

**Summer Training at
Fortis Escorts Hospital Jaipur
(April 9 – June 1, 2012)**

Biomedical Waste management

**By
Jenifer David**

**Under the guidance of
Dr. Nirmal Kumar Gurvani**

**Post Graduate Diploma in Hospital and Health Management
2011-2013**



**Institute of Health Management Research,
Jaipur
2012**

**INSTITUTE OF HEALTH
MANAGEMENT RESEARCH**

1, Prabhu Dayal Marg
Sanganer Airport, JAIPUR - 302 011, INDIA
Tel. : 3924700, 2791431-32
Fax : 91-141-3924738
E-mail : iihmr@iihmr.org
URL : <http://www.iihmr.org>
Gram : HEALTHINST

CERTIFICATE

This is to certify that Jenifer David has undergone summer training in Fortis Escort Hospital, Jaipur from 9th April to 1st June, 2012

The candidate carried out all the studies related to summer training herself. Her approach to the studies has been sincere, scientific, and analytical. This summer training in partial fulfillment of the course requirement is recommended for the award of Post Graduate Diploma in Hospital & Health Management.

I wish her success in all future endeavors.

Dr .P. R.Sodani

(Dean Academics and Student Affairs)

Dr.Nirmal Kumar Gurbani

(Associate Dean)

(Pharmaceutical Management)

16th June, 2012

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Jenifer David** worked as a **Trainee** with us in the **Dept. of Nursing Education Department** from **9th April to 1st June, 2012**.

Her performance during the period in the department was good. She comes across as a willing, sincere and intelligent person who has a strong drive and zeal for learning.

We wish her the best for all her future endeavors.



Authorized Signatory



Acknowledgement

I would like to extend my heartfelt gratitude towards all the personnel at “**Fortis Escort Hospital**” who helped me get through this project.

This project would never have been possible without those who went out of their way to help me.

My institute **IIHMR, Jaipur** and its education deserves foremost appreciation for providing me opportunities to understand my individual capabilities. Of course, all the faculties at IIHMR had facilitated the Endeavour; I acknowledge contribution of **Director Mr. S.D.Gupta, Brig.S.K.Puri** and my mentor **Dr. N.K.Gurbani** in completion of project right from the word go.

I start by expressing my sincere gratitude to, **Dr.Shrikant Swami, Medical Superintendent** fortis escort hospital who gave me the opportunity to work in this renowned organization.

I also extend my heartfelt gratitude to **Major Ranjana Williams, Chief of Nursing** who extended timely guidance and support at every crucial juncture of this project and gave it the shape you see today.

I wish to express my deep sense of gratitude and indebtedness to **Mr. Subhrodho Das, Human Resource Head** Fortis Escort.

Sincere thanks to all the staff at all levels, especially all Education dept. staff, and infection control dept. for helping me at each and every step of my work. Heartiest gratitude to them for making my stay and work at this place a memorable one.

Last but not the least; I would like to thank Miss Timi Thomas for her valuable suggestions & effort in bringing this project to a meaningful end.

Jenifer David

TABLE OF CONTENTS	Page No.
1. Abbreviations	5
2. Introduction	6
3. Objectives	7
4. Research Methodology	7
5. Organization Profile	8 – 14
o History & infrastructure	
6. General Findings of Clinical and Non Clinical Departments	13 - 24
7. Brief on Department of Nursing	25
7. Study on Evaluation of Bio medical waste management.	26
Introduction	26
8. Review of literature	26
9. Bio medical waste rules	28
10.Objectives & Rationale of study	35
11.Study Methodology	36
12.Observations and findings	37
13. Analysis & interpretation of the Study	46-48
Tables	
Graphs and Charts	
Estimation of waste generation	
14. Findings	49
15. Recommendations	50

16. Conclusion	51
17. References	51
18. Annexure I	
19. Annexure II	
20. Annexure III	
21. Annexure IV	

ABBREVIATIONS USED:

- F&B- Food and Beverage
- USG- Ultrasonography
- FEHJ- Fortis Escorts Hospital, Jaipur
- FEHL- Fortis Escorts Healthcare Limited
- GE- Gastroenterology
- ZD- Zonal Director
- MS- Medical Superintendent
- FOS- Fortis Operating System
- QA- Quality Assurance
- CTVS-
- HOD- Head Of the Department
- ENT- Ear Nose Throat
- CSSD- Central Sterile Supply Department
- SICU- Surgical Intensive Care Unit
- NICU- Neonatal Intensive Care Unit
- LDR- Labor and Delivery
- OT- Operation Theatre
- HDU- High Dependency Unit
- MICU- Medical Intensive Care Unit
- CCU- Cardiac Care Unit
- HR- Human Resources
- MRD- Medical Records Department
- IT- Information Technology
- PWD- Patient Welfare Department
- GI- Gastrointestinal
- NGW- Neuro General Ward
- OPD- Outpatient Department
- IPD- In patient Department
- PICU – Pediatric Intensive Care Unit
- CMW – Cardiac Monitoring Ward
- BMW- Bio-medical Waste

INTRODUCTION

Summer training is an integral part of PGDHM. As a part of the curriculum, students are required to undergo 45 days training with reputed organization to learn daily operational management and help management study and address some identified issue/problems associated with some specific operational area. The main purpose of training is to get exposure to functioning of the organization.

Fortis Escorts hospital, a tertiary care hospital, is recognized as centre of excellence for providing medical care, and research facilities of high order in field of medical sciences. The hospital is centrally air conditioned having capacity of 300 beds, 210 functional beds, state of the art operation theatres and Intensive Care Unit beds. Fortis Escorts Hospital is continuously growing by setting example not only in field of clinical excellence, training and research but also in field of management expertise.

Due to these distinguishing features I did my summer training in Fortis Escorts Hospital, Jaipur with the aim and objective of getting exposure to functioning of the institute.

My aim was to study managerial functioning of Fortis Escorts Hospital, Jaipur with special reference to different areas and departments of the hospital.

OBJECTIVES

- To learn daily operational management of the organization and its various departments.
- To study salient and critical features about functioning of these departments.
- To identify issues and problems with some specific departments.
- To undertake the projects assigned.

Study Tenure: 30-Days (12th APRIL 2012 – 12th MAY 2012)

Place of study: FORTIS ESCORT HOSPITAL, JAIPUR

METHODOLOGY:

- Information regarding organization, location, area, history, planning, manpower, organizational hierarchy, statutes and other details collected from hospital's manual, concerned authorities and other sources.
- Various department were identified.
- Training in identified areas was done by collecting information and data from co-coordinators, personal observation and by assisting concerned personnel in daily operational management of that area.
- Data was collected by reviewing records and from co-coordinators. Data comprises of:
 - Input to the department
 - Output generated
 - Other data specific to the department
- Information was collected regarding location, equipments used, policies, procedures and other managerial issues.
- Additional information was collected wherever required.
- Observational findings and information collected were compiled and a report was prepared.

Limitation of study:

- Time for planning was limited and based on some assumptions.
- The staff is too busy to get accurate information on BMW.
- The study is based on the information received from the interview schedule.

HOSPITAL PROFILE:

Fortis Healthcare is India's fastest growing healthcare chain, with state of the art facilities and an unparalleled commitment to patient care. FEHL was founded on vision of becoming an integrated healthcare delivery organization driven by quality, excellence, technology and compassionate care. FEHL, one of the largest private healthcare companies in India has one of its branches in Jaipur as Fortis Escorts Hospital, Jaipur which focuses on cardiac sciences, neurosciences, renal sciences and GI diseases. Besides, it also provides services in mother and childcare, Ortho and complete range of multi-specialty services in all disciplines.

FEHJ has dedicated facilities for comprehensive care of trauma patients and others in need of emergency care including an emergency Operation Theatre and 10 bedded Medical Intensive Care Unit. FEHJ is the first amongst proposed multi-specialty hospitals to be set up in Rajasthan with a mission to bring quality medical care at doorstep. FEHJ is the first hospital in the country to attain NABH accreditation in minimum stipulated time after commencement of operations and got re-accredited on 27th April 2011. FEHJ is a super-specialty hospital backed by multi-specialty.

Super-specialty includes cardiology and cardiac surgery, renal sciences, neurosciences and GI diseases.

Multi-specialty includes Orthopedics and joint replacement, diabetes and endocrinology, dermatology, internal medicine, pulmonary medicine, ophthalmology, dietetics, physiotherapy, preventive health check-ups, general surgery, dental and cosmetic and plastic surgery, ENT, gynecology and obstetrics, pediatrics, neonatology.

HISTORY:

- Jaipur, August 2, 2007- FEHL, one of largest private healthcare companies in India, Thursday announced a multi-specialty hospital at Jaipur as part of its initiative to expand its operations in Rajasthan.
- It was inaugurated by Chief Minister Vasundhara Raje in presence of Malvinder Mohan Singh, Chairman, FEHL, Shivinder Mohan Singh, CEO and MD, Fortis and Escorts Heart, besides other dignitaries and company officials.

INFRASTRUCTURE:

FEHJ has certain entities of excellence like:

- C arm with digital subtraction angiography
- Flat Panel Cath Lab
- Advanced Pathology Lab
- Mobile X-Ray
- 64 slice CT Scan
- TMT, ECHO, HOLTER recorder and monitor and ECG to help non invasive cardiac investigations
- 500 ma image intensifier TV

- Digital CR reader X-Ray

LOCATION:

FEHJ has an easy to access basis. It is situated on JLN road, Jaipur.

