Quality assurance in biomedical waste management

A dissertation submitted in partial fulfillment of the requirements for the award of

Post-Graduate Diploma in Health and Hospital Management

By

DR. ARPITA

International Institute of Health Management Research

New Delhi -110075

May, 2012

Park Hospital Gurgaon
Multi Super Speciality Hospital

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Internship Completion Certificate

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Certificate of Approval

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Approval Of DAC

ABSTRACT

Quality assurance in biomedical waste management

Despite of statutory provision of biomedical waste management practice, Indian hospitals have still not achieved the desired standard even after twelve years of enforcement of law 'Biomedical Waste (Management and Handling) Rules, 1998'. All health care facilities are required to treat their biomedical waste as per rule. The rule delineates the duty of occupiers in the treatment and disposal of biomedical waste as categories under schedule I and schedule II. Including its segregation, packaging, transportation, storage and also notifies the prescribed authority, authorization procedure, the role of advisory committee, maintenance of records and provision for appeal.

The study was carried out in order to assess the management of biomedical waste in **PARK MULTI SUPER SPECIALTY HOSPITAL** and to carry out a Force Field analysis for the quality assurance in biomedical waste management.

The primary data was collected through observations and interviews of the staff in various departments. The path of the BMW transport was also studied from the user site till the end.

The awareness regarding biomedical waste management was found to be low and the identification of the cause was done which came out to be the lack of training. Further, Force field analysis clearly depicted the positive and negative forces which led to the improper management of the biomedical waste. The positive force was that the staff was quite receptive and ready to follow the guidelines. The negative force was the lack of supervision and training.

After analysis of by the various forces, action plan/recommendations were given which needs to be implemented in order to manage the biomedical waste in the appropriate manner and to fulfill the statutory requirements as well. One of the major recommendations was the provision of training to staff regarding biomedical waste management and then evaluation of the training needs to be done to assess the future training needs.

ACKNOWLEDGEMENT

Nothing really can be accomplished alone. It's the direction, guidance, involvement, support and prayers of more than few that results into realization.

It gives me a feeling of great pleasure to express my heartfelt gratitude to **Dr. Ajit Gupta and Dr. Ankit Gupta**, Managing Director, Park Group of Hospitals.for providing me the opportunity for internship in Park Hospital and to learn under his guidance.

I consider myself privileged to have worked under the guidance of **Dr. Rekha Ganguli** (Medical Superintendent), **Mr. Ashok Bedwal** (COO), and **Dr. Sunil Kumar** (GM Operations) who were instrumental in providing me constant guidance, direction and encouragement throughout this period.

I am highly thankful to my project guide and mentor **Mr. Nitin Suryan** (Head Quality). It's my honor to have worked under him. His critical appraisal and pertinent suggestions have been of great help in shaping this report. I am extremely grateful for his keen interest, constant support and guidance throughout the training tenure and clarifying my doubts as and when necessary.

The data collection and my learning would not be possible without in depth discussions with the Team of Quality department, biomedical waste management teasm, housekeeping staff, nurses and technicians at Park Hospital. I am appreciative of the favor they provided.

My Institute - **International Institute of Health Management Research (IIHMR), New Delhi** and its education deserves the foremost appreciation for providing me the opportunities to understand my individual capabilities. Of course, all the faculties at IIHMR had facilitated the endeavor; I acknowledge the tremendous contribution of my mentor **Mrs. Kirti Udayai** in completion of the project right from the word go.

Dr. Arpita

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ABBREVIATIONS

OPD	Outpatient department
PHP	Preventive health package
OT	Operation Theatre
MRI	Magnetic resonance imaging
NABH	National Accreditation board for hospitals and healthcare providers
HIS	Hospital information system
CCU	Coronary care unit
ICU	Intensive care unit
BMW	Bio Medical Waste

PART – I

INTERNSHIP REPORT

1.1 ORGANIZATION PROFILE

The Park has a strong legacy of more than 3 decades that redefines healthcare arena in a unique and larger perspective. Since its inception the group has always strived to take the healthcare services to a new level. This journey of healthcare excellence and highest level of patient satisfaction has seen many milestones on its way. Today the group boasts a panel of more than 100 doctors and an array of state-of-the-art healthcare facilities across its hospitals in West Delhi, South Delhi, Gurgaon, Faridabad and Panipat. Patients at Park include common people, corporate, government employees and many who's who of the society. Park envisions of providing latest and affordable services to the people of all social and economic backgrounds. With a passion to surpass patients' expectations and bring about a meaningful change in the lives of people, the Park is on its way to becoming a leading healthcare provider of north India.

Park Hospital Gurgaon is an ambitious initiative from the house of Park. Fully-equipped with all state-of-the-art medical facilities, this **250 bed** Super-Specialty hospital, located in the heart of Gurgaon at South City –II, is the beginning of a new era in taking healthcare services in Gurgaon to a new level. It envisions of providing a comprehensive spectrum of advanced medical & surgical interventions with a perfect mix of inpatient and outpatient services to people of all social and economic backgrounds. It is the onset of a new experience where patients not only get medical services as per international standards but also receive an empathetic and humane treatment by the professionals attending to them. It is about pursuing a dream called 'wellness for all.' It is proposed to make it an affordable/ value for money hospital to all the section of Indian society who would like to avail high quality health care /medical treatment reasonable price.

Park Group is having over three decades of serving the patients in West and south Delhi having three functional hospitals with focus on Patient services with utmost dedication , compassion , ethics and setting high level of medical standards and professionalism.

Park Group of Hospital looks forward to future with excitement, hope and is geared to bring more Landmark Hospitals in West Delhi (Cancer Hospital), Faridabad and Panipat.

It strives to achieve the betterment of society by **"CREATING VALUE FOR LIFE."**

THE PARK MISSION

"To deliver state-of-the-art personalized healthcare services to people of all social and economic background and achieve highest level of patient satisfaction."

THE PARK VISION

"To be a leading name in the healthcare sector by providing holistic healthcare at affordable cost."

ABOUT LOGO

P ERSONALISED

A LL SPECIALITIES

R ESONABLE COST

Q UALITY SERVICES

The two hands stand for care & help. Blue color signifies excellence and orange indicates the zeal for care. The logo also assure people that they are in safe and caring hands.

COMMITMENT TOWARDS QUALITY

At Park Hospital, we believe in our people, our systems and our commitment to quality and continuous improvement. It is our aim to deliver safe, cost-effective care to the community and the patients we serve. At Our Hospital we believe that the patient experience is comprised of outstanding quality and excellent customer service.

We are committed to provide our patients with the: Highest-quality, safest and most-satisfying care possible.

We continuously strive to improve the quality of our health care services by

- Adopting latest technology and equipments to strengthen our Medical processes and procedures to achieve the set objectives.
- Induction of regular training programs for staff.
- To meet the National and International Standards.
- Park Super Speciality Hospital, Gurgaon is in the process of applying for NABH Accreditation at the earliest.
- Hospital is one of the complex institutions, which are frequented by people from every walk of life. All of them produce waste, which is increasing in its amount and type due to advances in scientific knowledge and is creating its impact. Keeping in view inappropriate biomedical waste management, the Ministry of Environment and Forests notified the "Biomedical Waste (management and handling) Rules, 1998" in July 1998.

SALIENT FEATURES OF PARK HOSPITAL

- More than 25 departments, 100 doctors, 500 paramedical support staff available round the clock
- A branch of Park Group of Hospitals having branches in South Delhi, West Delhi, Faridabad and other upcoming hospitals in Panipat and Cancer Hospital in West Delhi
- Fully equipped 70 bedded ICU/ CCU complex with ultramodern intensive care facilities manned by intensivists, physicians and residents round the clock

- Department of Interventional Cardiology and Cardiothoracic Surgery equipped with latest GE Innova, IQ Cath Lab and Ultramodern Cardiothoracic Operation Theatres
- Park Mother's Nest- High end premium boutique birthing center with Labor Delivery Recovery (LDR) suite.
- Department of Neonatology comprising of all the ultramodern facilities with monitoring units, open and close Incubator, Ventilators, Analyzers, with dedicated team of Neonatologists and Paramedical staff.
- Park Trauma Center- Comprehensive integrated approach by team of Orthopaedicians, Neurosurgeons, General Surgeons and other paramedical staff to handle all kind of trauma cases.
- Fully functional Gastroenterology department with all ultramodern equipments manned by Gastroenterologist and Gastro Intestinal surgeon to deal with all kind of routine and emergency procedures.
- 24 x 7 Blood Bank services.
- Department of Radio Diagnosis equipped with advanced CT, MRI, Ultrasound, Color Doppler, and Digital X- Ray system 24 x 7

SERVICES AND DEPARTMENTS

- Anesthesia /Pain Management
- Blood Bank
- Cardiology and Cardio Thoracic Vascular Surgery
- Critical care
- Cancer and Oncology
- Dentistry

- Dermatology and Cosmetic Surgery (Plastic and Reconstructive Surgery)
- Emergency Medicine and Ambulance Services
- Endocrinology
- ENT (Ear , Nose and Throat)
- General and LaparoscopicSurgery (Minimal Invasive and Bariatric Surgery)
- Gastroenterology
- Gynecology and Obstetrics
- Internal Medicine
- Nephrology
- Neurology and Neurosurgery
- Ophthalmology
- Orthopedics
- Pediatrics
- Pulmonology and respiratory Medicine
- Urology
- 24 hour emergency and pharmacy
- Radiology Services and diagnostics

SERVICE LOCATION DISTRIBUTION

BASEMENT:

1) Radiology- X-Ray, Ultrasound, CT Scan, MRI
2) Pathology and Microbiology
3) Neurology Lab- EEG, EMG
4) OPD Chambers- ENT, Psychiatry and Psychology, Respiratory Medicine, Urology and Nephrology,
5) Ophthalmology
6) Dermatology
7) Blood bank
8) Physiotherapy
9) Dental
10) Accounts
11) IPD Billing
12) Medical Record Department and Store
13) Admin Offices
14) Conference Room and Auditorium
15) Gas Manifold
16) Restaurant

GROUND FLOOR:

1) RECEPTION (Front Desk)

2) TPA and International Patients Desk
3) Casualty
4) Admin Offices
5) OPD Chambers- Medicine, Surgery, Orthopaedics, Gastroenterology, Paediatrics, Neurology and Neurosurgery, Cardiology and Cardiothoracic Surgery, Obs & Gynae etc.
6) Mother's Nest- Obs & Gynae Wards, Labour Room, LDR (Birthing) Suites, NICU and Nursery.
7) Surgical ICU
8) Gastro Lab
9) OT Complex- 3 Major and 1 Minor Operation Theatre

FIRST FLOOR:

1) Inpatients Wards – Single Rooms and Twin Sharing Rooms, Suite Rooms
2) Medical ICU- I

SECOND FLOOR:

1) Inpatient Wards- General Wards, Single Rooms and twin sharing rooms.
2) Dialysis Unit
3) Heart Centre - Cardiac OT, Cath Lab, Heart Command, CCU and Medical ICU-II.

