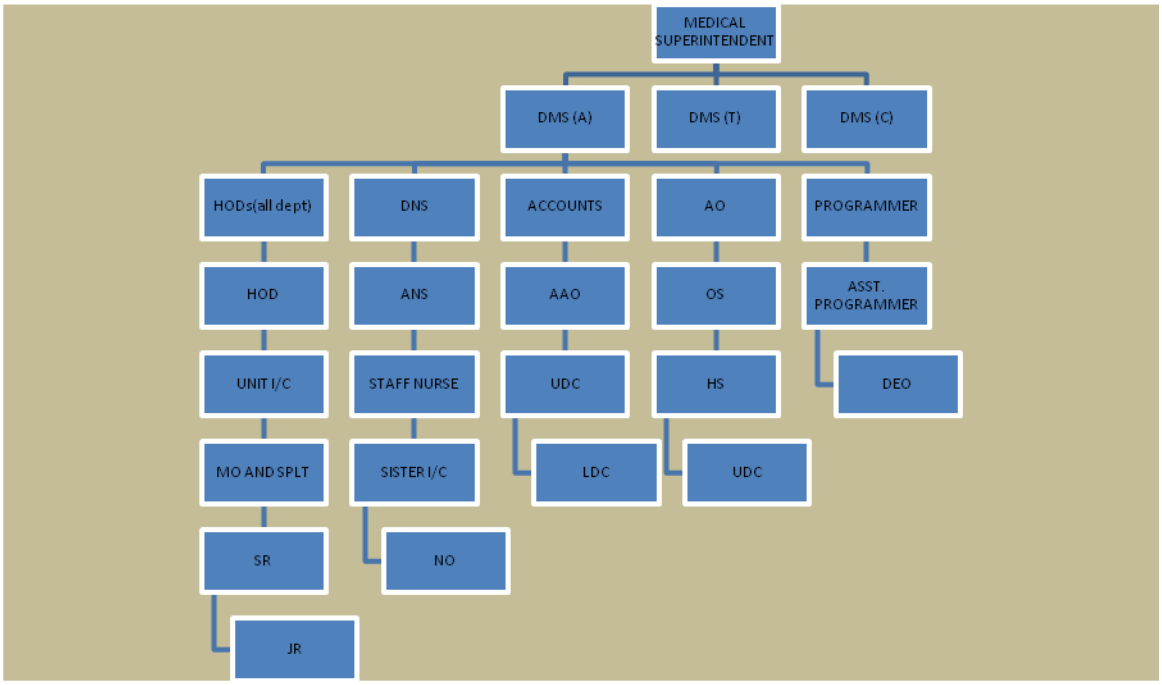

Table 2: Staff strength of the hospital

No. of Doctors	223
No. of Nurses	268
No. of paramedic staff	97
Ministerial staff	36
Group D staff	134

Managerial task performed

As my internship programme in the hospital, I was engaged with activities related to bio medical waste management.

As management of Biomedical waste is an overall responsibility of all the employees and not the sole responsibility of government. All the generators of bio–medical waste should

adopt universal precautions and appropriate safety measures while doing therapeutic and diagnostic activities and also while handling the bio-medical waste.

The hospital was conducting a financial audit for biomedical waste for which survey was conducted. It helped in evaluating types and quantity of biomedical waste generated so that overall expense could be justified. The aim of the survey was to

i. Differentiate the type of waste
ii. Quantify the waste generated
iii. Determine the points of generation and type of waste generated at each point
iv. Determine the level of generation and disinfection within the hospital
v. To find out the type of disposal carried

Task assigned:

1. Evaluate the current practise
2. Determine the points of generation and type of waste generated at each point

To perform the task assigned following departments were visited and their biomedical waste practise was noted.

1. OPD's- Orthopaedics, Medicine, Surgery, Gynaecology, Paediatrics, Eye, ENT, Dental.
2. Main OT, Labour room, Maternity OT, Emergency OT, Causality, ICU, CCU, NICU
3. X-ray, Lab, Radiology, blood bank
4. Wards- Paediatrics, Orthopaedics, Surgical, Medicine (male & female), Gynaecology.

Reflective learning

Issues observed during the visit

1. The segregation of waste is not proper at time of generation
2. Have three color coded bags but segregation not followed properly. General waste is mixed with biomedical waste which increases the burden to treat total amount of biomedical waste
3. Personal protective equipment and accessories are not provided

4. General awareness among staff is lacking
5. Ignorance on part of staff even if they know the proper method of segregation
6. Same trolley used to carry both red and yellow bags for internal transportation
7. Posters related to handling of bio medical waste not seen
8. No manual on bio medical waste is being provided to the staff
9. Dumping of general waste near wall corners
10. At some places needle destroyer was not working
11. There is lack of supplies of basic equipments to the front line waste handlers.

Suggestions

It should be ensured that:

1. Drivers, collectors and other handlers are aware of the nature and risk of the waste.
2. Written instructions, provided regarding the procedures to be adopted in the event of spillage/ accidents.
3. Protective gears are provided and instructions regarding their use are given.
4. Workers are protected by vaccination against tetanus and hepatitis B
5. The hospital must have well planned awareness and training programme for all categories of personnel including administrators (medical, paramedical and administrative). Training should be conducted to all categories of staff in appropriate language/medium and in an acceptable manner.
6. Adopt procedures and policies for proper management of waste generated, the mainstay of which is segregation to reduce the quantity of waste to be treated.

Part 2

DISSERATATION REPORT

INTRODUCTION

Hospital is a place where patients with various infections are treated and in due course lot of infectious waste is generated. This waste is referred to as Biomedical waste (BMW). Biomedical waste, also known as infectious waste or medical waste is defined as solid waste generated during the diagnosis, testing, treatment, research or production of biological products for humans or animals. Biomedical waste includes syringes, live vaccines, laboratory samples, body parts, bodily fluids and used sharp needles, cultures and lancets etc.

Bio-medical waste differs from hospital waste in the sense that it is "any solid, fluid or liquid waste, including its container and any intermediate product. These products could be generated during the diagnosis, treatment of immunization of human beings or animals, in research pertaining there to, or in the production or testing of biological and the animal waste from slaughter houses or any other like establishments. As per the reports from developed countries approximately 1-5 kgs of waste is generated per bed per day, whereas 1-2 kgs / bed / day is the figure from developing countries. In India it is estimated to be 2.0 kgs /bed/day. Improper handling of solid waste in the hospital may increase the airborne pathogenic micro-organisms, which could adversely effect the hospital environment and the community as well.