Address: Fortis Escorts Hospital, Jaipur

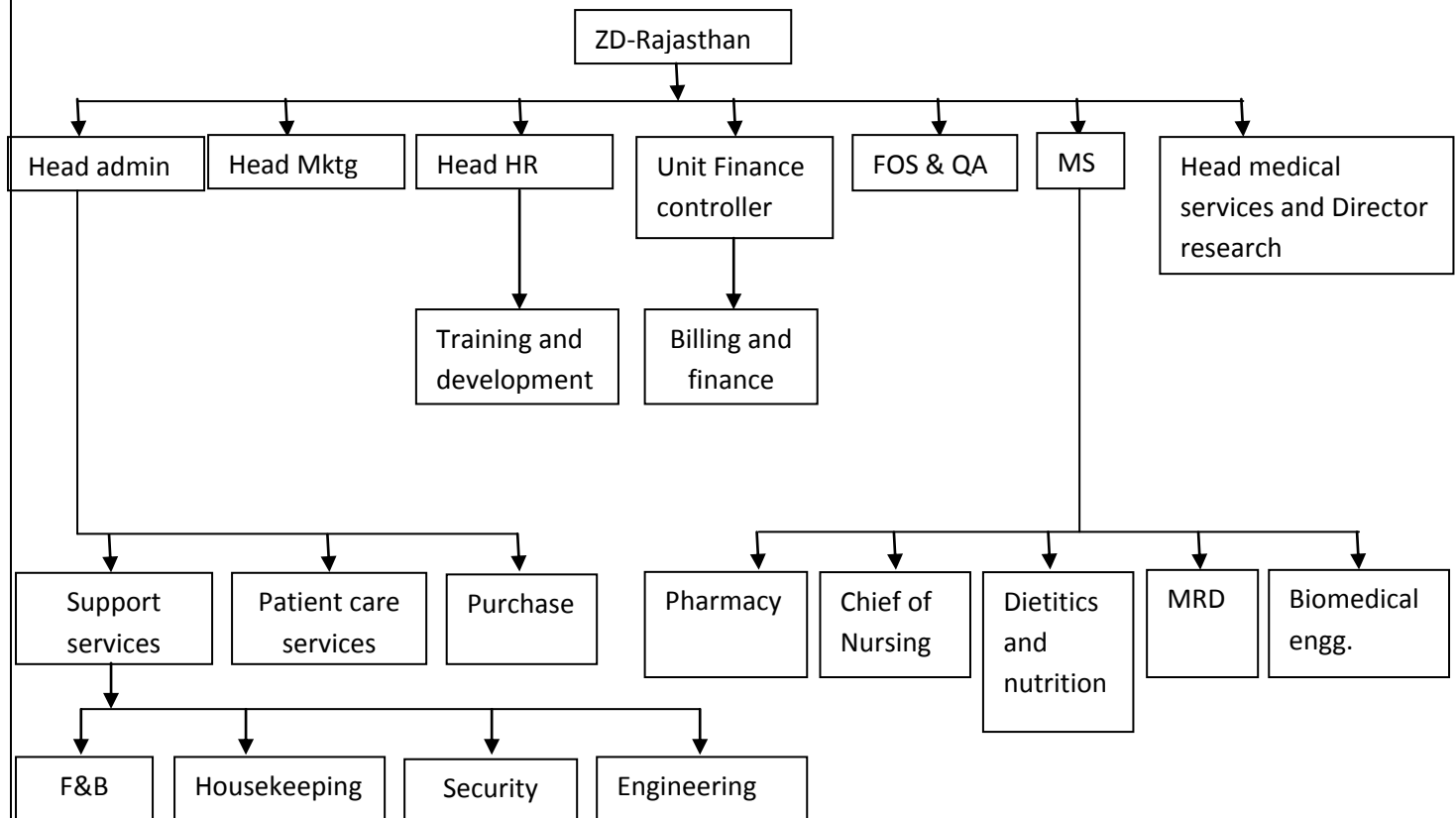
JLN Marg, Malviya Nagar, Jaipur-302107

Rajasthan, India

AREA:

It covers an area of 6.68 acres with an investment of 1.10 billion it has 210 operational bed facility with 350 installed bed capacity. It facilitates space and convenience to both patient and staff which further increases efficiency.

NON-CLINICAL ORGANOGRAM:



DEPARTMENTS:

There are 37 departments divided into clinical and non-clinical departments.

CLINICAL:

- Infection control
- CSSD
- Physiotherapy
- CTVS
- SICU,PICU ,CMW
- NICU
- LDR
- OTs
- Triage
- HDU
- Radiology
- General ward
- Neuro General ward
- Dietitics
- MICU
- CCU
- Cath Lab
- Laboratory
- Blood Bank

NON-CLINICAL

- Administration
- Engineering
- Biomedical engineering
- Finance
- Marketing
- HR
- Housekeeping
- Laundry
- Pharmacy
- MR
- F&B
- Security
- Central stores
- QA
- Research
- PWD
- IT

SERVICES PROVIDED:

CLINICAL

- Cardiac Surgery
- Cardiology
- Nephrology
- Neurology
- GI diseases
- Pulmonology
- Dermatology
- General Surgery
- Paediatric Surgery
- Gynaecology
- Neonatology
- Radiology
- Thoracic Surgery
- Speech Therapy
- Sports Medicine
- Orthopaedic
- Oncology
- Emergency Medicine
- Critical Care
- Blood Bank
- General Medicine
- CTVS
- Renal Science
- Urology
- Neurosurgery
- Internal Medicine
- Endocrinology
- Psychiatry
- Plastic Surgery
- Obstetrics
- Paediatric
- Urology
- Psychology
- Vascular Surgery
- Rheumatology
- Physiotherapy
- Ophthalmology
- Nephrology

- Dental
- Anesthesia
- ENT
- Intervention Radiology

NON-CLINICAL

- Housekeeping and Laundry
- Pharmacy
- MR
- F&B
- Security
- Central Stores
- Training and Development

FLOOR WISE DISTRIBUTION:

4TH Floor:

- 2 Deluxe rooms
- 8 Single rooms
- 16 Double rooms

3rd Floor:

- 2 Deluxe rooms
- 8 Single rooms
- 16 Double rooms

Service Floor:

- Anaesthetic Gas Scavenging System
- Reverse Osmosis Unit
- Air Handling Units

2nd Floor:

- SICU-I General Surgery
- SICU-II CTVS
- CSSD
- 5 OTs

1st Floor:

- Training, Library, Retiring room, Admin. Offices, Doctors Lounge
- CCU & CATH Lab, CMW, PICU, LDR, NICU, NGW
- IT Dept., Physiotherapy, General Ward

Ground Floor:

- OPD, IPD, ER, Dialysis, Day care, OPD Pharmacy, Endoscopy
- MICU, HDU, General Ward, All OPDs, Executive Health Check up, Cafe and Doctors Dining
- Lab & Radiology, Triage & Ambulance, Nutrition clinic, Blood Bank & Nuclear Medicine

Basement Floor:

- Engineering & Biomedical Engineering, MRD, Stores, Research, QA
- F&B, HR, Nursing admin., IPD Pharmacy, Mortuary
- Admin., Finance/Billing, Marketing, Housekeeping & laundry, Security

GENERAL FINDINGS OF CLINICAL AND NON-CLINICAL DEPARTMENTS

1. Quality assurance department:

Goal- Headed to maintain and perk up the standards.

Quality assurance or QA for short, is the activity of providing evidence needed to establish quality in work, and that activities which require good quality are being performed effectively.

Documents maintained:

- Standard operating system
- Policies
- Manuals
- Plans
- Committees
- Quality indicators
- Internal audit
- 8. Medical
- 9. Training record
- 10. QA programmes
- 11. Clinical guidelines
- 12. Scope of services
- 13. Admission discharge criteria

2. Human resource department:

Goal- To ensure availability and retention of quality talent to meet organizations goal and objectives. Overall growth and development of employee's their orientation and functional training.

Scope of services:

- Manpower planning
- Recruitment process
- Internal job posting process
- Pre-employment health check-up
- Trainings
- Attendance and leave management
- Appraisal and promotion process
- Statutory compliances
- Medical benefits
- Employee welfare programmes
- Disciplinary action
- Grievance handling
- Payroll management
- The hospital is adequately assigning staff to each department. This task is very well handled by HR department. The need of staff in each department whether clinical or non-clinical is assessed and further appointees are given job. The over and under staffing criteria is considered well in advance to make effective utilization of staff.

- Continuous trainings are given to every individual (doctors, nurses, GDA's and housekeeping staff) according to their work profile. Few benefits of trainings are:
 - ✓ Higher productivity and reduction in errors.
 - ✓ Helps employees to quickly climb the learners curve for full productivity.
 - ✓ Results in increase job satisfaction and reduces turnover.

3. Medical records department:

Goal- Medical records department is the _____ of all discharged/ expired health record charts. The medical records department staff ensures the confidentiality, preservation, storage, and retention of the patient's documents.

Documents maintained by the department:

- IPD files receive register
- IPD files dispatch register
- OPD files receive register
- IPD files dispatch register
- Death register
- Birth register

Scope of services:

The workflow of the department can be broadly divided into following steps:

- Record collection
- Analytical evaluation
- Codification
- Assembly / Storage
- Retrieval
- Data generation

4. Pharmacy department:

Goal- The goal of pharmacy is to procure and provide the medicine to the patient.

Documents maintained by the department:

- Purchase registers
- Bills files

Scope of services:

To give services of all range of medicines and surgical items to the patients, wards, OT's, ICU's and bio-medical include:

- Procuring and providing the genuine medicine to the patient.
- Deliver the medicine to wards and OT's.

- Discharge summary of the patient (medicine issued).

5. Housekeeping:

Goal- To achieve defect free room with 100% hygiene and cleanliness to maximize the patient's satisfaction with minimum cost.