PARK GROUP - OTHER HOSPITALS:

1) Park Sunil Hospital (South Delhi) – 50 bedded

2) Park Hospital (West Delhi, Keshopur) – 300 bedded and NABH Accredited.

OTHER UPCOMING PROJECTS:

3) Park Hospital (Faridabad)

4) Park Hospital (Panipat)

5) Park Cancer Hospital (West Delhi)

1.2 OBJECTIVE OF THE INTERNSHIP

The primary objective of the Intern program is to provide a student interested in the field of hospital gaining some experience and knowledge on the management and operations of a hospital.

- To complete my internship with full efficacy and efficiency
- To understand working of whole hospital and seek opportunity that provides me real experience.
- To groom myself as a professional.
- To accomplish the objective the student is expected to participate in variety of activities in the hospital and co-operate in the day to day working.
- The duties require significant involvement in management activities the various responsibilities require the ability to work effectively with coworkers and to meet the demands of the public as well.

Designation: Manager Operations

Job Responsibilities:

1. To deal with all issues related to the OPD facilities of the Hospital

2. Accountable for the issues related to Front office, OPD, and Investigation Services.

3. Billing related issues at the front office.

4. To minimize the waiting time.

5. Responsible for organizing like CME, Press Conference etc.

6. To monitor the housekeeping of the basement.

7. To coordinate between various departments for the smooth work flow.

1.3 TASKS ASSIGNED TO ME DURING MY INTERNSHIP

I joined the Park Hospital when it was under construction and it got completed and started under our observation.

1) **HR**- From the beginning, I was assigned the job of handling the recruitment process in this new hospital, like arranging interviews, managing CV's, and maintaining files and data.

2) **DISPLAYS**: I was assigned the job of preparing the matter and selecting the appropriate place for directional signboards required for the new hospital. I was whole sole responsible for preparing them, placing the order, receiving them till they are properly put at their place.

3) **WEBSITE DESIGNING:** Assisted in designing of the website of the hospital including the matter as well as design.

4) **CATALOGUE:** Also assisted in Catalogue preparation, designing, pictures as well as the matter part.

5) **PROJECT MANAGEMENT:** We observed all the project related works so that they get complete on time. It was our duty to make the OPD Chambers, ICU, Casualty, OPD, Radiology, Pathology, Inpatient Wards etc. get ready before start looking after all specific requirements.

6) **CO-ORDINATOR:** To coordinate between different departments and making the patients as well as the Consultants Satisfied.

7) **GUEST SERVICE OFFICER:** As, it is a new Hospital, patients are not aware of the internal departments, so it is also our duty to guide them to required OPD Chambers and the Investigations.

PART – II

DISSERTATION REPORT

ON

QUALITY ASSURANCE

IN

BIOMEDICAL WASTE MANAGEMENT

AT

PARK HOSPITAL, GURGAON

CHAPTER - 1 - INTRODUCTION

1.1 Background

The hospital is an integral part of a social and medical organization, the function of which is to provide complete healthcare for the population, both curative and preventive, and whose out-patient services reach out to the family and its home environment.

Interpretation of Biomedical Waste

Waste: Everything is made for a defined purpose "anything which is not intended for further use is termed as waste".

Definition of Biomedical Waste: Biomedical wastes (BMW) are defined as waste that is generated during the diagnosis, treatment or immunization of human beings or animals, or in research activities pertaining thereto, or in the production of biological activity.

The management of health care waste is a subject of considerable concern to public health and infection-control specialists, as well as the general public. It is a well-known fact that in several types of health care activities, various types of hazardous and contagious materials are generated. Even though the consequences of discarding such waste carelessly are well known, it is only recently that adequate initiatives to manage this waste in a scientific manner are being taken in India by the incorporation of biomedical waste management handling rules, 1998.

Unscientific disposal of health care waste may lead to the transmission of communicable diseases such as gastro-enteric infections, respiratory infections, spreading through air, water and direct human contact with the blood and infectious body fluids. These could be responsible for transmission of Hepatitis B, C, E and AIDS within the community. Health care professionals and the general public are at risk due to this. Diseases are spread by improper treatment and disposal of waste. Rag pickers expose themselves to diseases like Hepatitis B, Tetanus, Staphylococci, etc. while handling items like needles, surgical gloves, blood bags etc.

1.2 Importance of Bio medical waste management

Biomedical waste management is of prime importance in the healthcare sector as it has a great potential for various adverse effects on health. Following are some of the effects which directly or indirectly affect the humankind:

1. **Infection**: - The infectious agents can enter in the body through a puncture, abrasion, or cut in the skin; through mucous membranes; by inhalation and ingestion. Commonest infections, which can result from mishandling of hospital/health care waste, are gastro enteric through faeces and/or vomit, Respiratory through inhaled secretions; saliva, Ocular infections through eye secretions, Genital infections, Skin infection through pus, meningitis through Cerebrospinal fluid, AIDS through blood and sexual secretions (HIV) and Viral Hepatitis B & C through blood and body fluids (hepatitis B and C viruses).

2. **Genotoxicity and Cytotoxicity**: - Many cytotoxic drugs are extreme irritant and have harmful local effects after direct contact with skin and eyes. Many neoplastic drugs are carcinogenic and mutagenic; secondary neoplasia is known to be associated with chemotherapy.

3. **Chemical toxicity**: - Many of chemicals and pharmaceutical drugs used in health care establishments are hazardous (e.g. toxic, genotoxic, corrosive, flammable, reactive, explosive and shock -sensitive). They may cause intoxication by acute or chronic exposure, injuries including burns, poisoning.

4. **Radioactivity hazards**: - The radioactive waste exposure may cause headache, dizziness, vomiting, genotoxicity and tissue damage.

5. **Physical injuries**: - May result from sharps, chemicals and explosive agents.

6. **Public sensitivity**: - The general public is very sensitive about visual impact of the anatomical waste, recognizable body parts including foetuses if handled improperly.

Biomedical waste management is of prime importance in the healthcare sector as it has a great potential for various adverse effects on health.

Following are some of the effects which directly or indirectly affect the humankind: e.g. Infection, Genotoxicity and Cytotoxicity, Chemical toxicity, Radioactive Hazards, Physical Injuries, Public Sensitivity etc.

The effects of hospital waste are not only on hospital personnel and patient within the hospital, but also on the human health and environment outside the hospital. Improper Hospital waste management has serious impact on environment.

People at Risk

Everyone but housekeeping staff nurses and doctors are more prone.

If the disposal of waste is not practiced properly, then the residue in the landfill can pollute the surrounding area in the form of soil and ground water pollution. In case, the recycling of polymers is not done properly, it will release Dioxin and Furan that may cause air pollution. Apart from the air, water and soil pollution, waste management is considered to be serious affair due to aesthetic effects on public life.

Corrective and preventive Management of biomedical waste not only gives the benefits in reducing the amount of waste but also helps in reducing the infection rate of the hospital which is of serious concern in the healthcare sector.

The Benefits of Waste Management are as follows:

- Waste management leads to cleaner and healthier surroundings.
- Incidence of nosocomial infections gets reduced, so the cost of infection control within the hospital reduces.
- Disease and death due to reuse of infectious disposables is eliminated.
- Low incidence of Occupational health hazards.
- Segregation and appropriate treatment of medical waste reduces cost of waste management and generates revenue.

1.4 Scope of the Study

After analysis of biomedical waste management, action plan/recommendations will be given which needs to be implemented in order to manage the biomedical waste in the appropriate manner and to fulfill the statutory requirements as well.

Force field analysis will clearly depict the positive and negative forces and the cause can be identified and the change will be implemented.

1.5 Literature Review

Legal Framework

The following acts and rules are associated with the bio medical waste management. This suggests that the bio medical waste management is not just the concern for hospitals, but it has multifaceted implications. That is why; the Government of India has issued certain rules and guidelines from time to time.

Central legislation:

1. The Water (Prevention and Control of Pollution) Act, 1974.
2. The Air (Prevention and Control of Pollution n) Act, 1981.
3. The Environment (Protection Act), 1986.
4. The Hazardous wastes (Management and Handling rule), rules1989.
5. The Biomedical wastes (Management and Handling) Rules, 1998.