The improper management of biomedical waste causes serious environmental problems in terms of air, water and land pollution. The nature of pollutants can be classified biological, chemical and radioactive. Environmental problem can arise during the generation and from the process of handling treatment and disposal of biomedical waste. Although pollution cannot be mitigated completely it can be reduced to a large extent if measures are taken for proper handling management of biomedical waste.

It is quite a disquieting irony that Healthcare settings intended to provide medical treatment and care for ill, today on the contrary are increasingly turning out to be potential centers for spreading diseases. The reason being improper handling and management of biomedical waste associated with lack of hospital sanitation, as also the lack of awareness about the adverse consequences. Although the medical fraternity is well informed as far as health care

matters are concerned, paradoxically, knowledge related to health impacts of environment mismanagement of wastes is not common.

The Biomedical Waste generated could cause serious hazards to health and environment in case of indiscriminate management. All the hospital personnel are at a risk to get many fatal infections like HIV, HBV, HCV and injuries by these infectious materials. To avoid these hazards, discriminate waste management system should be implemented in every hospital, clinic, Nursing Home etc.

The Objectives and rationale of BMW management are mainly to reduce waste generation, efficient collection, handling and disposal in such a way that it controls spread of infection and provides safety to employees working in the system and community at large. Accordingly, waste is required to be treated and disposed of in accordance with schedules prescribed. The basic elements is to recognize the waste, identify where waste is generated and determine the cause of generation, plan disposal of the waste in a scientific manner so as to render it environmentally non-hazardous and eliminate the source of infection.

When the concern is so much about the medical waste there is a need for such a ruling, the health care workers ought to understand what is actually biomedical waste and the waste connected with the hospital. According to a WHO report around 85% of the hospital wastes are actually nonhazardous, 10% are infective (hence, hazardous), and the remaining 5% are non infectious but hazardous (chemical), pharmaceutical and radioactive

The hospital waste when improperly disposed, poses a deadly menace to public health. We can hardly underestimate the new threat emerging from clandestinely repackaged item from the hospital waste in form of various serious infections like AIDS, Hepatitis, TB etc. to name a few. Infection risk from hospital waste is related to the number and types of microbes present; their ability to survive in the environment and their probability that those organization will reach a susceptible site.

Classification of Hospital waste

1. **General waste:** Largely composed of domestic or house hold type waste. It is non-hazardous to human beings, e.g. kitchen waste, packaging material, paper, wrappers, plastics.
2. **Pathological waste:** Consists of tissue, organ, body part, human foetuses, blood and body fluid. It is hazardous waste.
3. **Infectious waste:** The wastes which contain pathogens in sufficient concentration or quantity that could cause diseases. It is hazardous e.g. culture and stocks of infectious agents from laboratories, waste from surgery, waste originating from infectious patients.
4. **Sharps:** Waste materials which could cause the person handling it, a cut or puncture of skin e.g. needles, broken glass, saws, nail, blades, scalpels.
5. **Pharmaceutical waste:** This includes pharmaceutical products, drugs, and chemicals that have been returned from wards, have been spilled, are outdated, or contaminated.
6. **Chemical waste:** This comprises discarded solid, liquid and gaseous chemicals e.g. cleaning, housekeeping, and disinfecting product.
7. **Radioactive waste:** It includes solid, liquid, and gaseous waste that is contaminated with radionuclide generated from in-vitro analysis of body tissues and fluid, in-vivo body organ imaging and tumour localization and therapeutic procedures.

Some facts

Situation in the developing countries, the Sulabh study team[10] revealed that

1. 66% of the rag pickers showed a definite instances of injury or cut while dealing with medical waste
2. Syringes, needles, glass; plastic materials are being recycled on large scale without standard treatment.
3. There is definite impact of medical waste on health care establishment, environment and health
4. The money can be saved by reduction of HAI (hospital acquired infection) is much more, than what would be spent on HAI control activities. (Patients with HAI spends 10 days extra of hospitalization compared to similar patients without HAI)
5. Rising incidence of HIV infection also stresses on the requirement of an integrated approach.
6. An integrated approach is required to be implemented
    a. To achieve sound hospital waste management
    b. To develop cost effective better technology to waste management
    c. To reduce quantity of waste undergoing incineration

Reason for unsatisfactory status

The various important reasons are

- There is absence of qualitative and quantitative scientific data regarding various components of hospital waste management, like collection, storage, transfer, treatment, disposal, management and lack of epidemiological data of medical waste management.
- Waste handling is left to poorly educated low category of workers operating without adequate guidance and supervision.
- Lack of awareness regarding well defined national policy and regulation on medical waste management.
- Lack of availability of updated technologies.
- Lack of accountability.

Rules framed for the BMW management

Realizing the seriousness of the problem associated with the poor management of the bio-medical wastes, the Ministry of Environment and Forests (MoEF), Govt. of India, notified the Bio-Medical Waste (Management and Handling) Rules in July 1998 under the Environment (Protection) Act, 1986, through a Gazette notification [S.O. 630(E)]. Thereafter, the Bio-Medical Waste (Management and Handling) Rules were amended twice in the year 2000 and the last amendment was made in the year 2003. The first amendment was published on 6th March 2000 vide S.O. 210(E), the second amendment was published on 2nd June 2000 vide the Gazette Notification S.O. 545(E) and third Amendment was published on 17th September 2003 vide Gazette Notification S.O. 1069(E). The main objective of the rules are to ensure proper segregation, collection, transportation and disposal of the infectious BMW in order to safe guard the public health of the society.

Some of the salient features of these rules are as follows:

- These rules are applicable to the Hospitals, Nursing Homes, Veterinary Institutions, Pathological Laboratories and Clinics, Blood Banks, etc. generating bio-medical wastes.
- The State Pollution Control Board/Pollution Control Committee is the prescribed authority for the implementation of the Rules in the States/Union Territories.
- Every occupier (bedded/ non-bedded) generating, collecting, receiving, storing, transporting, treating, disposing and/or handling BMW in any manner, except such occupier of clinics, dispensaries, pathological laboratories, blood banks providing treatment/service to less than 1000 (one thousand) patients per month, shall make an application in Form-I to the prescribed authority for grant of authorization.
- The prescribed authority shall on receipt of Form-I make such enquiry as it deems fit and if it is satisfied that the applicant possesses the necessary capacity to handle the BMW in accordance with the Rules, grant or renew an authorization as the case may be.