Documents maintained by the department:

- Cleaning records of all clinical and non-clinical departments
- Attendance registers of all workers
- Materials record
- Patient feedback form
- Surveillance
- Record of round by supervisors
- Room checklist
- Training data

Scope of services:

The scope and complexity of services provided by this department is:

- Cleaning of all areas
- Providing water
- Providing room amenities
- Providing services like glass cleaning, pest controlling, horticulture and in-house laundry
- Waste disposal

6. Laundry:

Goal- To deliver spotlessly clean and hygiene linen uniforms to the user departments.

Document maintained by the department:

- Cloth incoming register
- Cloth outgoing register
- New linen stitch register
- Alteration register

Scope of services:

The scope and complexity of services provided by this department are:

- Providing clean linen and uniform
- Treat infected / contaminated linen
- Treat heat liable linen

7. Marketing:

Goal- Marketing department is responsible for the revenue generation through brand building, retail sales, corporate marketing, PR and media communication and liaison with government. Some of the activities of this department are brand awareness, events management, corporate social responsibility and ensuring business and growth in line with organizational objectives.

Documents maintained by the department:

- Tariff maintenance
- Media report

Scope of services:

1. The categorization of business is done, based on the type of specialty:
 - a) Cardiac
 - b) Multispecialty
2. Market intelligence is a part of marketing operation. Team is required to keep track of activities, events, procedure etc. developments taking place at competition hospitals with minimum variance. The same is shared with seniors and that helps as driving strategy at times.

. The marketing dept. is divided in four parts to handle the different marketing activities, which are :

1. PR (PUBLIC RELATIONS)
2. RETAIL SALES
3. CORPORATE TPA
4. CSR(corporate social responsibility)

PR dept. – The dept is headed by public relations officer. The dept looks after the following functions: promoting their doctor specialties and hospital over all through talk shows, ads news, print and electronic media. They promote their org by putting canopy's, organizing awareness program, promotional camps, becoming medical partners with other program and activities.

Retail sales dept. – The overall work of this dept. is to promote sales by creating more and more patient referral, i.e. meeting different doctors and creating referral thereby increasing patient footfall. Other activities include organizing and coordinating medical conferences, get to gather. The dept also organizes outreach activities in which paid camps are the one of the routine activities.

Corporate TPA – Fortis tie up with good corporate and provide for cash and credit health services. They act as a mediator between patient and TPA. This dept deals with TPA of insurance companies and TPA act as connecting link between patient and hospital and insurance company.

CRS dept.- it carries out the different social responsibility work of the corporate. Some of which includes, NANI CHHANN – promoting girl child and saving environment.

(in this a sapling is given to the parents on birth of baby girl).

GRAMIN SVASTHAY YOJNA -, GOLDEN AGE CLUB (for old age people), YATAN project for the deaf and dump, HIV AIDS program etc are the different activities of the dept.

8. Finance department:

Goal- To provide accurate relevant and timely financial information necessary in making right business plan and decisions.

Documents maintained by the department:

- Monthly payment voucher
- Employee salary
- Vendor payment
- Input output billing

Scope of services:

- Business building insights
- Areas for lowering cost and improve profitability
- Updating of bills on daily basis for IPD patients
- Customer (patients attendant) satisfaction for billing concern
- The has overall responsibility for coordination of various functions (pharmacy, wards etc.) and daily basis report for admission, collection to higher management and administration of the department and they maintain the log of all the problems that arise on day to day basis and provide the necessary solution as deemed proper and reasonable.
- It serves all departments for finance and billing aspects.

9. Information technology:

Goal- **To provide IT value to end users with respect to their day to day functioning.**

Documents maintained by the department:

- Vendor file
- Call report
- Assets report
- Audit report
- Medtrak

Scope of services:

The scope and complexity of services provided by this department is application software (medtrack).

1. IT infrastructure

- Hardware and Software
- Anti Virus services
- Internet services

2. Communication system

10. Research

Goal - To work on few studies related to the hospital and the activities undergoing there.

Documents maintained by the department:

- Protocol report
- Investigator brushes
- Informed consent form file
- CRF(Case Report form) file
- Investigator site file

11. Food and beverages

Goal - To provide food and beverages and fulfill the needs and desires of our esteemed customers.

Documents maintained by the department:

- Diet record of patients
- Vegetables stock
- Stores stock
- Utensils stocks

Scope of services

- The diets planned and served is according to the needs of the patients and helps in speedy recovery as food also plays a very vital role.
- Total eight services starting from the morning to evenings.
- Food served and checked under the supervision of our own supervisors.

- Meals are served to the patients keeping in mind the ailments and needs. The special diets served are renal, Acitrome, hepatic, Jain food, Ryle's tube, cardiac etc. Providing services in all the areas. (ICU, WARDS, & rooms).

12. Central stores

Goal - To provide the required items at the right time, at the right price and in the right quantity.

Documents maintained :

- Vendor list
- Quotation
- Purchase order file

- Capital system
- Non capital system
- Recommendations of opt file

Scope of services :

The scope and complexity of services provided by this department is to provide stationary items (printed stationary, office stationary and computer stationary), Engineering, housekeeping, laboratory, biomedical, medical consumables and capital items.

This department serves to all the medical and non – medical departments in the hospital.

13. Engineering:

Goal- To manage all engineering equipments and machines and supervising day to day hospital maintenance work and ensuring smooth functioning of all facilities of hospital.

Documents maintained:

- Log book
- Maintenance
- Consumption diesel
- Running hours

Scope of services

The scope and complexity of services provided by this department is to coordinate with various departments medical and non- medical so that there is no hindrance in day to day work of all facilities.

The department monitor all the facilities such that diesel generator , steam boiler , firefighting equipment , air conditioning chiller plant , sewage treatment plant , RO plant , soft water plant , tube well , all plumbing work , carpentry work etc. Preparing the plan for equipment daily and preventive maintenance, spare parts and consumable for the department so that each facility works properly and there will be minimum breakdown. Engineering is also responsible for controlling and ensuring for optimum use of power, water and diesel.

14. Patient welfare department:

Goal - To make and position the hospital as a centre for excellence, by ensuring customer satisfaction through personalized customer care, following the guiding principles of empathy, care and compassion to make the patients feel cared for.

Documents maintained:

- Grievance book
- Complaint register
- Comments and suggestions

Scope of services:

The scope and complexity of services provided by this department is to enhance the customer satisfaction. The types and ages of patients served are patients of all age group.

15. Bio-medical engineering:

Goal- To install, commission and maintain all medical equipments in an efficient and cost effective way and make technical appraisal and recommendations for purchase of new equipments.

Documents maintained

- Complaint register
- Calibration records

Scope of services:

- Exercise controls over financial expenses on equipment and other necessary items for maintenance purposes .Ensure the downtime are lowest.
- Timely reporting of progress to GM ADMIN.
- Monitor daily use of safety devices by all staff members to maintain safe working conditions. Any other responsibility assigned by the staff members to maintain safe working conditions. Any other responsibility assigned by the concerned seniors.

16. Security

Goal- To provide a proactive , competent service , to protect the life and property of every individual present in our premises.

Documents maintained:

- Audits
- Mock drills
- Complaint register

Scope of services:

- Security against intrusion , theft and robbery
- Transport & parking control
- Investigation & corrective action
- Informing the police for any ML cases
- Access control
- Key Management
- Disaster and fire management
- Mortuary management

17. Clinical departments:

Goal- To provide medical care and treatment to patients with all types of diseases .

Documents maintained:

- Transfer in and out patients
- Medical record department register
- Replacement book
- Bio- medical complaint register
- Death register
- Daily assignment and communication register
- Leave and remark register
- Monthly data register
- Admission discharge register
- Daily billing register
- Daily shift report
- Discharge process register
- Attendance register

Scope of services :

Operation Theater: All types of cardio- thoracic and vascular surgeries are performed here. High risk surgeries are also performed with heart supporting system and advanced perfusion techniques.

SICU-CTVS AND general surgery , CCU and general ward :

Services include:

- Invasive monitoring
- Patient assessment
- Personal needs
- Dietary needs
- Bed side X-ray , physiotherapy
- Transfer to ward
- Patient and family education

CSSD: Provide clean and sterile supplies which help in reduction of infection and improve the quality of care.

Infection control:

- To educate staff on biomedical waste segregation and management.
- To review epidemiological surveillance data and identify areas of intervention.

- To identify patients and or staff with communicable / potentially communicable infections and institute appropriate measures in such cases.

Dialysis: Laboratory investigation and feedback from patients and their attendants.

Pediatric NICU: To provide world class tertiary level management of critically sick babies and children. Specialized services will include pediatric surgery, neurosurgery, and physiotherapy and child psychology.

LDR: Outpatient care for patients coming to the OPD. It includes –Obstetric consultation, investigation and referrals and opinions from other departments, if required.

Physiotherapy:

Facilities in department of physiotherapy:

Electrotherapy, diagnostic, mechanical, manual mobilization therapies, exercise therapy, chest physiotherapy, gynae /obstetric, fitness, post operative cardiac surgeries, for neurological disorders and geriatrics.

HDU, triage and ICU: The role of these three is same to some extent.

They provide intensive nursing care and monitoring. Patients with critical medical problems are treated in this highly focused specialized environment , featuring the best intensive care medical personnel and cardio-pulmonary monitoring equipment available .Procedures performed included bronchoscopes, central venous lines , peripherally inserted line, arterial line , pulmonary arterial catheter , temporary pacemakers.

Cathlab : The range of services includes all the elective and emergency procedures across whole spectrum of cardiology . CAG’S, PTCAs, BMV’s, device closures, EP studies, and RF cardiology procedures are performed in cath lab.

Dietetics: Provide an array of patient care services , including nutritional assessment , counseling services , and enteral and parenteral feeding recommendations . The food services section of the department is committed to provide all IPD patients with fresh hygienic food.