Biomedical Waste (Management and Handling) Rules, 1998

Keeping in view of inappropriate biomedical waste management, the Ministry of Environment and Forests notified the "Bio medical Waste (management and handling) Rules, 1998" in July 1998.

I. Categories of Bio-Medical Waste

The rules clearly identified the different categories of the bio medical wastes along with their treatment and disposal method. The table mentioned below shows the categorization of the bio medical waste in ten categories:

Table 1

Classification of Bio-Medical Waste

Sr. No	Biomedical waste	Treatment & Disposal
1	Human Anatomical Waste (Human tissues, organs, body parts	Incineration/deep burial *
2	Animal Waste (Animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals).	Incineration/deep burial *
3	Microbiology & Biotechnology Waste (Wastes from lab. Cultures, stocks of specimens of micro-organisms live or attenuated vaccines, human and animal incineration* cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices sued for transfer of cultures)	Autoclaving/ micro-waving.
4	Waste Sharps Needles, syringes, scalpels, blades, glass etc. that may cause puncture and cuts. This includes both used and unused sharps)	Chemical/ disinfection autoclave/ micro-waving and mutilation/shredding
5	Discarded Medicines & Cytotoxic drugs (Wastes comprising of outdated contaminated and discarded medicines)	incineration/destruct & drugs disposal in

		secured landfills
6	Soiled Waste (Items contaminated with blood, and body fluids including cotton, dressing, soiled plaster casts, lines, beddings, other material contaminated with blood)	incineration/ autoclave micro-waving
7	Solid Waste (Waste generated from disposable items other than sharps such as tubings catheters, intravenous sets, etc.)	Chemical disinfection autoclave/micro-waving and mutilation/shredding
8	Liquid Waste (Waste generated from laboratory and washing, cleaning house-keeping and disinfecting activities)	Disinfect-chemically & discharge into drains
9	Incineration Ash (Ash from incineration of any bio-medical waste)	disposal in municipal landfill
10	Chemical Waste (Chemical used in production of biological, chemicals used in insecticides etc.)	Chemically treatment/ secured landfill for solids.

II. Guidelines for Color Coding

As per the schedule II of the bio medical waste management and handling rules, 1998, the color coding of bio medical waste is as follows:

Table 2

Colour coding	Type of Container	Waste Category	Treatment options
Yellow	**Plastic Bags**	**Human and animal wastes, Microbial and Biological wastes and soiled wastes (Cat 1,2,3 and 6)**	**Incineration/ Deep Burial**
Red	**Disinfected container/ Plastic bags**	**Microbiological and Biological wastes, Soiled wastes, Solid wastes (Cat 3,6,7)**	**Autoclave/ Microwave/ Chemical Treatment)**
Blue/ White/ Transparent	**Plastic bag, Puncture proof container**	**Waste sharps and solid waste (Cat 4 &7)**	**Autoclave/ Microwave/ Chemical Treatment Destruction and Shredding**
Black	Plastic bag	Discarded medicines, Cytotoxic drugs, Incineration ash and chemical waste (Cat 5,9 & 10)	Disposal in secured land fills

III. STANDARDS FOR WASTE AUTOCLAVING

The auto clave should be dedicated for the purpose of disinfecting and treating bio medical waste:

A. When operating a gravity flow autoclave, medical waste shall be subjected to:

- a temperature of not less than121C and pressure of 15 per square inch (psi) o for an autoclave residence time of not less than 60 minutes; or
- a temperature of not less than 135C and pressure of 31 per square inch (psi) o for an autoclave residence time of not less than 45 minutes; or
- a temperature of not less than 149C and pressure of 52 per square inch (psi) o for an autoclave residence time of not less than 30 minutes; or

B. When operating a vacuum autoclave, medical waste shall be subjected to a minimum of one pre-vacuum pulse to purge the autoclave of all air. The waste shall be subjected to the following:

- a temperature of not less than 121C and pressure of 15 psi per an auto clave o residence time of not less than 45 minutes; or
- a temperature of not less than 135C and pressure of 31 psi for an auto clave o residence time of not less than 30 minutes.

Various Aspects of BMW Management

Bio medical waste management has various parameters which begin with the **segregation, collection, storage and disposal.** These aspects not only show the importance of the waste management but also depict the harmful effects even if there is a single breach in the rules of the biomedical waste management and handling.

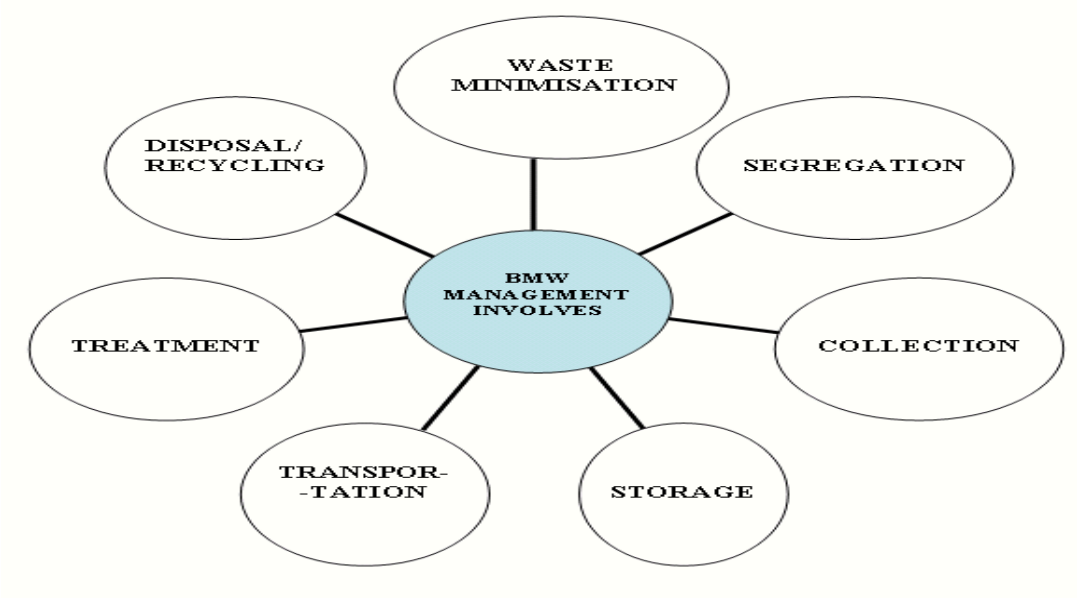


Figure 1: Various aspects of BMW management

The above diagram depicts the various areas associated with the management of the BMW. The management does not only mean the management of the generated waste but it also aims to minimize it. In short '**waste minimization is waste management itself.'**

"Accumulation of dust, soil, and microbial contaminants on environmental surfaces is both aesthetically displeasing and a potential source of nosocomial infections. Effective and efficient cleaning methods and schedules are, therefore, necessary to maintain a clean and healthy environment in healthcare settings."

The bio medical waste not only demands attention on the management but also the preventive action would be to minimize the waste as much as possible. The minimization not only affects the revenue of the hospital but also reduce the harmful effects proportionately. Various ways to minimize waste are as follows:

- By source reduction (avoiding wastage)
- Use of recyclables (e.g. using sterilizable glass ware)
- Purchasing policy (purchasing non-PVC healthcare equipment)
- Segregation at source separating bio medical plastics, glass, metal at source for autoclaving & shredding each category separately before recycling)
- Stock management (inventorying regularly and replacing IV fluids, blood and drugs so that there is no wastage due to spoilage)

AIM

This project intended to assess the quality assurance in the biomedical waste management through Force Field Analysis.

OB JECTIVES

1. To assess the awareness about biomedical waste management amongst the employee

2. To study the existing process of the BMW management.

- To study the segregation of waste at the different points of generation of waste.
- To study the collection of biomedical waste in the Hospital as per Biomedical Waste Rule.

3. To carry out a Force Field Analysis for the biomedical waste management.

CHAPTER – 2 – DATA AND METHODS

2.1 Study Design

A descriptive study where data was collected through interviews and observations.

2.2 Data Collection Techniques

I. Primary Data

(i) **Observation technique** was used to observe and analyze the generation of biomedical waste from various departments.

(ii) Interview with staff

Sample: Sample taken was 100%, that means all the employees of the following categories were interviewed. Their number is as follows:

- Housekeeping – **47**
- General Duty Attendants – **12**
- Nurses – **32**
- Technicians - **13**

II. Secondary Data

Studying the records maintained for BMW

Time Period

From 1st March to 15th April, 2012

2.3 Department Wise Observation

The following departments were observed which the main generating sites are for BMW.

1. Blood Bank
2. Laboratory
3. OPD and dressing room
4. Wards
5. Dialysis
6. Operation theatre
7. The dirty utility and clean utility room

The observations made were on the following points:

1. The waste generating source and area
2. The segregation technique
3. The working technical staff as well as the house keeping staff in the department
4. The store room inside or outside the department
5. Condition of the dustbins and the sharp containers
6. Mode of transportation

CHAPTER 3 – RESULTS AND FINDINGS

The results were based on the observations and the interviews pertaining to various departments. Blood bank, laboratory, wards, ICU were visited and the observations were made.