- The onus of the treatment of the BMW lies squarely with the occupier of the health care unit. Treatment is to be done on their own or by joining the Common Bio-medical Waste Treatment Facility available in the area.
- The Municipal body of the area cannot pick up and transport untreated bio-medical wastes generated in the hospital and nursing homes. They can only collect and dispose duly treated BMW for disposal at municipal dump site.
- The BMW shall not be stored beyond 48 hours without permission of the appropriate authority.
- The occupier of the health care unit needs to maintain the records related to the generation, collection, reception, storage, transportation, treatment, disposal and/or any form of handling BMW.
- Every occupier/operator shall submit an annual report to the State Pollution Control Board in Form-II by 31st January every year. The State Pollution Control Board shall send this information in a compiled form to the CPCB by 31st March every year.

RATIONALE OF THE STUDY

Hospital waste management is a part of hospital hygiene and maintenance activities. In fact only 15% of hospital waste i.e. "Biomedical waste" is hazardous, not the complete. But when hazardous waste is not segregated at the source of generation and mixed with nonhazardous waste, then 100% waste becomes hazardous. The question then arises that what can be done to improve hospital waste management practise. What is the need or rationale for spending so much resource in terms of money, man power, material and machine for management of hospital waste? The reasons are:

1. Injuries from sharps leading to infection to all categories of hospital personnel and waste handler.
2. Nosocomial infections in patients from poor infection control practices and poor waste management.
3. Risk of infection outside hospital for waste handlers and scavengers and at time general public living in the vicinity of hospitals.
4. Risk associated with hazardous chemicals, drugs to persons handling wastes at all levels.
5. "Disposable" being repacked and sold by unscrupulous elements without even being washed.
6. Drugs which have been disposed of, being repacked and sold off to unsuspecting buyers.
7. Risk of air, water and soil pollution directly due to waste, or due to defective incineration emissions and ash.

SCOPE OF THE STUDY

The survey done in the study includes Doctors, Nurse and Paramedic staff of the hospital which are the main generators and handlers of biomedical waste. The study conducted will help the management of the hospital to have an overview about the current biomedical waste management practice in the hospital.

PROBLEM STATEMENT

It has been emphasized that for proper disposal of biomedical waste mere introduction of laws is not sufficient. Lot more is needed to be done to actually improve the practice of biomedical among hospital staff. The awareness of these laws among the general public as well as development of these policies and enforcement that respect those laws is essential.

Hence the current status of employee's awareness about biomedical waste management will help the authorities to create strategy for improving the status in future. For proper biomedical waste (BMW) management, lot of seminars, workshops and symposia are needed for the awareness of the medical and paramedical staff. Therefore I feel that there is a need to conduct a study to measure the awareness amongst the hospital staff, about biomedical waste management, so that policies for improved status can be formulated in future.

LIMITATION OF THE STUDY

- Previously documented data was not accessible due to the confidentiality of the data. Hence, the quantum of waste generated could not be calculated.
- Biases in data may have occurred due to one of the following reasons
    - The staff considered the survey as a test, thus answered after discussing among themselves.
    - Attempts were made to hide their lack of awareness by giving positive response to most of the questions.

REVIEW OF LITERATURE

The modern hospitals and health care institutions including research centres use a wide variety of drugs including antibiotics, cytotoxics, corrosive chemicals, radioactive substances, which ultimately become part of hospital waste. All round technological progress has increased availability of health related consumer goods, which have the propensity for production of increased wastes.

The issue of improper Hospital Waste Management in India was first highlighted in a writ petition in the Supreme Court and subsequently pursuant to the directives of the court. The Ministry of Environment and Forests, Govt. of India notified the Bio-Medical Waste (Management and Handlings) Rules on 27th July 98; under the provisions of Environment Act 1986. These rules have been framed to regulate the disposal of various categories of Bio-Medical Waste so as to ensure the safety of the staff, patients, public and the environment.

In order to ensure proper and safe management of biomedical waste, all those involved in generation of such waste must be aware of proper handling and management techniques for which they require to have training, guidance and supervision. Organized structured training programs, improvement in cleanliness standards coupled with strict enforcement of laws will go a long way in improving the overall biomedical waste management scenario in every hospital. Health care workers have an important opportunity to manage the environmental effects of their practice. Their efforts may seem small, but each step builds a base of sound behavior and thinking that are necessary for the success of the whole. (1)

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Bio-medical waste management programme cannot successfully be implemented without the willingness, devotion, self-motivation, cooperation and participation of all sections of employee of any health care establishment. (1) Therefore assessment of knowledge, attitude and practice of bio medical waste management provide a base for healthcare establishments to provide necessary assistance to its employees

In a study conducted to assess the awareness about bio medical waste among healthcare personnel of some important medical centre in Agra by Shalini Sharma states that awareness

about bio medical waste (Management & Handling) rules, 1998 was quite low and very few had received special training on this topic. The study was divided into four strata i.e. apex Government hospitals, Government and non Government FRU (first level referral units), private health care facilities and corporate health care facilities. It was found that among all personnel in apex government hospitals only 33.21% employees were aware of the Biomedical waste (Management & Handling) Rules, 1998. Similarly was the status of awareness in other healthcare facilities i.e. 17.07% in private health institutions, 29.09% in government and non-government FRU and zero percent in corporate healthcare facilities. Also it was found that very few were aware of the risk associated with biomedical waste handling and neither they did reporting to higher authorities in case of any adverse event. It was observed that neither government funded nor the privately managed healthcare institutions were working in accordance with the act. (1)

In a similar study conducted to assess the awareness and reported practice of biomedical waste management among grade 2 attenders and nursing assistants in Medical College Hospital, Trivandrum, it was found that attenders and nursing assistants do not show much variation either in their awareness or practice. Though their level of knowledge seems inadequate, their performance seems considerably above average. 44% of the total workers have attended awareness class earlier. Also parameters such as educational status and period of service are found to have no influence on the efficiency of their practice. Though 97% of the study population was aware of the implementation of biomedical waste management & 88% was aware of its segregation only 72% of the study population was aware of the correct segregation through colour coding. It was also observed that the study population was well aware of the practice of universal precautions. While 100% of the study population practice handwashing following handling of waste & 99% use barrier methods (gloves, mask, etc), 95% was found to adopt precautions following a prick during handling of waste. (2)