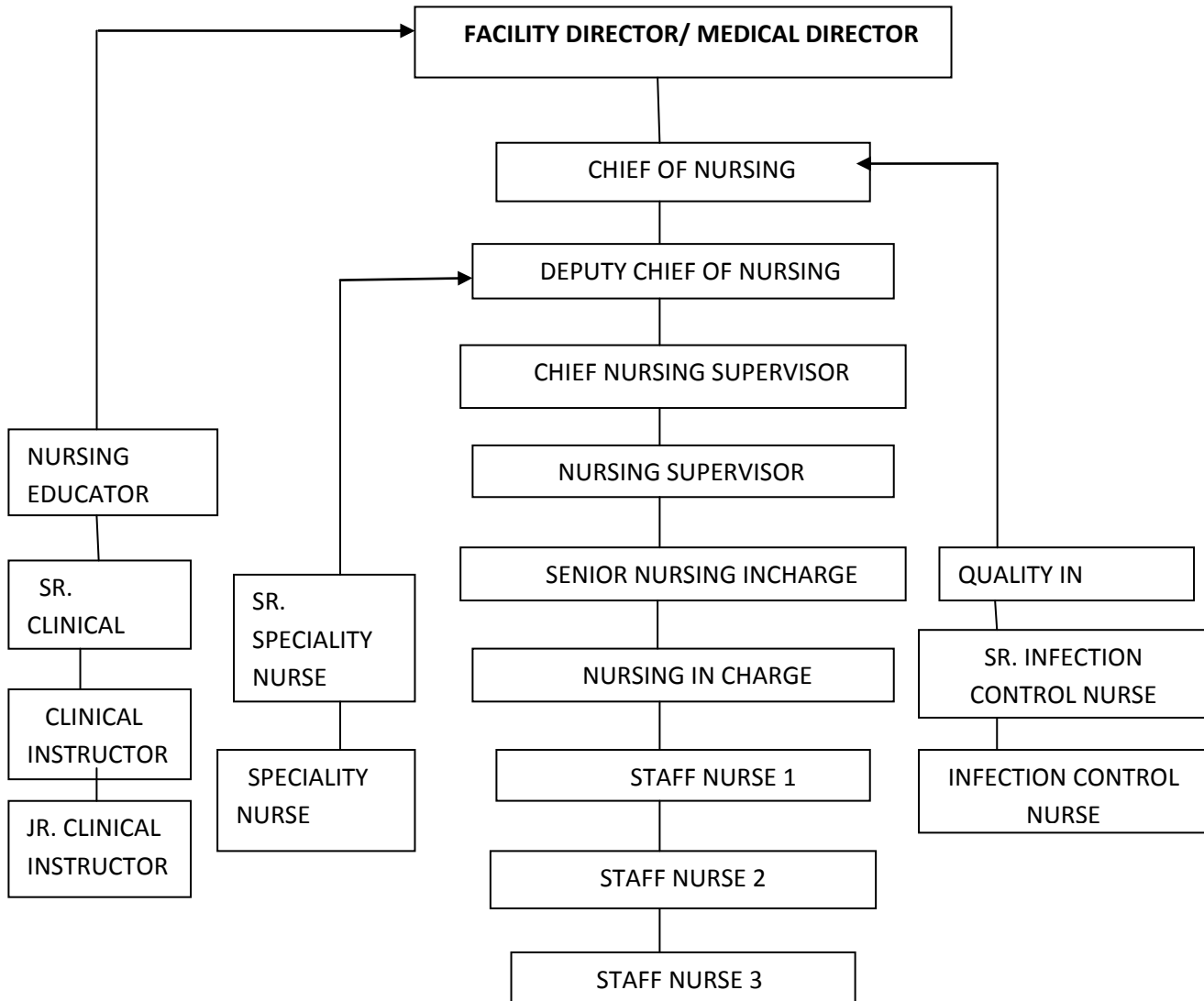
Laboratory: The department of lab medicine offers a comprehensive menu of more than 3000 regular and specialized tests performed through state of the art equipment and based on more than ninety five technologies.

- ❖ Fortis escorts hospital, Jaipur has taken a special initiative to express its respect and appreciation for senior citizens of the country through FORTIS ESCORTS GOLDEN AGE CLUB. As a member of this club, senior citizens have the privilege to access world-class medical facilities at special concessions and discounts, across a range of specialties available.
- ❖ Number of committees are there in Fortis Escorts hospital, Jaipur which are following:
 - Hospital management and Advisory committee
 - Quality steering committee

- Academic affairs, research and education committee
- Safety committee
- Blood transfusion committee
- Sentinel events committee
- OT committee
- Infection control committee
- MRD committee
- Pharmacy and Therapeutic committee
- Mortality committee
- Medical audit committee
- Ethics committee
- Purchase committee

NURSING DEPARTMENT OF FEHJ

Organogram of dept. of nursing



The dept is headed by the **Chief of Nursing (CON)** Mrs. Ranjana Williams. There are total 348 nurses at present functional in the hospital. The nurses are skilled and are the model of patient care

STUDY ON THE NURSING EDUCATION DEPARTMENT:

The department is headed by nursing educator Miss Timi Thomas. She reports to CON. This dept has three to four Clinical Instructors who reports to nursing educator. The main work of this dept is to organize and conduct induction programme for the newly recruited staff nurses and also for GDA .They also conduct on boarding program for their new nurses.

The induction program is for 10 days in which 3days is for HR induction, in which the staffs are taught about grooming and personality development. Rest days they are taught topics related to nursing care by the clinical instructors. The staff has to give 4 exam after the induction class in which they have to pass by 75% before joining the duty. This regress induction programme for the staff insure that that the new staff learns the protocol and policies of the organization and thus provide better nursing care and services .

After the 10 days of induction program. The staff is given OJT i.e. on Job Training for the period of 15 days . during this period they are given floor teaching by clinical instructors and a “BUDDY” is assigned to every nurse in the ward they are doing duty.

ON BOARD TRAINING is then given to the staff for 5 months, during these months the staff has to clear 25 exams (tests) on various imp topics and 4 vivas is also taken.

Hence every new nurse has to undergo 6 months of training in Fortis to ensure her/his confirmation in the organization. If the tests are not cleared probation period is extended.

Another important work of this dept is nursing auditing .They are numerous checklist prepared on which the staff are evaluated biannually, this auditing is called NQIP i.e. performance appraisal. On the basis of marks in NQIP the nursing staff is given increment.

Evaluation of all the nursing staff is done by clinical instructor, supervisor, doctors and also patient and on the basis of this the staff is awarded with **Patient Care Champion Award**. This is a source of inspiration and motivation to all staff to provide best nursing care services.

CQI is a form which reports any event or mishappening in the respective areas e.g. HAPU, medication error etc, the form is filled and reported to the nursing supervisor or education dept. each form is seen for scope of improvement and final report is sent to corporate.

Thus it can be seen that dept plays a very important role as the nurses are trained so that they can fit into the system easily. The audits help in proving better patient care so as to satisfy the patients to their expectations.

Topic of Study – Evaluation of Bio medical waste management in Fortis Escorts Hospital, Jaipur .

Introduction

In the persuasion of the aim of reducing health problems, eliminating potential risks, and treating sick people, healthcare services inevitably create waste which itself may be hazardous to health. The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate knowledge of handling of healthcare waste may have serious health consequences and a significant impact on the environment as well. It is estimated that annually about 0.33 million tones of hospital waste is generated in India and, the waste generation rate ranges from 0.5 to 2.0 kg per bed per day. Wherever, generated, a safe and reliable method for handling of biomedical waste is essential. Effective management of biomedical waste is not only a legal necessity but also a social responsibility.

Though legal provisions [Biomedical Waste (management and handling) Rules 1998] exist to mitigate the impact of hazardous and infectious hospital waste on the community, still these provisions are yet to be fully implemented. The absence of proper waste management, lack of awareness about the health hazards from biomedical wastes, insufficient financial and human resources, and poor control of waste disposal are the most critical problems connected with healthcare waste. The hazardous impact of medical waste on the public and environment is enhanced manifold if adequate and appropriate handling of these wastes is not adopted. The hospital waste management has diverse ramifications as it not only affects the health of patients but also of healthcare workers (doctors, nurses, sanitary staff, etc.) and general public.

Although, there is an increased global awareness among health professionals about the hazards and also appropriate management techniques but the level of awareness in India is found to be unsatisfactory.

Adequate knowledge about the health hazard of hospital waste, proper technique and methods of handling the waste, and practice of safety measures can go a long way toward the safe disposal of hazardous hospital waste and protect the community from various adverse effects of the hazardous waste. With this background, this study was conducted with the main objective of assessing knowledge, attitude, and practices of doctors, nurses, laboratory technicians, and sanitary staff regarding biomedical waste management.

Need & Significance – Treatment and disposal of BMW generated from hospital should be done as per BMW (management and handling) Rules 1998. It is responsibility, of waste generator, to treat and dispose of the BMW generated in health care institution respectively. 85% is the general waste while 15% is infectious.

Review of Literature

We all know that bio medical waste management is an important issue, and this need to be handled with care. Improper waste handling and disposal leads to several infections. Therefore several studies have been done to keep a check on biomedical waste practices .Several studies have been done on biomedical waste management some of these are as follows.

Assessment of biomedical waste management in tertiary care teaching hospital in Ludhiana by Sawen Sara Matthew, A.I. Benjamin, Paramita Sengupta Healthline, volume 2, July December 2009.

Studies were undertaken to assess BMW practices showed the gap in knowledge of all the three categories of respondents i.e. doctors, nurses, and paramedical staff. The knowledge of the existence of BMW management rules 1998 was better in doctors then in nurses and paramedical staff. But the knowledge of the practical aspects of BMW management was better in nurses and paramedical staff.