3.1 OBSERVATIONS FROM THE DEPARTMENTS

I. BLOOD BANK: The blood bank is the crucial part of the hospital where bio medical waste management is quite important. The blood bags cannot be disposed in the normal bags; they can be disposed only after autoclaving. Disposal of sharps is an important BMW issue in blood banks. Lancets or pickers used for rapid blood group screens and the needles of donor sets form the major sharps. The detailed observations are as follows:

1. **Type of waste:**
   Sharps: lancets, needles, broken g lass, test tubes, glass slides, cover stickers
   Plastics: syringes, blood bags, tubing, Apheresis kits, plastic cards
   Human tissue: infected rejected blood, unused blood returned from OT
2. **Segregation technique:** Different colored plastic bags are used as directed by the standards. Sharps collected in sharp container.
3. **Condition of the dustbins and the sharp containers:** Dustbins have cover lids. They were clean and not overflowing. The sharp containers were properly covered.
4. **Any equipment for waste treatment:** Gravity flow Autoclave machine

Observations

a) The department was clean and tidy.
b) There was no spillage of waste outside the dustbins.
c) There was no mixing of wastes in the colored bags.
d) The sharp container had sodium hypochlorite inside it.
e) The unused blood or infected blood is autoclaved at 121 degrees at 15 lbs for 20 minutes.
f) The technical and the house keeping staff were well versed.

II. LABORATORY (PATHOLOGY, MICROBIOLOGY)

The laboratory medicine majorly contains the sharps, fluids like plasma, serum, urine, sputum and blood. The disposal of all of the above needs to be done with utmost care. The sharps were disposed in the puncture proof container with hypochlorite in it.

1. **Type of waste:**

   Sharps: needles, lancets, broken glass, test tubes, glass slides, cover stickers, ESR tubes

   Plastic: syringes, urine collecting boxes

   Human tissue: blood, urine, pus, sputum and other body fluids
2. **Segregation technique:** Different colored plastic bags are used as directed by the standards. Sharps collected in sharp container.
3. **Condition of the dustbins and the sharp containers:** Dustbins have cover lid. They were clean and not overflowing. The sharp containers were covered.
4. **Any equipment for waste treatment:** No

Observations

a) The department was clean and tidy.
b) There was no spillage of waste outside the dustbins.
c) There was no mixing of wastes in the colored bags.
d) Sharp container d id not have sodium hypochlorite inside.
e) The ESR glass tubes after use are kept in 1% sodium hypochlorite solution for one hour for sterilization.
f) The technical staff was not very clear about some facts about waste segregation.

III. OPD AND DRESSING ROOM

The dressing room majorly generates the waste in the form of dressings soaked with blood. These dressings were disposed off in the yellow bag. Regular monitoring of the segregation needs to be done and the housekeeping staff needs to equipped with personal protective equipments.

1. **Type of waste:**
   Sharps: needles, broken glass
   Plastics: syringes
   Human tissue: blood, pus
2. **Segregation technique:** Different colored plastic bags are used as directed by the standards. Sharps collected in sharp container
3. **Condition of the dustbins and the sharp containers:** Dustbins were clean and not overflowing. The sharp containers were properly covered.
4. **Any equipment for waste treatment:** No

Observations

a) There is shortage of staff as only one person is looking after the whole OPD as well as the dressing room.
b) The dustbins kept in the OPD for patients do not have lids. It gives a bad impression to those moving in the OPD premises.
c) The OPD supporting staff i.e. the nursing and the housekeeping have average knowledge about the waste management.
d) The OPD did not have sufficient dustbins in the waiting lounge, therefore the patients and their attendants have to search for them to dispose of the litter.

V. INPATIENT WARDS

The staff in the wards needs to be trained enough to segregate the waste as per the rules of biomedical waste management. Wards contain all types of wastes be it human tissue or sharps or the plastics. The scheduling of the waste transport should be checked by the senior staff daily as break in the routine transport leads to over flowing of the dustbins which can lead to spread out of the bio medical waste. This not only leads to foul smell outside but also raises the risk of nosocomial infections.

1. **Type of waste:**
   Sharps: needles, broken glass
   Plastics: syringes
   Human waste: blood, pus, urine, vomiting
2. **Segregation technique:** Different colored plastic bags are used as directed by the standards. Sharps collected in sharp container
3. **Condition of the dustbins and the sharp containers:** Dustbins were clean and not overflowing. The sharp containers were properly covered.
4. **Any equipment for waste treatment:** No

Observations

In Inpatient area on **1st Floor**-

a) The department was clean and tidy.
b) There was no spillage of waste outside the dustbins.
c) There was no mixing of wastes in the colored bags.
d) Sharp container did not have sodium hypochlorite inside.
e) One particular day there was shortage of big sized black colored bags, as a result the general waste was thrown in the dustbins without plastic bags.
f) Waste is collected at the end of ever y shift usually at 3 p.m. in the noon.
g) The waste from the wards is collected in the dirty utility and is then transferred in black trolleys/hand carts.
h) The circular lid of the sharp container was found open in the dirty utility.

In Inpatient area on **2nd floor**-

a) The department was clean and tidy
b) There was no spillage of waste outside the dustbins
c) There was no mixing of wastes in the colored bags.
d) Sharp container d id not have sodium hypochlorite inside.
e) One particular day there was shortage of big sized black colored bags, as a result the general waste was thrown in the dustbins without plastic bags.
f) Waste is collected at the end of ever y shift usually at 3 p.m. in the noon.
g) The waste from the wards is collected in the dirty utility and is then transferred in black trolleys/hand carts.
h) The circular lid of the sharp container was found open in the dirty utility.

(NOTE: The ramp is used to transfer the waste in trolleys/hand carts.)

V. DIALYSIS

Dialysis majorly contains all types of bio medical wastes which need to be segregated as per the bio medical waste management rules, 1998. Dialysis is quite critical area where patients are quite vulnerable to infections, hence, the waste management protocol needs to be strictly monitored and followed.

1. **Type of waste:**
   Sharps: need les, broken glass
   Plastics: syringes, tubings
   Human waste: blood
2. **Segregation technique:** Different colored plastic bags are used as directed by the standards. Sharps collected in sharp container.
3. **Condition of the dustbins and the sharp containers:** Dustbins were clean and not overflowing. The sharp containers were properly covered.
4. **Any equipment for waste treatment :** No

Observations

a) There is no dirty utility inside the department.
b) The dustbins are kept behind the curtains.
c) The circular lid of the sharp container which was full and was kept to dispose off was found open.
d) The isolation room did not have any patient. The sharp container was found full and had not been replaced by a new o ne.
e) The technical staff did not have the full knowledge about infection control.

VI. OPERATION THEATRE

Operation theatre is a place where all sorts of bio medical waste are generated and as per the observations most of the areas were clean except dirty utility room which was stinking so waste collection needs to be monitored. Housekeeping staff also needs to be trained in the segregation and importance of personal protective equipments.

1. **Type of waste:**
   Sharps: needles, broken glass
   Plastics: syringes, tubings, cannulas
   Human waste: blood, urine, body parts during surgery
2. **Segregation technique:** Different colored plastic bags are used as directed by the standards. Sharps collected in sharp container.
3. **Condition of the dustbins and the sharp containers:** Dustbins were clean and not overflowing. The sharp containers were properly covered.
4. **Any equipment for waste treatment :** No

Observations

a) The biomedical waste is collected and removed from the area every 3 hours.
b) The waste is also immediately removed after any surgery.
c) The orthopedic and renal OTs were found clean and tidy.
d) The garbage bags were fresh indicating that they were replaced after a surgical procedure.
e) The dustbins were also empty.
f) The dirty utility was clean and not stinking. Large dustbins are used there to dispose-off the biomedical waste o f 2-3 OTs.
g) The housekeeping staff is also well versed with the special precautions to be taken for maintaining the cleanliness of the OT area.

Observations in the Night (At 1 A.M.)

1. In the basement, the house keeping boy was carrying the ringer trolley. There were used garbage bags in the lower shelf and clean bags in the upper shelf of the trolley.
2. In inpatient area on the first floor, the dustbins for general waste were overflowing at both the nursing stations. Garbage was spilled outside the bin as it was filling up to the rim.
3. Same scene was observed in the second floor. The dustbins were overflowing.
4. At one of the nursing station. Small dustbin instead of the larger one for general waste was used. This again resulted into the spilling of garbage outside the dustbin.
5. Dirty linen was lying on the floor in the dirty utility.
6. The garbage bags were not replaced even after the housekeeping boy was informed about that.

The situation was same till 5 o clock in the morning. At 5 in the morning, the garbage bags were changed **.**

3.2 EXISTING WORK FLOW OF BMW

Figure 3 depicts the existing work flow of the collection of BMW in various departments. This chart shows the waste pathway from the site of generation till the collection site.

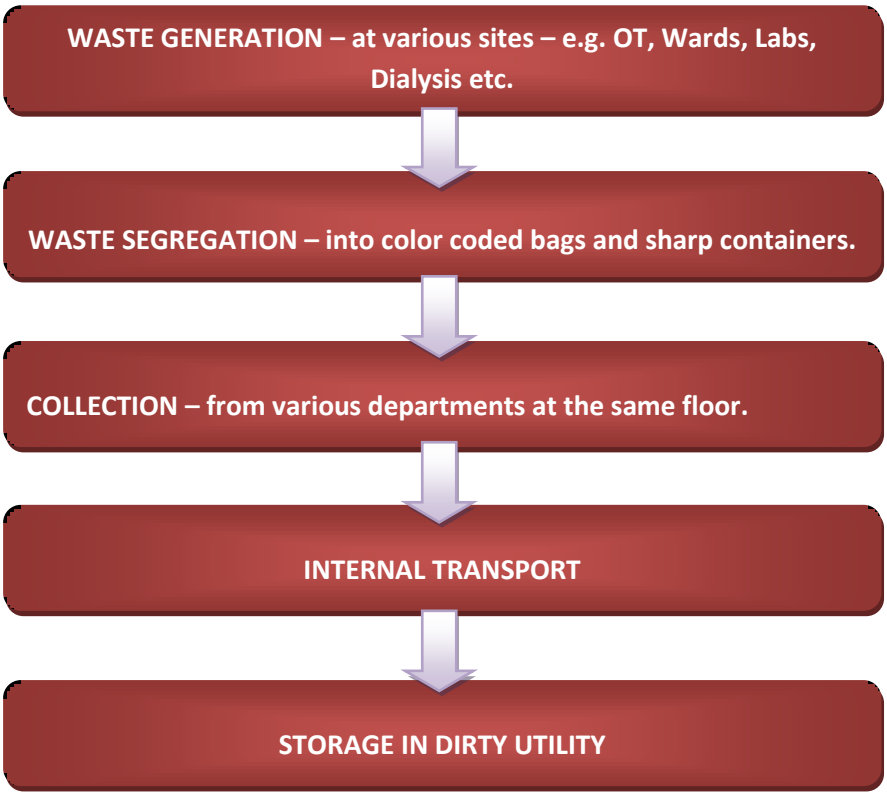


Figure 2: Process flow from generating site till dirty utility

Figure 3 depicts the pathway of bio medical waste from the dirty utility till the final disposal.