A major issue related to current Bio-Medical waste management in many hospitals is that the implementation of Bio-Waste regulation is unsatisfactory as some hospitals are disposing of waste in a haphazard, improper and indiscriminate manner. Lack of segregation practices results in mixing of hospital wastes with general waste making the whole waste stream

hazardous. Inappropriate segregation ultimately results in an incorrect method of waste disposal. Proper collection and segregation of biomedical waste are important. At the same time, the quantity of waste generated is equally important. A lesser amount of biomedical waste means a lesser burden on waste disposal work, cost-saving and a more efficient waste disposal system.

Safe and effective management of waste is not only a legal necessity but also a social responsibility. Lack of concern, motivation, awareness and cost factor are some of the problems faced in the proper hospital waste management. Clearly there is a need for education as to the hazards associated with improper waste disposal. Lack of apathy to the concept of waste management is a major stymie to the practice of waste disposal. (3)

In a study conducted by Gayathri V Patil, Biomedical solid waste management in an Indian hospital: a case study, it was observed that the personnel working under occupier were trained to take adequate precautionary measures in handling these bio-hazardous waste materials and therefore that staff was well aware of biomedical waste management practice. As a result the hospital was following a proper process of segregation, collection, transport, storage and final disposal of infectious waste. It is therefore seems mandatory for each and every employee to be well acquainted with the safe practice and follow the same. The study further suggested that periodic meetings should be conducted involving administrative and maintenance staff who are directly or indirectly involved with waste management in order to share and discuss the technical or practical difficulties and provide suggestions that may be specific to a particular hospital and region. (4)

OBJECTIVE OF THE STUDY

General objective:

Assess the knowledge, Attitude and Practice (KAP) of Doctors, Nurses and Paramedical staff about biomedical waste management

Specific objective 1:

Know the existing Biomedical Waste management practice in the hospital

Specific objective 2:

Evaluate the KAP based on the data collected through structured questionnaire

DATA AND METHODS

METHODOLOGY

Study area:

The study area was Dr Baba Saheb Ambedkar Hospital, Rohini, New Delhi

Study design:

The research methods used were qualitative and quantitative analysis.

COLLECTION OF DATA

Type of data:

Primary data was collected through direct observation and a structured questionnaire (Annexure 2). In the questionnaire various components were included to assess knowledge, attitude and practice of biomedical waste. The questionnaire was pretested on a sample of 10 staff.

A simple random sampling method was used. Sample variable was selected randomly from all departments of the hospital. The population of the study was 588 (total of doctors, nurses and paramedic). Sample size was kept 120 which represent 20% of the study population. The sample was divided equally among Doctors, Nurse and Paramedics.

Data collection procedure:

Initial permission was obtained from the medical superintendent of the hospital. The questionnaire was distributed among the on-duty doctors, nurses and paramedic. The forms were collected on the same day. Before asking them to fill the form, the employees were given information about the aim of the study and assured of confidentiality.

Tool used for analysis:

The statistical analysis of data was done by generating bar graphs and pie charts. Software used for data analysis was SPSS 12.0. The graphs were generated using Microsoft excel

RESULT AND FINDINGS

OBJECTIVE 1: To know the existing practice of biomedical waste practice in the hospital

Bio-medical waste management scenario in Dr Baba Saheb Ambedkar Hospital

To analyze the current practice of biomedical waste, an initial survey was conducted which involved taking of informal round and observation of practice in the hospital. A Performa which was used to collect the data to identify the existing status is given in annexure 1

1. **Kind of waste generated**

   Various kind of waste generated in hospital are

Type	Site of generation
1. **Non hazardous (General)**	Office, Kitchen, Cafeteria, Billing, Administration, Cashier, Rest rooms, Hostels, Residential Areas, Stores, Etc
2. **Hazardous (Infectious and Toxic)**	Wards, Treatment room, Nursing Station, Isolation rooms, Operation theaters, Intensive care units, and post operative recovery room, Minor OTs, Blood bank, Pharmacy and Medical stores, All laboratories, Pharmacology OPDs, Injection rooms, Dialysis and Endoscopy rooms, CT scan, MRI rooms and various follow up clinics

Total amount of waste generated in hospital is 2 Kg per bed per day.

2. **Segregation**

   The waste was segregated separately, according to its characteristics, at the point of generation, mainly from the patient care areas. The hospital used color-coded, high-density polyethylene bags for easy identification and segregation of bio-medical solid

waste. Non-infectious and domestic type of waste was collected in black polyethylene bags, placed in bins while the infectious wastes was collected in red and yellow color-coded polyethylene bags labeled with a bio-hazardous infectious materials symbol. They also had needle destroyer placed at every nursing station.

Issue observed:

- General waste is mixed with biomedical waste which increases the burden to treat total amount of biomedical waste
- Personal protective equipment and accessories are not provided
- No manual on bio medical waste is being provided to the staff

3. Collection of waste

Infectious waste was packaged to

(i) Protect waste handlers and the public from possible injury and disease that could result from exposure to the waste and

(ii) Avoid attraction to rodents and vermin.

The integrity of packaging was preserved during handling, storage, transportation and treatment. Objects that were capable of puncturing or cutting including syringes with needles, scalpels, blades, pipettes and broken glass, were put in puncture-proof containers. The needle tips were first destroyed by needle shredder. Later, these materials were disinfected prior to incineration by soaking them for a period of at least 30 min in a freshly prepared 1% hypochlorite solution before discarding them in the bins.

Issue observed:

- There is lack of supplies of basic equipments to the front line waste handlers.
- At some places needle destroyer was not working

4. Storage of waste

The waste is not stored beyond a period of 24 hours. The bins in the wards were placed away from patients but were close to the nursing stations. The hospital has a separate waste collection centre.