Biomedical waste management awareness and practices in the district of Madhya Pradesh. Manoj Bansal 1 , Ashok Mishra 2 , Praveen Gautam 3 , Richa Changulani 3 , Dhiraj Srivastava 4 , Neeraj Singh Gour 5

The study was a cross sectional study carried out in both urban and rural health facilities of Gwalior district from Jan to Jun 2008. Only those hospitals having indoor care facility were included randomly. Medical, Para-medical and non-medical personnel working at their current position for at least 6 months were included as study participants to assess awareness. Awareness regarding biomedical waste management was highest among doctors followed by para-medical staff and least among non-medical staff. Practices of waste management in hospitals were grossly inadequate, particularly in rural area.

Awareness about Bio-Medical Waste Management among Health Care Personnel of Some Important Medical Centers in Agra , International Journal of Environmental Science and Development, Vol. 1, No. 3, August 2010, by Shalini Sharma, Senior *member IACSIT*

In the present study, health care facilities are categorized into four strata i.e. apex Government hospitals, Government and non Government first level referral units (FRU), private health care facilities and corporate health care facilities. Random sampling technique is adopted at all the four different strata mentioned above to have a representative sample. After random sampling technique, total fourteen health care facilities from all strata are taken up. Periodical visits were made to analyze awareness about bio-medical waste management among health care personnel of all the fourteen health care facilities. To make it all embracing and systematic, a written appraisal tool in the form of different questionnaires was prepared for various categories of working personnel in the hospital/nursing home. The results obtained pointed towards lack of knowledge and awareness towards legislations on bio-medical waste management even among qualified hospital personnel. As a consequence there is inappropriate practice of BMW handling and management, thus exposing themselves and general public to health and environment hazards.

Bio-Medical Waste: Management Issues

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.

A bag not securely tied results in scattering of Bio-Medical waste. Bio-Medical waste scattered in and around hospitals invites flies, insects, rodents, cats and dogs that are responsible for spread of communicable diseases like plague and rabies.

Most importantly there is no mechanism to ensure that all waste collected and segregated, reaches its final destination without any pilferage. Additional hazard includes recycling of disposables without even being washed. Usage of same wheel barrow for transportation of all categories of waste is also a cause of infection spreading. Most of the times there is no monitoring of trolley routes, resulting in trolley movement around patient care units posing a serious health hazard. There is no mechanism for ensuring waste treatment within prescribed time limits. Note that, Bio-Medical waste if not handled properly and within the stipulated time period could strike in the form of fatal infections. In some hospitals there is no proper training of the employees in hazardous materials management and waste minimization aspects. This indicates the lack of even basic awareness among hospital personnel regarding safe disposal of Bio-Medical waste.

Bio-Medical Waste Rules, 1998

Keeping in view inappropriate Bio-Medical waste management, the Ministry of Environment and Forests notified the “Bio-Medical Waste (management and handling) Rules, 1998” in July 1998. In accordance with these Rules (Rule 4), it is the duty of every “occupier” i.e. a person who has the control over the institution and or its premises, to take all steps to ensure that waste generated is handled without any adverse effect to human health and environment.

Vital steps for safe and scientific management of BMW in any establishment are:

- Handling,
- segregation,
- mutilation,
- disinfection,
- storage,
- transportation and
- final disposal

Schedule I of the Bio-Medical rules contains the categories of Bio-Medical Waste (Refer to Table1). Schedule II contains the Color coding and the type of container for disposal of different Bio Medical waste categories .

Percentage constitution of hospital waste.

Constituents	Approx%
Pathological waste	5
Infectious material	10
General non infectious	50
Kitchen	30
Recyclable material(paper ,plastic metal)	4.5

Hospital Waste related Nosocomial Infections

Organism	Disease caused	Related waste item
VIRUSES		
HIV	AIDS	Infected needles, body fluids
Hepatitis B	Infectious hepatitis	Infected needles, body fluids
Hepatitis AC	Infectious hepatitis	Infected needles, body fluids
Arbovirus	Dengue, Japanese encephalitis, tick borne fever etc	human excreta, soiled linen, body fluids, blood
Enteric virus	Dysentery	Human excreta, soiled linen
BACTERIA		
Shigella spp.	Shigellosis	Human excreta and body
Salmonella typhi	Typhoid	fluids in landfills and hospital
Vibrio cholera	Cholera	waste
Clostridium tetani	Tetanus	Needles, surgical waste in hospital waste
Staphylococcus spp.	Wound infection, septicemia,	Needles , surgical waste in hospital waste
Pseudomonas streptococcus	Rheumatic fever, endocarditis, skin	Needles , surgical waste in hospital

	and soft tissue infection	waste
Borelli spp.	Louse and tick borne fever	Rodent's infestation.
PARASITES		
Giardia lamblia	Guardians	Human excreta, blood,
Wucheria bancrofti	Cutaneous leishmaniasis	body fluids in poorly managed
		sewage system of hospitals

TYPES OF BIOMEDICAL WASTE

1. SOLID OR SEMI –SOLID WASTE

Dry garbage: ordinary floor, refuse, paper, trash etc.

Partially wet garbage: waste from kitchen (fruit peels, leftover food) etc.

Wet tissue and boxes: from operation theatres, labor room, mortuary, and lab.

Plaster carts: from plaster room, OT

Packaging material: cardboard cartons, paper packets

Surgical waste: dressing, cotton pads

Metal waste: tin caps, bottle caps, needles

Glass: broken bottles etc.

Disposable plastic items: from all areas in hospital.

2. SECOND GROUP OF HOSPITAL WASTE COVERS: silage and sewage waste which emanates from bathrooms, labs, toilets, kitchen, pantries, OT, dressing room, laboratory for laundry. The quantity of total waste is estimated to be 200 to 300 liters on a per bed day basis.

3. THIRD GROUP IS RADIO ACTIVE WASTE: from radiotherapy for nuclear medicine department usually in large teaching hospital. The quantity of such waste is very little but requires understanding of principles of disposal.

Option Treatment & Disposal Waste Category

Cat. No. 1 - Incineration /deep burial - Human Anatomical Waste (human tissues, organs, body parts) .

Cat. No. 2 Incineration /deep burial- Animal Waste Animal tissues, organs, Body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals/ colleges, discharge from hospitals, animal houses)

Cat. No. 3 Local autoclaving/ micro waving/ incineration - Microbiology & Biotechnology waste (wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures)

Cat. No. 4 Disinfections (chemical treatment /autoclaving/micro waving and mutilation shredding - Waste Sharps (needles, syringes, scalpels blades, glass etc . that may cause puncture and cuts . This includes both used & unused sharps)

Cat. No. 5 Incineration / destruction & drugs disposal in secured landfills - Discarded Medicines and Cytotoxic drugs (wastes comprising of outdated, contaminated and discarded medicines)

Cat. No. 6 Incineration, autoclaving/micro waving - Solid Waste (Items contaminated with blood and body fluids including cotton, dressings, soiled plaster casts, line beddings, other material contaminated with blood)

Cat. No. 7 Disinfections by chemical treatment autoclaving/micro waving& mutilation shredding - Solid Waste (waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets etc.)

Cat. No. 8 Disinfections by chemical treatment and discharge into drain - Liquid Waste (waste generated from laboratory & washing, cleaning, house-keeping and disinfecting activities)

Cat. No. 9 Disposal in municipal landfill - Incineration Ash (ash from incineration of any Bio-medical waste)

Cat. No. 10 Chemical treatment & discharge into drain for liquid & secured landfill - for solids Chemical Waste (chemicals used in production of biological, chemicals, used in disinfection, as insecticides, etc).

SCHEDULE II of BIOMEDICAL WASTE RULES

COLOR CODING	TYPES OF CONTAINER	CATEGORY	TREATMENT OPTIONS AS PER SCHEDULE I
Yellow	Plastic bag	1,2 3,6	Incineration, deep burial
Red	Plastic bag	3,6,7	Autoclaving, microwaving, chemical treatment
Blue	Plastic bag, puncture proof container	4,7	Autoclaving, microwaving, chemical treatment, destruction , shredding
Black	Plastic bag	5,9 10	Disposed in secured landfill

Hospital waste refers to all waste generated, discarded and not intended for further use in the hospital.

Classification of bio medical waste according to WHO

- (1) **General non hazardous 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) **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. Consists of tissue , organs, body part, human fetuses, blood and body fluid. It is hazardous waste.
- (3) **Sharps:** Waste materials which could cause the person handling it, a cut or puncture of skin e.g. needles, broken glass, saws, nail, blades, and scalpels
- (4) **Pharmaceutical / chemical waste:** This includes pharmaceutical products, drugs, and chemicals that have been returned from wards, have been spilled, are outdated, or contaminated. This comprises discarded solid, liquid and gaseous chemicals e.g. cleaning, housekeeping, and disinfecting product.
- (5) **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.

Source of Bio-Medical Waste

The primary sources of Bio-Medical Waste are Hospitals, Diagnostic Centre, Laboratories, Blood Banks, Nursing Homes and Clinics and Veterinary Hospitals and Clinics.

Non - infectious waste forms nearly 80% of the waste generated by a hospital. The remaining 20% comprises of infectious waste and is generated in all the Wards, Operation Theatres, Intensive Care Units, Laboratories and Blood Banks.