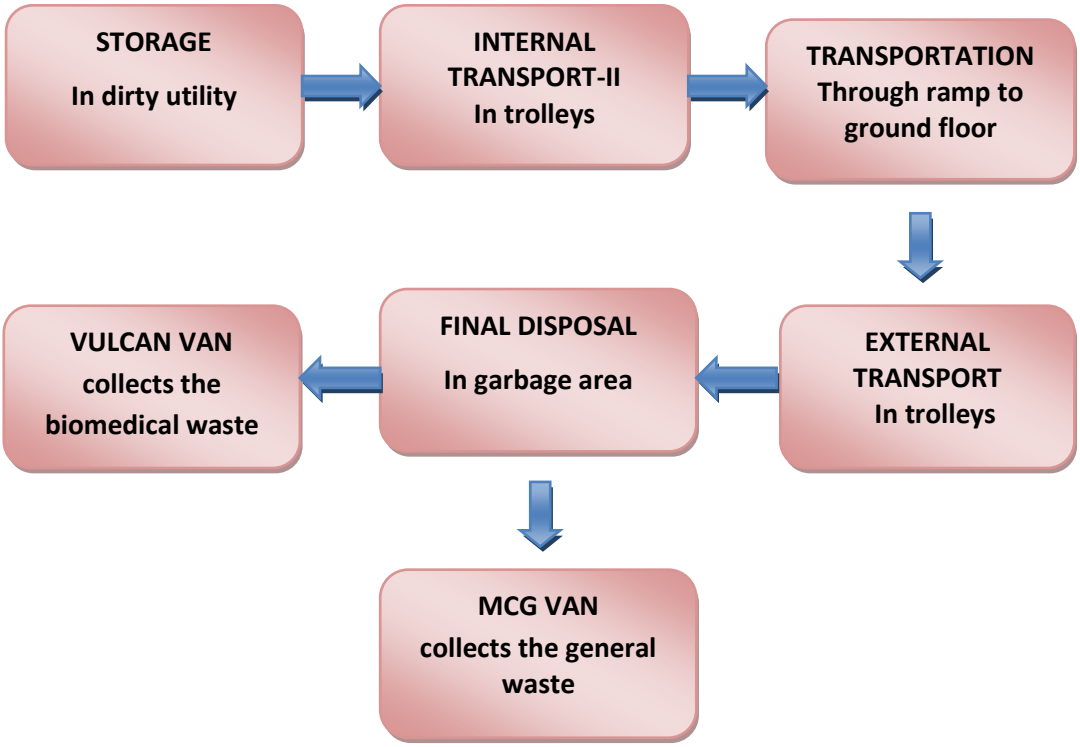


Figure 3 - Pathway of bio medical waste from the dirty utility till the final disposal.

Regarding the Housekeeping staff

1. They are very receptive and open to any suggestion.
2. There is confusion regarding the segregation of the BMW into different categories.
3. Some departments complained that the housekeeping staff has the habit of shifting responsibilities.
4. They cannot talk freely to their supervisors.
5. Housekeeping boys can be seen shifting bags without trolleys/hand carts.
6. Housekeeping boys can be seen without the recommended protective gears like high tension gloves, gumboots and masks in the garbage area.
7. They throw the garbage bags instead of gently putting them into the containers in the garbage area.

About waste bins and their usage

1. There is confusion with bags and dustbins. For example black bags are put in yellow containers. This can create confusion for a newcomer whether to put general waste or infected waste in it.
2. Stickers with instructions in English are being used.
3. There is mixing of waste inside dustbins.
4. There are dustbins without lids in various departments.

About dirty utility rooms

1. Some of the dirty utility rooms stink.
2. Soiled linen can be seen lying on the floor.
3. The sharp containers are kept without the small circular lid open.
4. The sharp containers are not sealed immediately as soon as they are put in the dirty utility.

About the garbage area

1. Garbage like gloves, masks can be seen lying outside the containers.
2. The side doors of most of the waste bins were found open.
3. There place is not secure i.e. stray dogs can easily enter the areas and tear the polythene bags.
4. The containers are washed regularly from outside not from inside.
5. Garbage was found littered inside the containers.
6. In many containers, the polythene bags were found open which means they were not tied at the time of collection from the site.
7. There is no supervisor in the garbage area to keep a check on the working of the housekeeping boys.
8. Housekeeping boys can be seen throwing the bags into the containers which results in bursting of the bags and its contents spread out. This is very dangerous for the person who is finally collecting this waste i.e. the **VULCAN TEAM.**
9. Not all bags have the sticker bearing the details of the shift, the ward and the person who is collecting the waste.

About the kitchen

1. The place where the utensils are washed is not clean.
2. Garbage was littered around the waste bin.

About the polythene bags

1. One day the hospital ran out of stock of big sized black poly bags as a result of which general waste was thrown into dustbins directly. This shows that enough buffer stock is not maintained of the polythene bags.
2. Small polythene bags weighing as less as 100-200 grams are not put into large sized bags. This results in increase in the number of garbage bags. It also occupies space of the garbage trolley which can otherwise be avoided.

Quantity of waste generated per day

The following graph shows the amount of BMW generated each day in PARK MULTI SUPERSPECIALTY HOSPITAL. The data was collected over a period of ten days.

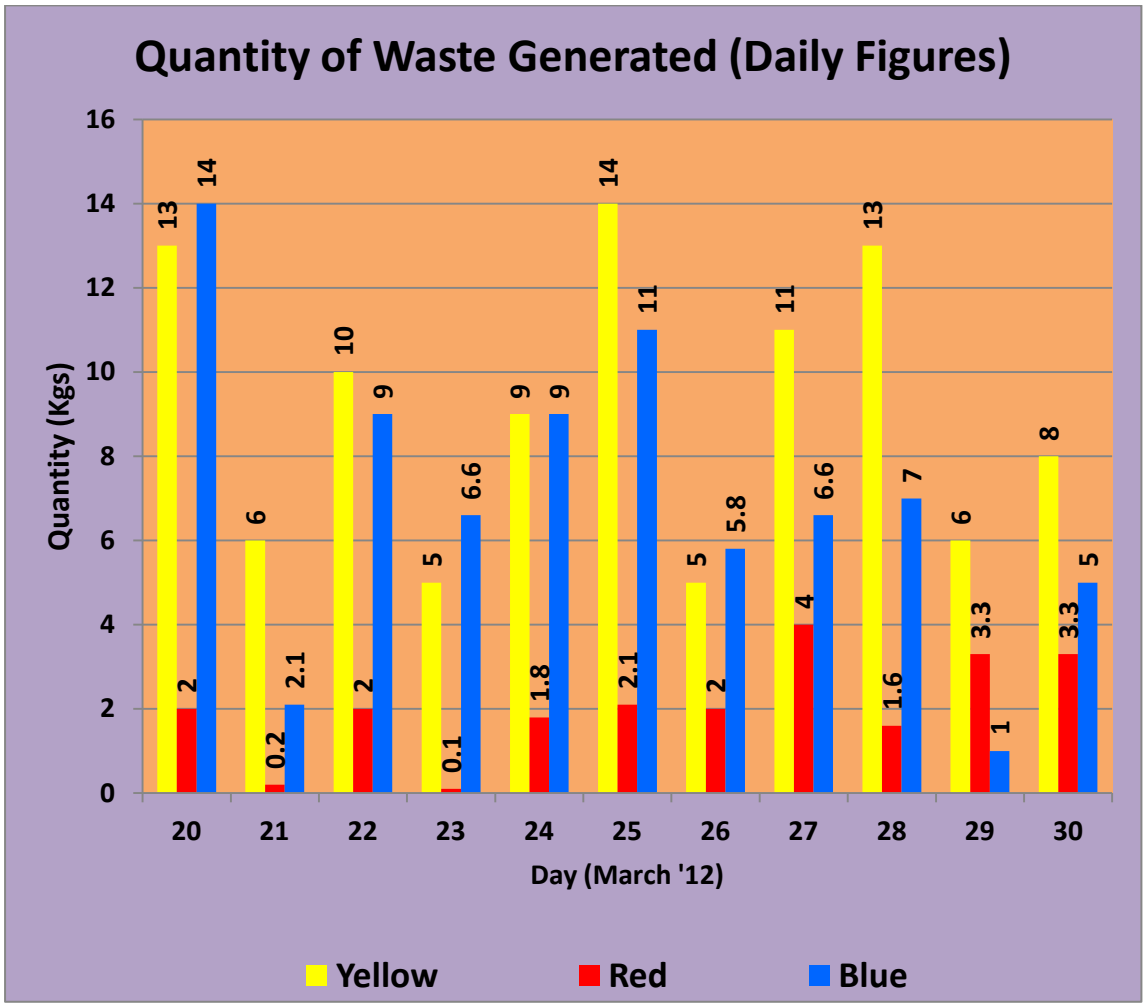


Figure 4 - Quantity of waste generated per day

Percentage of waste generated

The following PIE CHART shows the average percentage of each waste out of the total waste generated every day. The chart shows that the percentage of the infected BMW is the maximum as compared to plastics and sharps.