Issue observed:

- Non reporting of contractual cleanliness staff due to which replacement of bins in not at proper time

5. <u>Transportation</u>

a. Internal

The collection of infectious and non-infectious wastes was undertaken two members each, one for pulling the cart and distributing empty polyethylene bags and the other member for sealing the bags, putting the bags into the cart and replacing the bins with polyethylene bags. The staff was aware of the potential hazards of the material they were handling and were found to take requisite protective measures. They wore impervious gloves during collection of infectious waste but not wore mask most of the times. Upon questioning, it was found that the staff had been instructed to report any injury during material handling to the medical authorities in charge.

b. External

Segregation of various color-coded containers and transporting waste was done in the designated cart, taking adequate precaution to prevent any spillage from the plastic bags.

Issue observed:

- Used same trolley for both infectious and non infectious waste

6. <u>Treatment and disposal of hospital waste</u>

a. <u>Civil bodies</u>

The local municipal authorities transport the segregated non-hazardous general waste collected in black bags every other day for suitable disposal.

b. <u>Incineration</u>

Hospital does not have its own incinerator. It is outsourced to Synergy Waste Management Company.

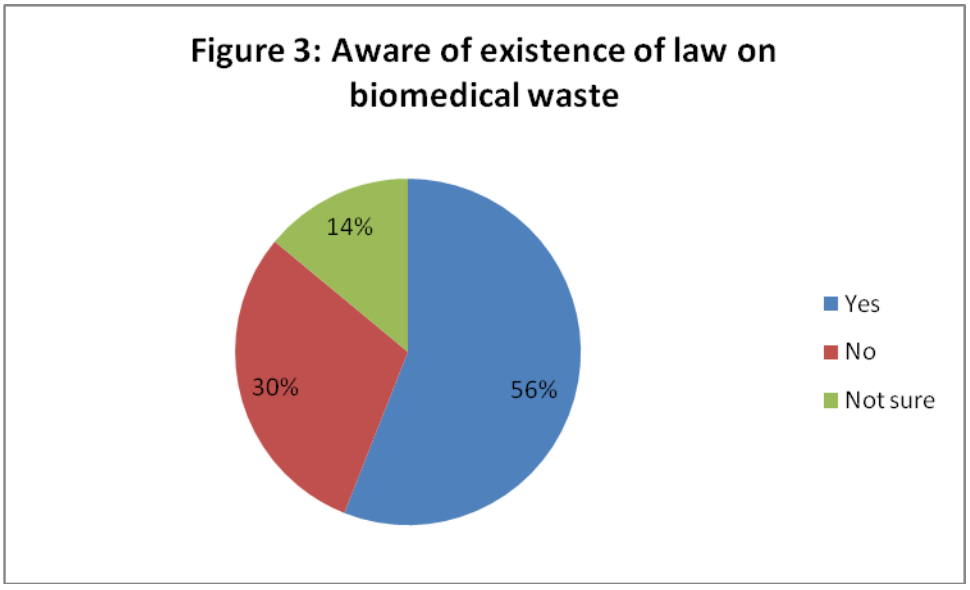
OBJECTIVE 2: Evaluate the KAP based on the data collected through structured questionnaire

The data in the present study was collected with the help of questionnaire (annexure 2) that was formatted to understand the knowledge, attitude and practice of employees involved in direct patient care regarding biomedical waste management methods. A total of 120 questionnaires were distributed out of which only 94 questionnaires were received back. The overall response rate was 78.33%.

Table 3: Total Number of staff responded to Questionnaire by Designation & Years of experience

		Years of experience			
		Less than 5 yrs	5 to 10 yrs	10 yrs & above	Total
Designation	Doctor	26	6	1	**33**
	Nurse	12	7	12	**31**
	Paramedic	13	7	10	**30**
Total		**51**	**20**	**23**	**94**

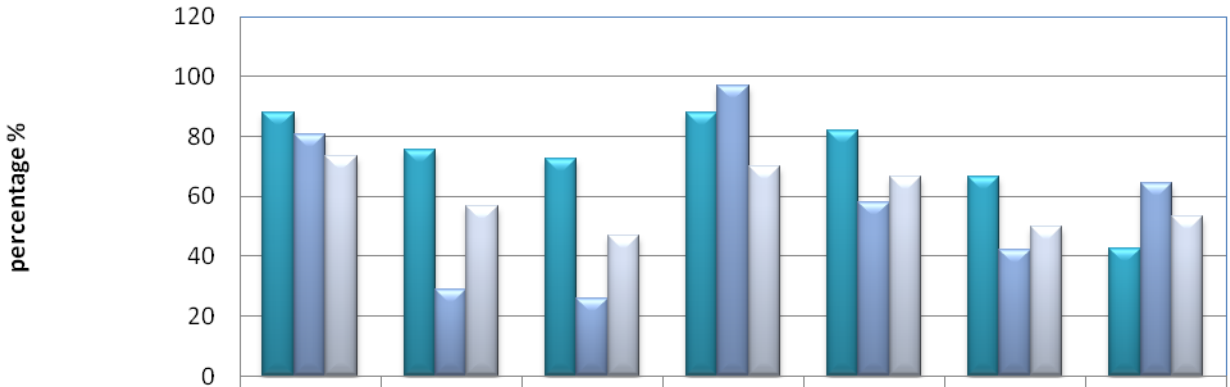
Only 56% of the employees were aware of the existence of law on biomedical waste.