The waste generated in each of these areas can be categorized as follows:

1. **General ward (Out Patient Department - OPD), Department wards, Intensive Care Unit and Emergency Care** - Cotton, dressing, bandages, syringes, needles, IV sets and tubing, blood sets, urine bags - all contaminated with blood, pus or other body fluids and other waste like packaging, paper waste and food waste.
2. **Operation Theatres , Labor Room** - Pathological waste, Cotton, dressing, instruments, contaminated plastic waste like syringes, tubing, IV sets, Blood sets, contaminated linen, contaminated gloves, caps, masks, hospital gowns used by the patients as well as the staff and doctors.
3. **Laboratories** - Contaminated samples, cultures, pipettes, Petri dishes, tips, test tubes (both plastic and glass), and slides.
4. **Blood Banks** - Contaminated samples, cultures, pipettes, petridishes tips, test tubes (both plastic and glass), slides, blood bags, unused blood bags (past the expiry date) and infected blood bags.

Approach for hospital waste management

Based on Bio-medical Waste (Management and Handling) Rules 1998, notified under the Environment Protection Act by the Ministry of Environment and Forest (Government of India) .

1. Segregation of waste

Segregation is the essence of waste management and should be done at the source of generation of Bio-medical waste e.g. all patient care activity areas, diagnostic services areas, operation theatres, labour rooms, treatment rooms etc. The responsibility of segregation should be with the generator of biomedical waste i.e. doctors, nurses, technicians etc. (medical and paramedical personnel). The biomedical waste should be segregated as per categories mentioned in the rules. . Segregation aims to keep the harmful and infected material separate from the harmless and non-contagious waste. It also helps in the appropriate disposal of a particular waste type.

2. Collection of bio-medical waste

Collection of bio-medical waste should be done as per Bio-medical waste (Management and Handling) Rules. At ordinary room temperature the collected waste should not be stored for more than 24 hours.

3. Transportation

Within hospital, waste routes must be designated to avoid the passage of waste through patient care areas. Separate time should be earmarked for transportation of bio-medical waste to reduce chances of it's mixing with general waste. Desiccated wheeled containers, trolleys or carts should be used to transport the waste/plastic bags to the site of storage/ treatment.

Trolleys or carts should be thoroughly cleaned and disinfected in the event of any spillage. The wheeled containers should be so designed that the waste can be easily loaded, remains secured during transportation, does not have any sharp edges and is easy to clean and disinfect. Hazardous biomedical waste needing transport to a long distance should be kept in containers and should have proper labels. The transport is done through desiccated vehicles specially constructed for the purpose having fully enclosed body, lined internally with stainless steel or aluminium to provide smooth and impervious surface which can be cleaned. The drivers compartment should be separated from the load compartment with a bulkhead. The load compartment should be provided with roof vents for ventilation.

4. Treatment of hospital waste

Treatment of waste is required:

- ☐ to disinfect the waste so that it is no longer the source of infection.
- ☐ to reduce the volume of the waste.
- ☐ make waste unrecognizable for aesthetic reasons.
- ☐ make recycled items unusable.

4.1 General waste

The 85% of the waste generated in the hospital belongs to this category. The, safe disposal of this waste is the responsibility of the local authority.

4.2 bio-medical waste: 15% of hospital waste

Treatment and Disposal

Housekeeping staff collects and brings the waste to the biomedical waste department where again the segregation is done. This is to ensure the correctness in segregation as segregation is very important part in waste disposal.

An account is kept about how much waste is generated, for this the baggage are weighed and monthly report is send to the concerned head for the signature.

Disposal methods

Hospital waste is send outside for treatment and disposal, infected waste is taken by INTRAMEDEX LTD , and general waste is taken by OMPRAKASH GENERAL WASTE.

5. Safety measures

5.1 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.

5.2 It should be ensured that:

- ☐ Drivers, collectors and other handlers are aware of the nature and risk of the waste.
- ☐ Written instructions, provided regarding the procedures to be adopted in the event of Spillage / accidents.
- ☐ Protective gears provided and instructions regarding their use are given.
- ☐ Workers are protected by vaccination against tetanus and hepatitis B.

6. Training

- ☐ Each and every hospital must have well planned awareness and training programme for all category of personnel including administrators (medical, paramedical and administrative).
- ☐ All the medical professionals must be made aware of Bio-medical Waste (Management and Handling) Rules 1998.
- ☐ To institute awards for safe hospital waste management and universal precaution practices.
- ☐ Training should be conducted to all categories of staff in appropriate language/medium and in an acceptable manner.

7. Management and administration

Heads of each hospital will have to take authorization for generation of waste from appropriate authorities as notified by the concerned State /U.T. Government, well in time and to get it renewed as per time schedule laid down in the rules. Each hospital should constitute a hospital waste management committee, chaired by the head of the Institute and having wide representation from all major departments. This committee should be responsible for making Hospital specific action plan for hospital waste management and its supervision, monitoring and implementation. The annual reports, accident reports, as required under BMW rules should be submitted to the concerned authorities as per BMW rules format.

8. Measures for waste minimization

As far as possible, purchase of reusable items made of glass and metal should be encouraged. Select non PVC plastic items. 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. Establish effective and sound recycling policy for plastic recycling and get in touch with authorised manufactures.

9. Coordination between hospital and outside agencies

- ☐ Municipal authority : As quite a large percentage of waste (in India up to 85%), generated in Indian hospitals, belong to general category (non-toxic and non-hazardous), hospital should have constant interaction with municipal authorities so that this category of waste is regularly taken out of the hospital premises for land fill or other treatment.
- ☐ Co-ordination with Pollution Control Boards: Search for better methods technology, provision of facilities for testing, approval of certain models for hospital use in conformity with standards laid down.
- ☐ To search for cost effective and environmental friendly technology for treatment of bio-medical and hazardous waste. Also, to search for suitable materials to be used as containers for bio-medical waste requiring incineration/autoclaving/ microwaving .
- ☐ Development of non-PVC plastics as a substitute for plastic which is used in the manufacture of disposable items.

Health hazards associated with poor management of BMW

1. Injury from sharp to staff and waste handlers within health care establishments.
2. Hospital acquired infections of patients due to spread of infection.
3. Risk of infection outside hospital for waste handlers /scavengers and eventually general public.
4. Occupational risk associated with hazardous chemicals ,drugs etc
5. Unauthorized repackaging and sale of disposable items, unused /expired drugs.

Everyone working in the hospital is at risk of acquiring infection due to negligence or mismanagement of hospital waste.

WHO ARE AT RISK?

Doctors
Nurses
Other staff
House keeping
General public

OBJECTIVES OF THE STUDY

- To understand the routine practices in hospital waste management.
- Knowledge on biomedical waste management among doctors, nurses, GDA, and housekeeping staff of Fortis Hospital, Jaipur.
- To estimate BMW generated /bed in Fortis Hospital Jaipur.
- Training need assessment for any particular group of staff of the hospital.

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 is the need or rationale for spending so much resources in terms of money, man power, material and machine for management of hospital waste? The reasons are:

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

Therefore there is need to study the biomedical waste practices in the hospital.

Study methodology

An anonymous survey form and a structured questionnaire were developed after literature search and review the checklist used and questionnaire were designed to suite categories of personnel associated with health care settings i.e nurses, doctors, GDA and housekeeping. The respondents were asked to indicate their views on BMW management practices and their attitude related to the issue. To document BMW management practices, photographs were taken.

Study tenure

April – may 2012

Study design

Cross sectional, observational study

Sampling Method

Stratified Sampling- Stratified sampling method is used in this study. In this method, we first divide the population in to different sub populations. In this study the sample population is sub divided into four – Doctors, Nursing, GDA (general duty assistant) and housekeeping.

Sample size

Random sampling was done to cover 110 respondents. 50 nurses, 20 doctors, 20 GDA, 20 housekeeping staff were selected from over all hospital including the staff doing patient care activities.

Inclusion Criteria: All staff that were directly concerned with biomedical waste handling.

Exclusion Criteria: Housekeeping and GDA staff that were working in office and other dept.

Tools

Structured questionnaire, checklist was prepared to collect data.

The primary data collection was done with the help of qualitative techniques, loosely structured interview, using open ended question with staff were done while on hospital visits which helped assess attitude, opinion and suggestions of the staff .

The secondary data was collected with help of previous records of hospital.

Analysis

Tools for Data Analysis

Percentage analysis

- Graphs

Findings and observation of BMW management process in Fortis Hospital, Jaipur.

Following are the stages that one has to adhere to for proper BMW in FEHJ.

Generation
Segregation
Collection and handling
Storage
Transportation
Chemical
Thermal
Mechanical

Final disposal of waste

Generation – potential area of waste generation in FEHJ are as follows;

Non-infectious waste forms nearly 80% of the waste generated by a hospital. The remaining 20% comprises of Infectious waste and is generated in all the wards, operation theatres, intensive care units, laboratories and blood Banks

The waste generated in each of these areas can be categorized as follows:

General ward (Out Patient Department - OPD), Department wards, Intensive Care Unit and Emergency Care Cotton, dressing, bandages, syringes, needles, IV sets and tubing, blood sets, urine bags - all contaminated with .blood,pus or other body fluids and other waste like packaging, paper waste and food waste.

Operation Theatres , Labor Room- Pathological waste, Cotton, dressing, instruments, contaminated plastic waste like syringes, tubing, IV sets, Blood sets, contaminated linen, contaminated gloves, caps, masks, hospital gowns, used by the patients as well as the staff and doctors.

Laboratories - Contaminated samples, cultures, pipettes, Petri dishes, tips, test tubes (both plastic and glass), slides.

Blood Banks - Contaminated samples, cultures, pipettes, petridishes, tips, test tubes (both plastic and glass), Slides, blood bags, unused blood bags (past the expiry date) and infected blood bags.

Segregation – at point of generation for segregation the guidelines mentioned in schedule II are followed strictly.

There is no radioactive waste generated by hospital.

Collection and handling

Handling of disposal items – disposal like gloves , syringes , needles, iv bottles , catheters etc, will be shredded cut or mutilate d. this ensures that items are not being recycled or reused by rag pickers.