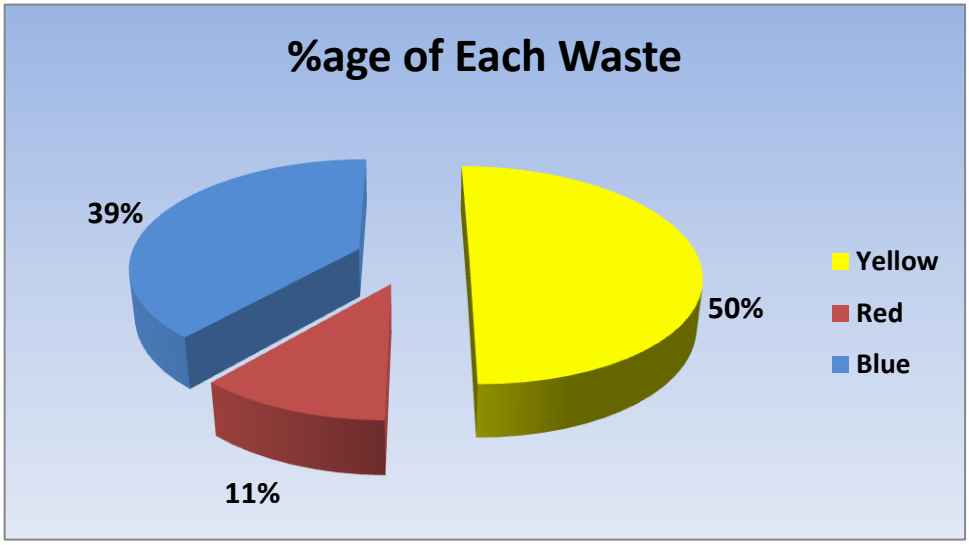


Figure 5: Percentage of waste generated

Awareness Level amongst the Staff

The staff was inter viewed on the basis of the questionnaire to assess the awareness o n the management and handling o f the bio medical wastes. Factors affecting the staff awareness survey:

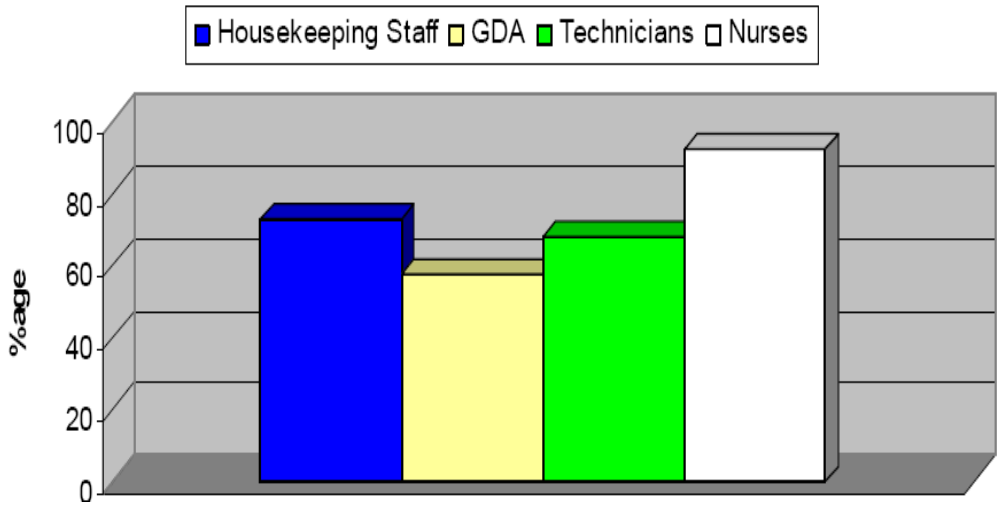


Figure 6: Awareness level amongst staff

- Many of the housekeeping boys were not able to read the Hindi language. They were explained the questions orally and asked to strike the correct answer. Even then, many of them were not able to understand the questions.
- Same problem were encountered with the GDAs. Moreover, they were of the view that biomedical waste management is not their job so they need not know about it. Questions from the questionnaire were asked orally to the technicians and the nurses and on that basis they were given marks.
- Some of the technical staff was also of the view that it's not their jo b to know much about BMW management.
- The sample size for housekeeping staff was 47.
- The sample size for GDAs was 12.
- The sample size for technicians was 13.
- The sample size for nurses was 32.

3.5 FORCE-FIELD ANALYSIS

OVERVIEW

Force-field analysis (FFA) was developed by Kurt Lewin. It identifies forces that help and those that hinder reaching the desired outcome. It depicts a situation as a balance between two sets of forces: one that tries to change the status quo and one that tries to maintain it. Force-field analysis focuses our attention on ways of reducing the hindering forces and encouraging the positive ones. Force-field analysis encourages agreement and reflection in a group through discussion of the underlying causes of a problem. The following chart depicts the steps for the force field analysis:

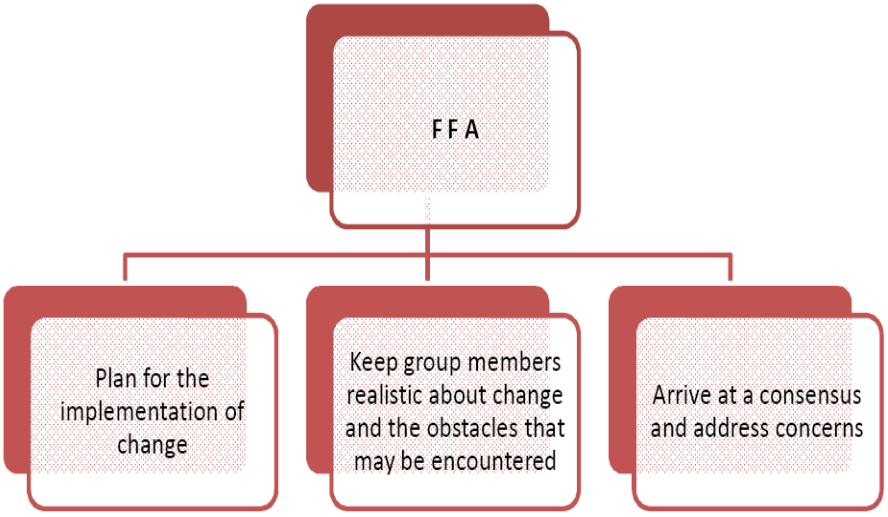


Chart 7: Force Field Analysis

THE METHODOLOGY FOR FORCE FIELD ANALYSIS

Step 1:- State the problem or desired state and make sure that all team members understand.

- The house keeping staff is quite well versed with the knowledge of biomedical waste management but does not strictly practice it.

- The technicians in some departments have `I know everything' attitude and are not very receptive to learning.
- The staff performs well in front of supervisors but in their absence they have casual approach to their job.
- The housekeeping has a free hand in the night shift. They are very casual about their job in the night.

Step 2:- Brainstorm the positive and negative forces.

Positive forces

- The house keeping staff is very soft spoken and behaves well with the patients.
- The housekeeping staff is very receptive and ready to learn.
- Regular debriefing sessions by the supervisors are very helpful for the housekeeping boys.

Negative forces

- Some of the housekeeping boys still have confusion regarding the segregation of waste.
- Absence of constant supervision.
- Some of the boys do not perform their duty well. They even leave bags unknotted. It is very difficult to catch hold of these boys as all the garbage bags do not bear the sticker bearing the name and shift number.
- The boys cannot freely interact with their superiors.

Step 3:- Review and clarify each force or factor.

- Good knowledge but lack of implementation: as already mentioned, the staff is quite well versed with the details of the waste management and safety measures to be taken but do not practice them.
- Receptive staff: This trait of the staff makes work very easy for the supervisors. They can teach them, criticize them and correct them.
- Regular debriefing sessions: this helps in keeping their knowledge up to the mark. Also help s the new recruits to gain education.

- Confusion regarding the segregation: some of the boys are not clear about the segregation of wastes. This reflects that the whole staff is not thorough with the biomedical waste management knowledge.
- Absence of constant supervision: Though the housekeeping activity is quite well monitored but the garbage disposal at its final destination i.e. the garbage area is not watched by the supervisors.
- Lack of free and frank interaction with superiors: this discourages the staff to come up with the issues that are bothering them. Majority of the bys said that they cannot talk freely to their supervisors. Therefore is very essential to work upon interpersonal skills of both the parties involved.

Step 4:- Determine how strong the hindering forces are (high, medium, low)

Step 5:- Develop an action plan to address the largest hindering forces.

CHAPTER 4 – DISCUSSION

4.1 QUALITY ASSURANCE

According to W. Edwards Deming the simplest definition of quality is "Doing the right thing right, rig ht away."

Dimensions of Quality

The following nine dimensions of quality have been developed from the technical literature on quality and synthesize ideas from various QA experts. Together, they provide a useful framework that helps health teams to define, analyze, and measure the extent to which they are meeting program standards for clinical care and for management services that support service delivery. While all of these dimensions are relevant to developing strategy and settings, not all nine deserve equal weight in every program. Each should be defined according to the local context and specific programs.

Technical performance: The degree to which the tasks carried out by health workers and facilities meet expectations of technical quality (i.e., adhere to standards).