Assessment of Knowledge

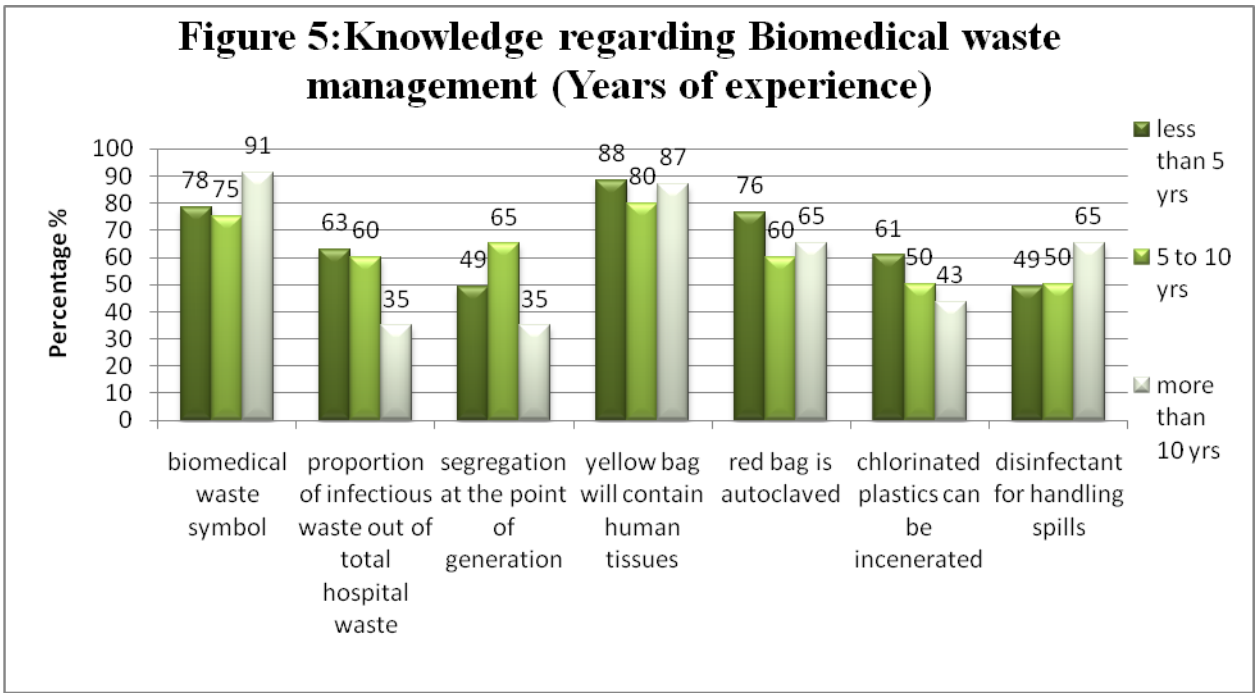
To assess the knowledge on Biomedical waste 7 questions were framed. The correct response was given '1' and incorrect was given '0'. The correct responses of the questions are given in Figure 4. It shows that on an average 74% of doctors, 57% of nurse and 60% of paramedic have a good knowledge of biomedical waste handling and management. The figures show that doctors are more aware biomedical waste management than nurses and paramedic staff.

Figure 4: Knowledge regarding Biomedical waste management (Designation)



	biomedical waste symbol	proportion of infectious waste out of total hospital waste	segregation at the point of generation	yellow bag will contain human tissues	red bag is autoclaved	chlorinated plastics can be incenerated	disinfectant for handling spills
doctors (n=33)	88	76	73	88	82	67	42
nurse (n=31)	81	29	26	97	58	42	65
paramedic (n=30)	73	57	47	70	67	50	53

Figure 5 shows the level of knowledge considering the experience as a factor. The 66% of staff with less than 5 yrs of experience, 63% of staff with 5-10 yrs of experience and 60% of staff with more than 10 yrs of experience have a good knowledge of biomedical waste management and handling. It shows that employees do not show more variation with respect to their experience.



Assessment of practice

All the doctors were aware of risk associated with the handling of biomedical waste but only 45.5% of them used gloves, apron and mask together as personal protective clothing. Similarly 97% of nurses and 83% of paramedic are aware of risk but only 3.2% of nurses and 13.3% of paramedic uses all three personal protective clothing during handling of biomedical waste.

Table 4: Aware of the risk associated with handling of biomedical waste * Designation

		Designation			Total
		Doctor	Nurse	Paramedic	
Aware of the risk associated with handling of biomedical waste	Yes	33	30	25	88
	No	0	0	0	0
	Not sure	0	1	5	6
Total		33	31	30	94

Table 5: Use of personal protective clothing * Designation

		Designation			Total
		Doctor	Nurse	Paramedic	
Use of personal protective clothing	only gloves	12	17	17	46
	only apron	0	3	4	7
	gloves, apron & mask	15	1	4	20
	gloves & apron	2	1	3	6
	glove & mask	4	5	2	11
	apron & mask	0	1	0	1
	None	0	3	0	3
Total		33	31	30	94

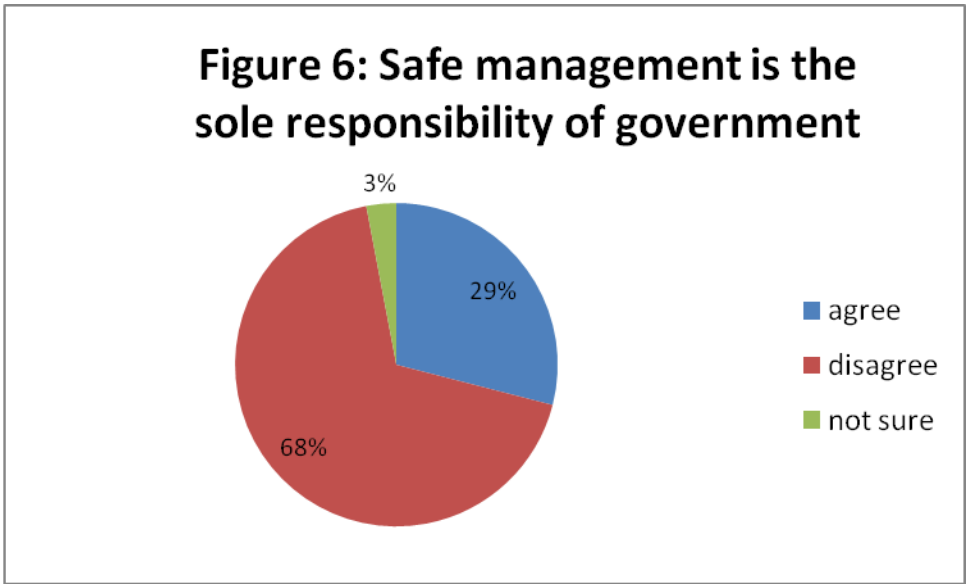
Also as a practise of safe management, vaccination against Hepatitis-B and Tetanus is important in order to prevent themselves from these 2 serious diseases. In the analysis it was found that 31 (94%) doctors are vaccinated against both Hepatitis-B and Tetanus but the proportion was quite low in nurses and paramedic. Only 17 (55%) nurses and 20 (67%) of paramedic staff is vaccinated against both. On an average only 68 (72%) of the total staff is vaccinated against both diseases.