Needles with are the major portions of sharps will be mutilated by needle cutter and then put in 1% hypochlorite solution.

Collection –

1. Solid waste: bins / receptacles are used for collection are used for collection . only non chlorinated plastics collection bags are to be used .

2. For hazardous material – most common hazardous material are

Bactorub

Bactosermum

Betadine scrub

Eusol

Hydrogen perperoxide

Mercury

Sodium hypochlorite

O2 gas

Micro shed

These are the hazardous material found in almost all wards and areas CCU, MICU, PICU, OT'S, SICU, and TRIAGE.

There is a hazmat kit is for handling any of the cases of hazardous material incidents /spills.

All potential area where there is probability of hazardous material are equipped with Personal Protective Equipments (PPE) to handle such spells minor or major.

For cytotoxic drugs and expired drugs are sent to pharmacy either for exchange to manufacture itself.

Waste is collected 3 times a day – 6:30 to 7:30 A.M

2:30 to 3:30 P.M

7:30 to 8:30 P.M

The housekeeping staff is responsible for collecting and transporting waste from wards to storage room. Almost all staff wear PPE (personal protective equipments) i.e. Gloves ,Caps , Masks.

Storage:

Storage

At point of generation in labs for wards

Common storage for total waste

Inside hospital before it is outsourced.

Segregated storage in separated containers is done at the point of generation as per guidelines given in schedule 1

Waste from all the areas of generation is collected for taken for storage in an intermediate storage area before they are outsourced.

One room is present for waste storage

Divided into sections

Black

Blue

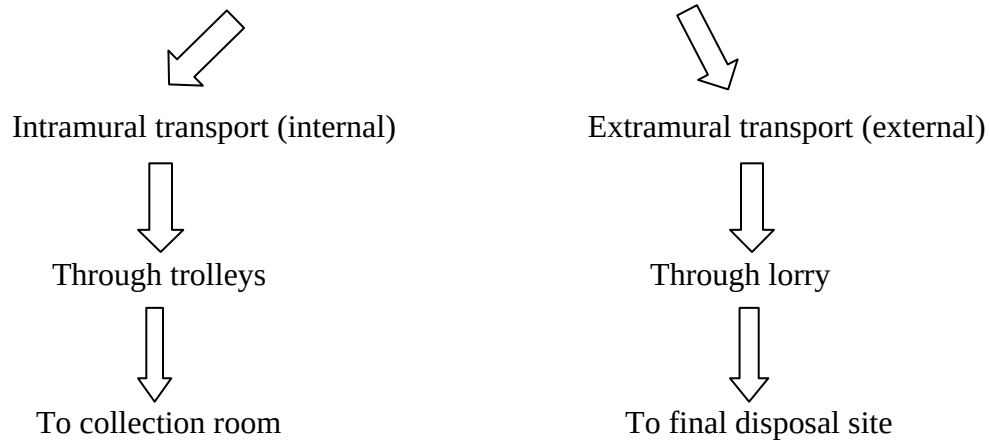
Yellow

Red

Waste is stored for a maximum of 24 hr

Transportation:

Two types of transportation of hospital wastage is done in escorts



For solid biomedical waste - waste is outsourced for final treatment and final disposal to

Red bags -	}	INSTROMEDIX PVT. LTD.
Yellow bags-		
Blue bags-		
Black bags-		OM PRAKASH GENERAL WASTE

OBSERVATION FOR BMW MANAGEMENT

It was done with the help of checklist. The existing scenario as compared with checklist helped find out the lacunaes with existing system.

Discussion :

Analysis and interpretations of the data collected, to assess the awareness of employees about biomedical waste management. Analysis and interpretations of the data were based on the objectives of the study which were.

- To know the awareness of staff about biomedical waste management.
- Whether they need further training or it is enough to maintain their management process.

ANALYSIS OF KNOWLEDGE – The questionnaire was analyzed and average percentage was calculated about the level of knowledge .

Table 1.1 Knowledge about the time within which the biomedical waste should be treated.

STAFF	FREQUENCY OF CORRECT	% OF Knowledge	TOTAL
Doctors	14	70	20
Nurses	15	30	50
GDA	4	20	20
Housekeeping	2	10	20

Table 1.2 Knowledge about disposal of human anatomical waste and microbiological waste, soiled waste in to color baggage .

STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	20	100	20
Nurses	49	98.9	50
GDA	20	100	20
Housekeeping	20	100	20

Table 1.3 Knowledge of staff about the color of baggage in which the waste sharps, soiled waste has to be disposed.

STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	20	100	20
Nurses	49	98.9	50
GDA	20	100	20
Housekeeping	20	100	20

Table 1.4 Knowledge about the color of baggage in which the infected waste other than sharp such as tubing catheter, blood bags etc waste is to be disposed.

STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	20	100	20
Nurses	47	96.7	50
GDA	20	100	20
Housekeeping	20	100	20

Table 1.5 Knowledge about the color of baggage which is to be treated by incineration (burning) /deep burial.

STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	18	90	20
Nurses	30	78.3	50
GDA	2	16.66	20
Housekeeping	1	10	20

Table 1.6 Knowledge of staff about the color of baggage's which is to be treated by autoclaving (high pressure and temperature) microwaving.

STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	19	95	20
Nurses	37	85.9	50
GDA	3	25	20
Housekeeping	2	20	20

Table 1.7 Knowledge about the color of baggage which is treated by disposal in secured landfill.

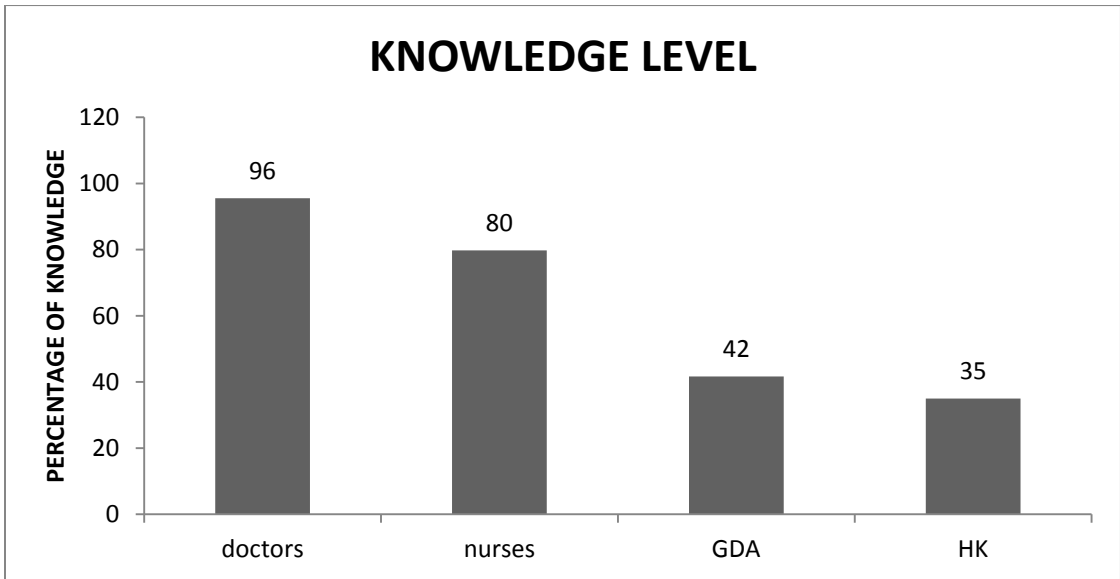
STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	19	95	20
Nurses	42	91.3	50
GDA	10	50	20
Housekeeping	4	20	20

Table 1.8 Knowledge about major risk (diseases) associated with the hospital waste .

STAFF	FREQUENCY OF CORRECT	% OF KNOWLEDGE	TOTAL
Doctors	20	100	20
Nurses	36	72	50
GDA	7	35	20
Housekeeping	10	50	20

Thus all these percentage of all frequency was calculated and average percentage was calculated for all categories of staff which is shown below.

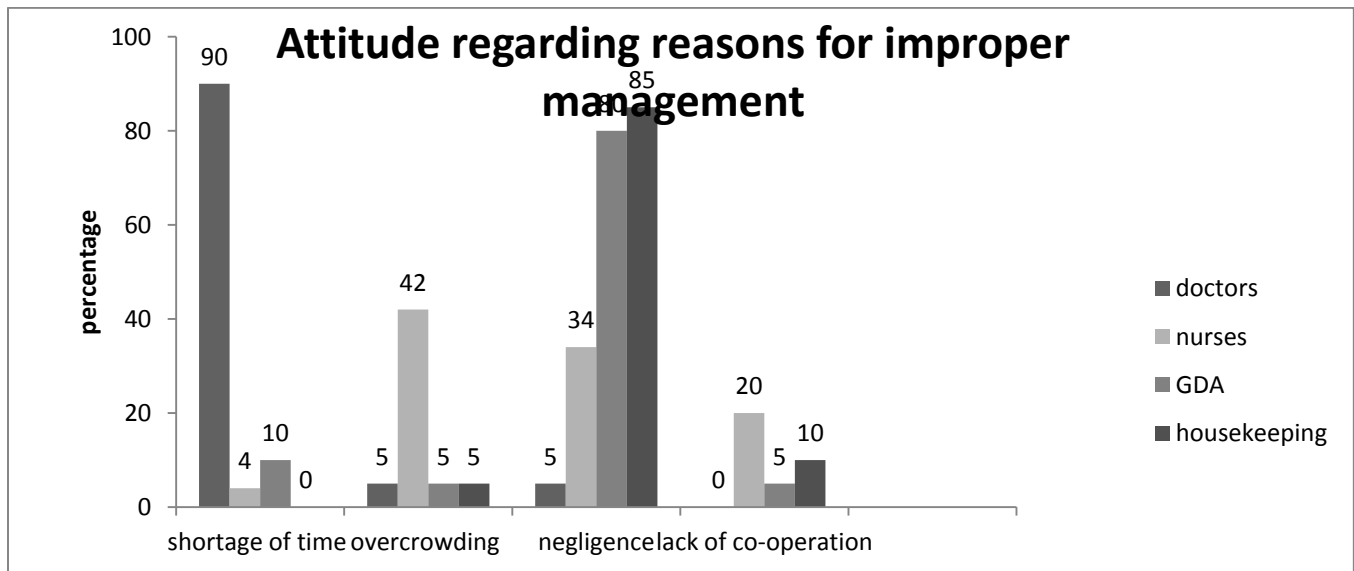
Fig 1 Average knowledge level of staff regarding BMW.