Access to services: The degree to which healthcare services are unrestricted by geographic, economic, social, organizational, or linguistic barriers.

Effectiveness of care: The degree to which desired results (outcomes) of care are achieved.

Efficiency of service delivery: The ratio of the outputs of services to the associated costs of producing those services.

Interpersonal relations: Trust, respect, confidentiality, courtesy, responsiveness, empathy, effective listening, and communication between providers and clients.

Continuity of services: Delivery of care by the same healthcare provider throughout the course of care (when appropriate) and appropriate and timely referral and communication between providers.

Safety: The degree to which the risks of injury, infection, or other harmful side effect are minimized

Physical infrastructure and comfort: The physical appearance of the facility, cleanliness, comfort, privacy, and other aspects that are important to clients

Choice: As appropriate and feasible, client choice of provider, insurance plan, or treatment**.**

QUALITY ASSURANCE IN HEALTHCARE

Quality assurance (QA) can be defined as all activities that contribute to defining, designing, assessing, monitoring, and improving the quality o f healthcare. These activities can be performed as part of the accreditation o f facilities, supervision of health workers, or other efforts to improve the performance of health workers and the quality of health services. Four core principles to guide quality assurance in healthcare are:

Focus on the client : services should be designed so as to meet the needs and expectations of clients and communities.

Focus on systems and processes: providers must understand the service delivery system and its key service processes in order to improve them

Focus on measurement: data are needed to analyze processes, identify problems, and measure performance

Focus on teamwork: quality is best achieved through a team approach to problem solving and quality improvement.

SYSTEMS AND THE PROCESSES

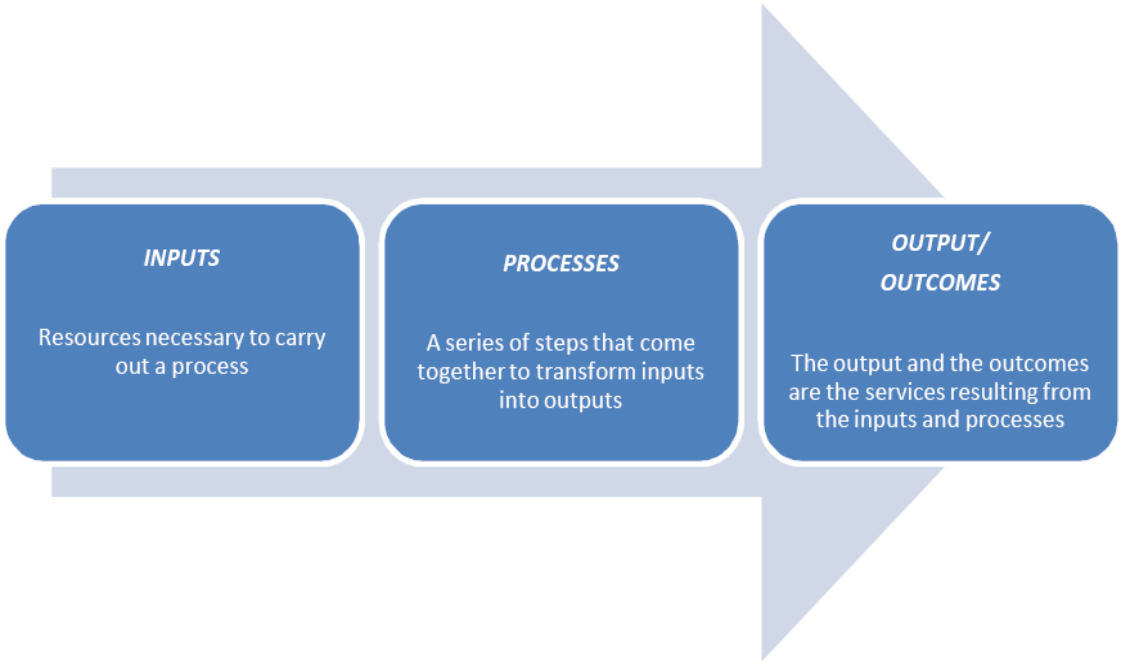
Of the above four principles, the most crucial one is the systems and the processes. It is the key to every action and change that can be brought about after a thorough analysis of the situation.

Quality management views all work in the form of processes and systems. Systems are arrangements of organizations, people, materials, and procedures that together are associated with a particular function or outcome. As shown in the figure below, a system consists of inputs, processes, and outputs/outcomes. A process is defined as "a sequence of steps through which inputs from suppliers are converted into outputs for customers."

All processes are directed at achieving one goal or output from the system that encompasses the processes. By increasing understanding of the processes and systems of care, Quality Assurance activities can identify weaknesses and change processes in ways that make them produce better results.

4.2 CONCEPTUAL MODEL OF A SYSTEM

Chart 6: Conceptual model of a system



TEAMWORK

A team is "a high-performing task group whose members is interdependent and shares a common performance objective". Teams are important to QA for several reasons. First, processes consist of interdependent steps that are executed by different people, so the group working within a process will understand it better than any one person. Including key people in the

improvement of a process often involves clarifying and incorporating the insights and needs of clients into healthcare delivery. The participation of major stakeholders improves the ideas generated, builds consensus about changes, and reduces resistance to change.

Moreover, mutual support and cooperation arise from working together on a project, leading to increased commitment to improvement. Such an atmosphere of support discourages blaming others for problems. Finally, the accomplishments of a team often increase the members' self-confidence. This empowers staff to work towards the goal of quality by motivating them to contribute their knowledge and skills to improve organizational and individual performance.

4.3 ROLE OF HOUSEKEEPING IN QUALITY ASSURANCE

Housekeeping refers to the general cleaning of hospitals and clinics, including the floors, walls, and certain types o f equipment, tables and other surfaces. The purpose of general housekeeping is to:

- Reduce the number of microorganisms that may come in contact with patients, visitors, staff and the community; and provide a clean and pleasant atmosphere for patients and staff.
- The housekeeping staff is the backbone of the hospital cleanliness management. Its personnel strength is one of the largest in a hospital exceeding that of the doctors and technicians. Therefore, it becomes very essential that this staff performs its duties perfectly without leaving any iota of incompetence.
- If the purpose of housekeeping as stated above is to be achieved, it is important that housekeeping staff be trained to perform their assigned tasks and are supervised on a regular basis.

As part of their training, it is important that housekeeping staff:

- Understand the risk of exposure to contaminated items and surfaces when performing environmental cleaning procedures; and
- Follow recommended policies and guidelines, including the use of appropriate personal protective equipment (PPE).

4.4 GENERAL PRINCIPLES OF CLEANING

- Scrubbing (frictional cleaning) is the best way to physically remove dirt, debris and microorganisms.
- Cleaning is required prior to any disinfection process because dirt, debris and other materials can decrease the effectiveness of many chemical disinfectants.
- Cleaning products should be selected on the basis of their use, efficacy, safety and cost.
- Cleaning should always progress from the least soiled areas to the most soiled areas and fro m high to low areas, so that the dirtiest areas and debris that fall on the floor will be cleaned up last.
- Dry sweeping, mopping and dusting should be avoided to prevent dust, debris and microorganisms from getting into the air and landing on clean surfaces. Airborne fungal spores are especially important as they can cause fatal infections in immunosuppressed patients
- Mixing (dilution) instructions should be followed when using disinfectants. (Too much or too little water may reduce the effectiveness o f disinfectants.)
- Cleaning methods and written cleaning schedules should be based on the type of surface, amount and type of soil present and the purpose of the area.
- Routine cleaning is necessary to maintain a standard of cleanliness. Schedules and procedures should be consistent and posted.

CHAPTER 5 – RECOMMENDATIONS AND CONCLUSION

5.1 RECOMMENDATIONS

Regarding staff

1. The housekeeping staff must be regularly rotated for duty so that everyone is well acquainted with all the aspects o f his job.
2. The house keeping staff shall not be just debriefed, but regular small test of 10-15 minutes durations shall be conducted by the house keeping supervisors. Rewards shall also be given to those who score well like a free meal in the cafeteria or an additional leave.
3. There should be good interpersonal relations between the housekeeping staff and their supervisors so that the boys feel free to express their views.
4. One of the housekeeping boys should be chosen every week and shall be asked to address his colleagues about the BMW management. This activity will instill in them the quality of leadership and responsibility for their job.

Regarding waste bins and polythene bags

1. Every evening, the inventory for the bags should be checked to check any shortage so that the hospital doesn't run out of poly bags stock.
2. Stickers should be put on each bag bearing the name of the house keeping boy, shift number and the ward number.
3. Stickers with instructions in Hindi language must be used for dustbins.
4. Colored dustbins corresponding to the color of the polythene bags must be used to avoid any confusion.
5. The sharp containers must contain sodium hypochlorite which should be changed every 8 hours.
6. The bags should always be picked by neck. Workers should maintain safe distance while handling those bags.
7. Yellow bags should never be kept on the floor as they contain blood soaked dressings.

Regarding the garbage area

1. Room fresheners shall be provided for dirty utility.
2. A separate record shall be maintained to register the name of the person who finally carries the garbage to the garbage area and disposes into the large dustbins.
3. Plastic aprons must be provided to those boys who are entering the garbage area these aprons can be kept with the security guard at the gate.
4. Fire g loves must be provided as the high tension gloves are no t 100% puncture proof. Also the rubber globes must be long enough so that they cover the forearm and the elbow.
5. Garbage bags must be put into the containers in the garbage area in the presence of a supervisor.
6. Special instructions must be given for blue bags to gently put them into containers and not throw them as they contain glasses, which can tear the bags.
7. Ensure that the containers in the garbage area are washed not just from outside but also from inside.
8. It must be ensure that the containers are dry from inside.