Table 6: Vaccinated against * Designation

		Designation			Total
		Doctor	Nurse	Paramedic	
vaccinated against	Hepatitis-B	2	11	8	21
	Tetanus	0	2	0	2
	Both	31	17	20	68
	None	0	1	2	3
Total		33	31	30	94

Assessment of Attitude

The questionnaire also had 5 questions focused to assess the attitude of employees regarding biomedical waste management.



After doing the analysis it was found that 68% of total employees (figure 6) feel that safe management is not the sole responsibility of government and every employee has to contribute for effective and proper safe management. Also 86% of employees consider that biomedical waste management do not add extra burden on work.

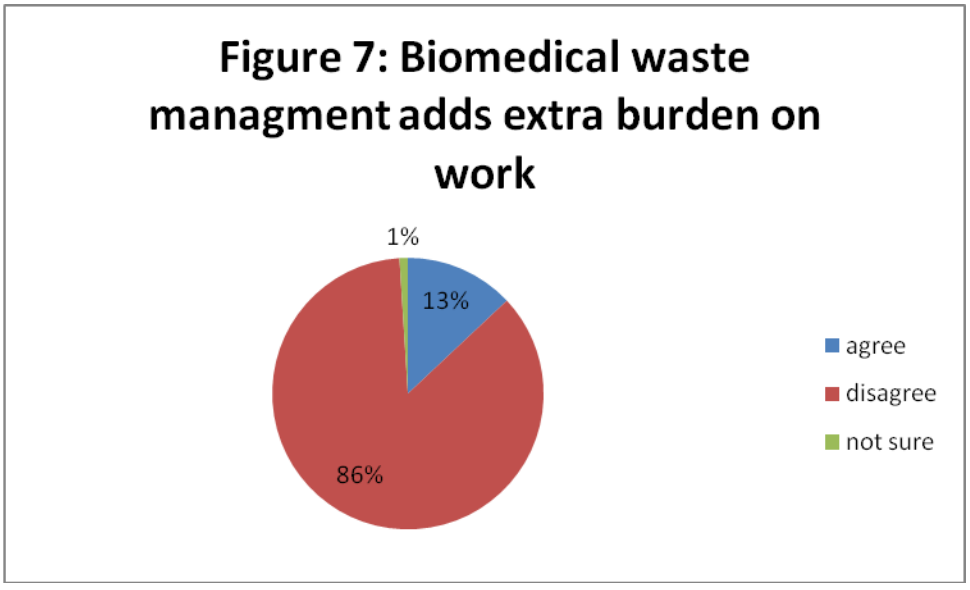
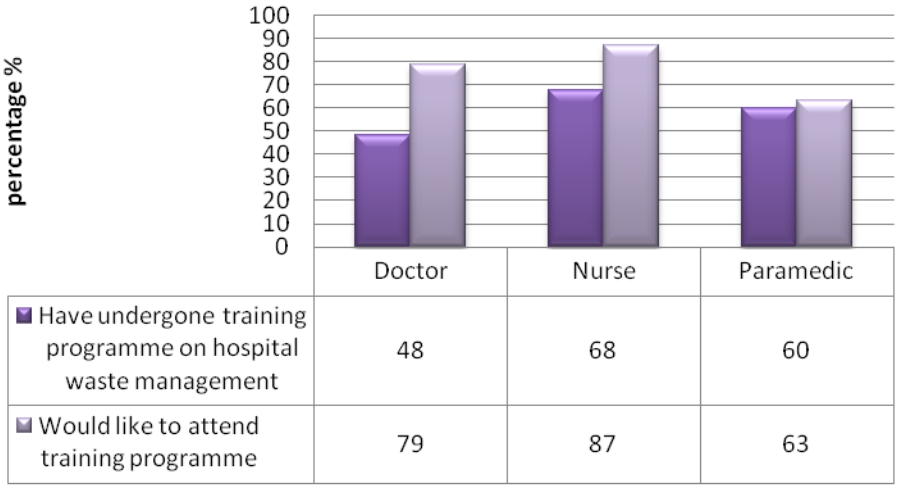


Table 7: Attitude towards incident reporting

	Designation					
	Doctor		Nurse		Paramedic	
	Yes	No	Yes	No	Yes	No
Any Infection/puncture/injury in past six months	4	29	5	26	6	24
Have reported to higher authority	4	0	4	1	5	1

The data also shows that 16% (15 out of 94) of the total staff suffered from any infection/puncture/injury in past six months out of which 87% (13 out of 15) of them reported the incidence to higher authority.

Figure 8 :Training need assessment



The data on employee education showed that 41% have not undergone any training on waste management (Annexure 3, figure 6). On analysis of data based on the designation it was found that 48% of doctors, 68% of nurses and 60% of paramedic have undergone biomedical waste management programme. About 2/3 (76%) of them were interested in attending a programme on Bio-medical waste management during a period other than duty hours. This shows their positive attitude towards biomedical waste management.

CONCLUSION & RECOMMENDATION

CONCLUSION

- KAP study reflects that only almost half of the key players in generation handling of biomedical waste (doctors, nurses and paramedics) are aware of existence of biomedical waste.
- Knowledge of nurses and paramedics was found low in comparison to doctors.
- Though the staff is aware of the risks associated with handling of biomedical waste, only very few of them use personal protective clothing.
- All the staff is not vaccinated against Hepatitis-B and Tetanus.
- More than half of the staff shows a positive attitude towards biomedical waste management and feels that safe management is not the sole responsibility of government.
- They also feel that BMW management does not add extra burden on work.
- The data shows that the staff is concerned about his/her health and report all the adverse incidence to the higher authority.
- Only half of the total staff population has undergone any kind of training programme on BMW.
- About 2/3 of the staff is willing to attend a training programme on BMW even if it is being provided during a time period other than duty hours.
- The hospital does not have a well planned awareness and training programme for biomedical waste management and there is no orientation programme for the newly appointed staff. The staff learns the tips from their seniors in day to day working.
- Hospital does not display any kind of posters which could help the in creating awareness regarding handling and management of BMW

RECOMMENDATIONS

- All the employees must be made aware of Bio-medical Waste (Management and Handling) Rules 1998.
- The hospital must have well planned awareness and training programme for all category of personnel (doctors, nurses and paramedics) those who are directly involved in handling of biomedical waste.
- Training should be conducted to all categories of staff in appropriate language/medium and in an acceptable manner.
- Workshops, seminars, exhibition etc. must be organized from time to time with representatives from various units related to bio-medical waste management, including the risks involved in scavenging discarded needles and other sharp items.
- Since all the departments do not have a copy of the SOPs, the hospital needs to ensure that each department is provided with one, so that they can comply with it.
- To reduce the risks related to biomedical waste, employees should be encouraged to use universal personal protective equipments.
- Measures should be adopted to ensure that all staff is vaccinated against Hepatitis-B and Tetanus.
- Information about the risks linked to health care waste can be displayed by poster exhibitions in hospitals, at strategic points such as waste bin locations, giving instructions on waste segregation.
- Hospital can institute awards for safe hospital waste management and universal precaution practices.