Regarding segregation and collection of the waste

1. General waste like garbage, garden refuse etc. should join the stream of domestic refuse.
2. Sharps should be collected in puncture proof containers.
3. Frequency of collection and transportation should be increased
4. Bags and containers for infectious waste should be marked with Biohazard symbol.
5. Highly infectious waste should be sterilized by autoclaving.
6. Cytotoxic wastes are to be collected in leak proof containers clearly labeled as cytotoxic waste.
7. Needles and syringes should be destroyed with the help of needle destroyer and syringe cutters provided at the point of generation.
8. Infusion sets, bottles and gloves should be cut with curved scissors.
9. Disinfection of sharps, soiled linen, and plastic and rubber goods is to be achieved at point of generation by usage of sodium hypochlorite with minimum contact of 1

hour. Fresh solution should be made in each shift.

10. On site collection requires staff to close the waste bags when they are three quarters full either by tying the neck or by sealing the bag.
11. Kerb side storage area needs to be impermeable and hard standing with good drainage. It should provide an easy access to waste collection vehicle.
12. Bio medical waste should be transported within the hospital by means of wheeled trolleys, containers or carts that are not used for any other purpose.

Recommendation for the Storage point of view

1. This hospital requires cold storage for the biodegradable waste like blood bags to store in a bulk for 48 hours when the hospital has already outsourced the BMW department.
2. Storage area should be sited on a well drained hard floor area and there should be special drain to discharge the washing which should go to the foul sewer.
3. Bio medical waste management room should be well lighted and well ventilated to keep secure from the entry of rodents, animal and insects.
4. Storage area should be spacious enough to store waste at least two days at a time.

Regarding transportation of waste

1. Transportation trolley should not be overloaded
2. Transportation trolley should be properly covered
3. The trolleys have to be cleaned daily.
4. Off site transportation vehicle should be marked with the name and address of carrier.
5. Biohazard symbol should be painted. Suitable system for securing the load during transport should be ensured.
6. Such a vehicle should be easily cleanable with rounded corners.
7. All disposable plastic should be subjected to shredding before disposing off to vendor.

5.2 IMPLEMENTATION

Following steps have been implemented by the housekeeping department:

1. A supervisor will be present the garbage transfer from trolleys to drums and from drums to the biotech van. The duty will be on rotation basis and every day three supervisors will be on duty at different timings of the day.
2. A sticker bearing the name of the housekeeping boy, shift and the ward number will be mandatory to be put on each bag collected from various departments.
3. The stickers will be checked by either the supervisor or the security guard at the exit gate of the hospital.
4. The briefing sessions would now be more frequently held and will be more vigorous.
5. The garbage drums will be washed in presence of one of the supervisors.
6. More sets of gloves, masks and gumboots will be issued to the housekeeping staff.
7. The housekeeping staff has been encouraged to openly come up with any issues regarding their work to the Executive Housekeeper.

5.3 CONCLUSION

By summarizing the whole thing, it can be said that even though the facilities are provided and the infrastructure is intact, it's the human resource that uses it which results in some or the other fallacy.

For ensuring the proper waste management practices in the hospital it is not only difficult to enforce the statutory guidelines but also there should be a change in the knowledge, attitude and practice at each level involved in the medical care. Along with it there should be continuous logistic support and user -friendly approach should be provided by the organization.

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APPENDICES

APPENDIX – I (A)

STAFF AWARENESS EVALUATION

Even though the statutory instructions for the waste management are followed strictly in the hospital, there always exist some lacunas in the system. It is very essential to ascertain that the personnel engaged in the BMW management are fully aware of the knowledge of BMW. To do the same, questionnaires were distributed amongst the concerned staff. The following are the questionnaires which were drafted individually for each staff.

- Following questionnaires were distributed amongst the nurses, the housekeeping staff and the technicians in various departments.
- The participants were explained the objective of this exercise.
- Participants were free to disclose/ not disclose their identity on paper.
- The duration for answering the questionnaires was 10 minutes.

Please take a few minutes to complete this survey. Your specific answers will be completely anonymous, but your views, in combination with those of others, are extremely important.

QUICK INSTRUCTIONS:

1. Please be honest in your answers
2. Please do not submit a false or bias responses, this will only damage our ability to get valuable results from the survey which will lead to decisive actions for improvement.
3. Please complete all questions at one sitting.
4. If you have any further queries, you are free to contact at arpita25oct@gmail.com or 7503141435.

QUESTIONNAIRE FOR NURSES

1. The present waste management system in the hospital.
   - Any training imparted

     yes----- no-----
   - Regular monitoring and record keeping

     yes----- no-----

2. Are you aware of the role of different personnel's involved in the system?

   yes----- no-----

3. What is the present sharps management system of the hospital?

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4. Different categories of sharps generated.

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5. How are sharps managed at the point of generation, collection and final disposal site?

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6. Method for sharps collection from the patient's bed side to the nursing station
   - Are the sharps stored in Puncture proof containers/ bags

     yes------ no-----
   - Is the container closed/ open

     closed------ open------
   - Any disinfectant used in the container ----------

   - Are the sharps destroyed individual or in bulk

     individual---------- bulk-------

7. How are the sharps destroyed?
   - Do you use needle destroyers and cutters

     yes------- no------

- Electric/ mechanical ----------

8. Are you comfortable with the present system? Yes------- no------

9. Do you get needle stick injuries? Yes-------- no------

- How often do you get one? ----------

- What are the reasons for it? ----------

- What is the most common reason for a sharps injury? ----------
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- What are the precautions taken in case of an injury? ----------
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  ----

10. Occupational safety while handling sharps?
    - Protective gears are provided
      yes--------- no------
    - If yes, are they being used regularly?
      Yes---------- no------
    - If no, what are the reasons for not using them?

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11. How is the waste carried from the point of generation to the final disposal site?

    - How often are the bins emptied
      once daily-------- twice daily----------
    - Are the sharps bin emptied regularly or how often?

Completely full--------- 3/4th full------

- Are the sharps collected manually in open bins/ secure puncture proof containers or polythene bags?

  Containers---------- bags----------

- What are the precautions taken by them? ----------

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12. Do you think that the present system of sharps management is easy and safe or should a new system be developed?

    Existing system is fine---------- new system is required--------

13. Are you satisfied with the working of the housekeeping staff?

    Yes---------- no----------

APPENDIX – I (B)

QUESTIONNAIRE FOR HOUSEKEEPING STAFF

1. What is your duty in the hospital?
2. What kinds of waste do you collect?
3. Are you aware of the dangers associated with waste specially sharps?
4. Are you aware of the present system of sharps management in the hospital?
5. Does anyone regularly monitor the system?
6. Was any training on waste management imparted?
7. How is the waste treated at the point of generation?
8. What is the collection method from the point of generation?
9. How is the waste carried from the point of generation to the final disposal site?
    - How often are the bins emptied?
    - Are the sharps bins emptied regularly or how often?
    - Are the sharps collected manually in open bins/ secure puncture proof containers or polythene bags?
    - What are the precautions taken by them?
10. Do you get needle stick injuries while handling waste?
11. How often do you get one and what are the common causes for this?
12. What do you do if you get an injury?
13. What precautions do you take while handling waste specially sharps?
14. Are you vaccinated against Tetanus and Hepatitis B?
15. Do you wear protective gears while handling waste?
16. Are you comfortable with the present system?
17. How is the waste carried from the point of generation to the final disposal site?
18. What is the present system of sharps disposal in the hospital
19. Is the final disposal site located in a secure area?
20. Do you think that the present system of sharps management is easy and safe or should a new system be developed?

(NOTE: for the convenience of the house keeping staff, the questions were translated in Hindi language.)

APPENDIX – I (C)

QUESTIONNAIRE FOR TECHNOLOGY OPERATORS

1. Which technology is used foe BMW management?

Segregation---------- Collective Disposal----------

2. What kinds of waste are treated?

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3. How are sharps treated?

Put in sharp containers---------- put in polythene bags----------

4. What are the occupational hazards associated with BMW?----------

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5.What are the precautions taken by the technicians?

- Use of protective gears----------
- Immunization yes--------- no----------

6. What is the material provided to you for BMW?

- Bags / bins used yes---------no----------
- Space provided sufficient yes--------- no----------

7. How shall the sharp containers be kept in the department?

8.Is there any need to cover the sharp containers?

Yes---------- no----------

9.Do you think that the present system is satisfactory or will you recommend a new system?

Present system---------- new system----------

10.Are you satisfied with the working of the housekeeping staff?

Yes---------- no----------

APPENDIX - II

QUANTITY OF BMW

The following data was collected from the security guard posted at the gate of the hospital. Every day VULACN company's vehicle comes to collect the garbage from the hospital. Every bag is first weighed and the entry is made into the register according to the color of the bags. Black bags which contain the general waste are collected by the Municipal Cooperation of Gurgaon. No data was available about the black bags. The waste is collected once a day

DATE	QUANTITY OF WASTE GENERATED PER DAY (In kgs)		
	YELLOW	RED	BLUE
20/03/2012	13	2	14
21/03/2012	6	0.2	2.1
22/03/2012	10	2	9
23/03/2012	5	0.1	6.6
24/03/2012	9	1.8	9
25/03/2012	14	2.1	11
26/03/2012	5	2	5.8
27/03/2012	11	4	6.6
28/03/2012	13	1.6	7
29/03/2012	6	3.3	1
30/03/2012	8	3.3	5
AVERAGE	9.09	2.04	7.01

From the above data, it can be seen that the infected waste is generated in the largest amount followed by the sharps and then the plastics. This data was collected over a period of 11 days and average was calculated to ascertain the amount of waste generated in different categories every day in the hospital.