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ANNEXURE 1

INITIAL SURVEY : A PROFORMA COLLECTED TO IDENTIFY EXISTING STATUS

1. Name of the hospital
2. Mailing address
3. Total no. of bed
4. Total Manpower
    a. Doctor
    b. Nurses
    c. Paramedic staff
    d. Ministerial staff
    e. Group D staff
5. No. of garbage containers
    a. Yellow
    b. Black
    c. Red
6. Segregation at source of by biomedical waste containers as per law or not?
7. How often is waste lifted and transported?
8. Which transport facility is used?
9. Is trolley covered?
10. Treatment facility available
11. Any storage/collection centre in Hospital campus?
12. Types of bin- color code used in the hospital
13. Method of disposal of sharps
14. Training programme
15. Operational hospital waste management committee
16. Written duties of responsibilities communicated to medical personnel

17. Posters and signboards used in hospital regading waste management
18. Information pamphlets issued to patient/staff
19. Quantity of waste generated by the hospital

ANNEXURE 2

QUESTIONNAIRE

A Study on "Assessment of Knowledge, Attitude and Practice of Biomedical Waste Management among Doctors, Nurses and Other Paramedic Staff in Dr. Baba Saheb Ambedkar Hospital"

Dear Respondent,

I am Neha Gupta, Student of International Institute of Health Management Research (IIHMR), New Delhi. I am conducting a study on "**Assessment of Knowledge, Attitude and Practice of Biomedical Waste Management among Doctors, Nurses and Other Paramedic Staff in Dr. Baba Saheb Ambedkar Hospital**" with due permission from the Medical Superintendent under the guidance of Dr. S.K. Malhotra, DMS. The objective of this research project is an attempt to know the existing practice of biomedical waste management. Through your participation, I eventually hope to understand ways and means to improve their biomedical waste management practice in health setups.

Enclosed with this letter is a brief questionnaire on some basics about biomedical waste management. Please be assured that all information you provide will be kept strictly confidential and shall be used for academic purpose only. Your name or other identity will not appear on the study report.

Your input is greatly appreciated and likely to take few minutes only. Your participation represents a valuable contribution to my research, and I thank you again for your cooperation.

Sincerely yours

Neha Gupta

Survey Questionnaire

Section 1

1. **Years of experience**
    a. Less than 5 yrs
    b. 5-10 yrs
    c. 10 yrs & above
2. **Designation**
    a. Doctor
    b. Nurse
    c. Paramedic

Section 2

1. Are you aware that there is risk associated with handling of bio medical waste?

    a. Yes b. No c. Not sure

2. For your personal protection while handling biomedical waste which of the following personal protective clothing's do you use

    a. Gloves ☐
    b. Apron ☐
    c. Mask ☐
    d. None ☐

3. What is the correct label for biomedical waste containers?

a.  b. 

c. 

4. Approximate proportion of infectious waste, of total waste generated from a health care facility is

   a. 5% b. 10% c. 85%

5. Biomedical waste shall be segregated into containers/bags at the point of

   a. Generation b. Transportation c. Disposal

6. Which of the following category of waste will go into yellow bag?

   a. Human Tissue b. Discarded medicines c. Catheters

7. The colour code for the biomedical waste to be autoclaved is

   a. Red b. Black c. Yellow

8. Chlorinated plastics can be incinerated.

   a. Yes b. No c. Not sure

9. Recommended disinfectant used for handling spills would be
   a. 1% Bleach Solution
   b. 10% Sodium hypochlorite
   c. 1% Sodium hypochlorite

10. Have you suffered with infection/puncture/injury in the past six months during handling of biomedical waste

    a. Yes b. No

If yes have you reported the incident to higher authorities?

i. Yes ii. No

11. The safe management of biomedical waste is the sole responsibility of government.

a. Agree b. Disagree c. Not sure

12. Bio medical waste management adds extra burden on work.

a. Agree b. Disagree c. Not sure

13. As a practice of safe management, against which of the following have you been vaccinated?

a. Hepatitis-B b. Tetanus c. Both d. None

14. Are you aware of any law that is applicable to the handling and management of hospital waste?

a. Yes b. No c. Not sure

15. Have you undergone any training programme on hospital waste management?

a. Yes b. No

16. If you are offered a free training on BMW management during a period other than your duty hours would you like to attend it?

a. Yes b. No c. Not sure

THANK YOU

Annexure 3

Tables & charts

Figure 2 : Knowledge regarding Biomedical waste management (Designation)

	biomedical waste symbol	proportion of infectious waste out of total hospital waste	segregation at the point of generation	yellow bag will contain human tissues	red bag is autoclaved	chlorinated plastics can be incenerated	disinfectant for handling spills	Average
doctors (n=33)	88	76	73	88	82	67	42	74
nurse (n=31)	81	29	26	97	58	42	65	57
paramedic (n=30)	73	57	47	70	67	50	53	60

Figure 3: Knowledge regarding biomedical waste management (Years of experience)

	biomedical waste symbol	proportion of infectious waste out of total hospital waste	segregation at the point of generation	yellow bag will contain human tissues	red bag is autoclaved	chlorinated plastics can be incenerated	disinfectant for handling spills	Average
less than 5 yrs	78	63	49	88	76	61	49	66
5 to 10 yrs	75	60	65	80	60	50	50	63
more	91	35	35	87	65	43	65	60

than 10 yrs								

Figure 6: Training need assessment

Designation	Have undergone training programme on hospital waste management	Would like to attend training programme
Doctor	48	79
Nurse	68	87
Paramedic	60	63
Average	59	76