The graph shows that the overall knowledge level among doctors and nurses is good but it is poor for GDA and housekeeping staff.

ATTITUDE ASSESSMENT

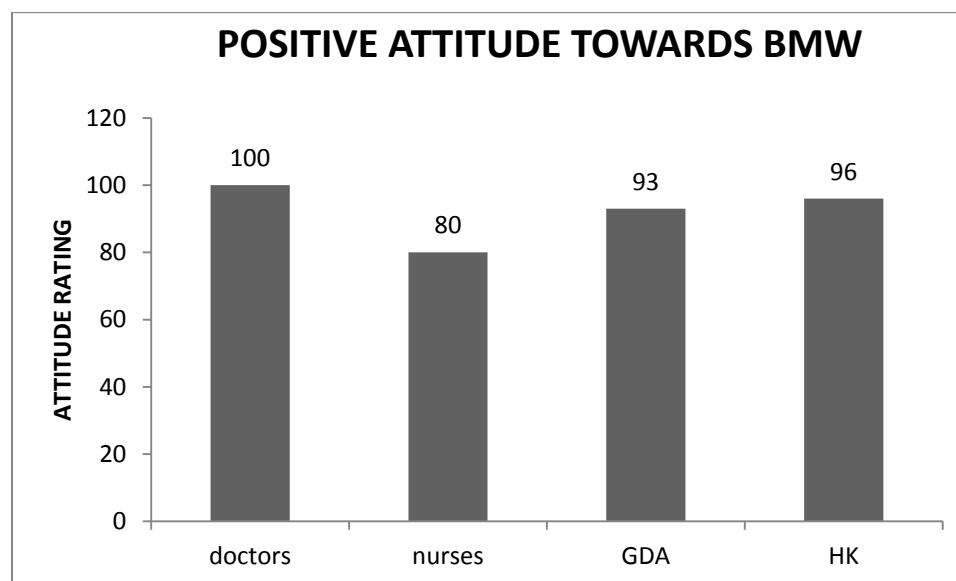
Fig. 2.1



Attitude of the staff was studied regarding what restricts them to properly manage BMW. Results showed that for doctors the major reasons were shortage of time. For nurses the main reasons were overcrowding and negligence. But most of the GDA and housekeeping the reasons reported were negligence. This shows the different attitude of various staff.

For others questions on attitude assessment percentage of positive attitude was calculated and average was taken out which is shown by the graph below.

Fig 2.2



The above graph shows that the almost all doctors GDA and HK staff have a positive attitude towards BMW management but only 80% nurses have this positive attitude .

Analysis of practices of BMW in Fortis Escorts Hospital

Practices of Bio medical waste was assessed with the help of checklist according to this Rating scale

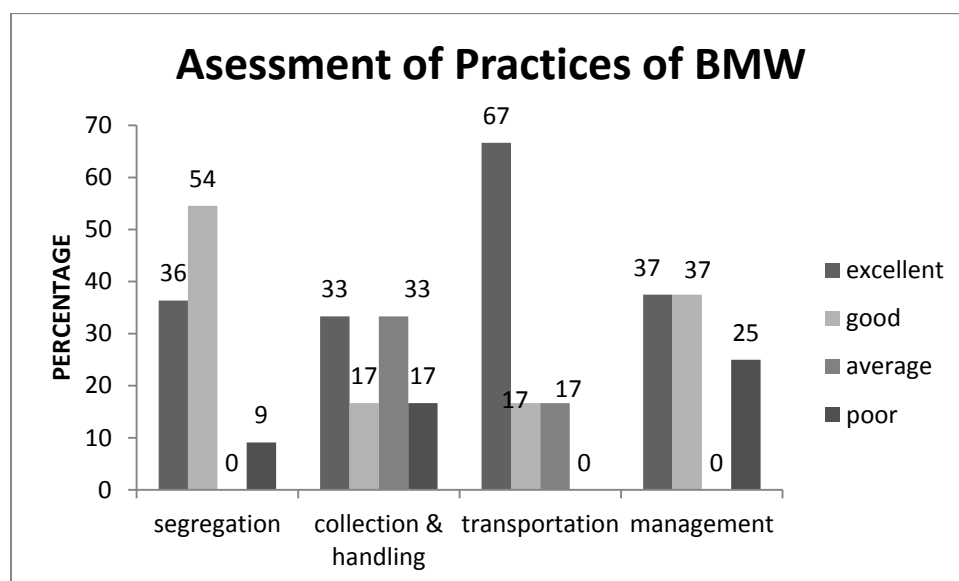
If all six correct – Excellent

Greater than or equal to four correct – Good

Half correct (three) – Average

Less than or equal to two correct – Poor

Fig 3



The BMW practices were assessed with the help of a checklist. Results showed that 34% practices are excellent and 54% is good. Therefore it can be concluded that segregation practices are good in the hospital.

Assessment of collection and handling of biomedical waste shows that around half of the practices are excellent to good but rest half are average to poor.

Most of the transportation practices are excellent only some of the practices are average.

While the assessing the management practices it was found that more than half of the practices are excellent and good but around 25% practices are poor.

COST OF BIO-MEDICAL WASTE MANAGEMENT:

The cost of operation and maintenance of system of managing BMW represent significant part of overall budget of hospital if biomedical rules 1998 have to be implemented in true spirit. Govt. of India in its Pilot project for hospital waste management in govt .hospital has estimated Rs 85 lakh as capital cost in 1000 bedded super specialty teaching hospital which includes onsite disposal of biomedical waste.

Two type of cost are required to be incur by hospital for BMW management.

These are:

Internal cost – cost of segregation, mutilation, disinfection, internal storage and transportation including hidden cost of protective equipments.

External cost - Involves off site treatment of waste, treatment and final disposal.

Financial cost of BMW in hospital waste management

Infected waste - Rs 3.50 per bed to Instromedix limited.

CONSUMABLES IN BMW MANAGEMENT PER MONTH

S.No.	Name of the item
1.	Black plastic bags
2	Yellow plastic bags
3	Red plastic bags
4	Blue plastic bags
5	Blue puncture proof container
6	Gloves (thick)
7	Hypochlorite
8	Caps
9	Masks

Thus we can see that the hospital is spending huge amount of money in BMW management.

ESTIMATING BIOMEDICAL WASTE GENERATED PER DAY PER BED

Data for one month is collected and following formula are applied:

Formula 1:

$$\text{Mean Waste Generated Per Day} = \frac{\text{Total Waste Generated During Period of the Study}}{\text{No. of days of study}}$$

Formula 2:

$$\text{Waste Generated Per Bed Per Day} = \frac{\text{Mean Waste Generation Per Day}}{\text{Total No. of BEDS}}$$

Average waste Generation per day = 2872KGS

No. of days = 31 DAYS

Therefore,

$$\text{Mean Waste Generated Per Day} = 2872 / 31 = 92.64 \text{ KG}$$

Occupancy (average) = 173 BEDS

Therefore,

$$\text{Waste Generated Per Bed Per Day} = 92.64 / 173 = 0.5353\text{KGS}$$

FINDINGS OF THE STUDY

1. The analysis of the interview schedule and observations shows that the staffs have excellent knowledge regarding the segregation of waste. But the knowledge about time of treatment and different types of methods used for different categories is good in doctors, but average for nurses and poor in GDA and housekeeping.
2. Awareness level of staff regarding risks (MAJOR DISEASES) associated with improper BMW handling is excellent for doctors but Good for nurses and average for GDA and housekeeping.
3. Over all the practices seen in different area of hospital regarding waste management is not up to the mark. The gaps seen are as follows:
 - The waste is not segregated as per the rules i.e. infected and non infected waste are mixed and thrown in wrong bins.
 - As per the protocols the waste is not carried in trays to the segregation site but instead most of the staff carries it in hands. Sharps and needles are also carried in hands
 - No gloves are worn while handling sharps
 - Used needles are recapped.
 - The staff is not aware of the one hand method of recapping needles
 - Needles are not burned hand to hand but instead they are kept near the burner.
 - Tubing's are not cut before throwing as per the protocols.
 - The infected and non infected wastes are taken together from the wards to the storage room. Bags of general waste are carried in hands by housekeeping staff.
 - Waste bins are not emptied on time even the blue puncture proof containers are fully filled which is not as per protocol.
 - Puncture proof container is not sealed in many areas as per the hospitals protocol.
 - Recapped and un- burned needles are thrown directly in the puncture proof container.
 - Storage room is very unclean and the waste is also not kept segregated as defined i.e. yellow red black baggage is mixed and kept together.
 - Storage and transportation of BMW is also not according to the protocol, it was seen that the agency workers who came to take the waste were not wearing any PPE (personal protective equipment).
 - From hospital records it was seen that that major cause for NSI is either the staffs were burning the recapped needles or they were not wearing gloves while handling needles and sharp objects.

RECOMMENDATIONS OF THE STUDY:

Study shows that more training need to be given to every staff regarding segregation and management

GDA and housekeeping need to be given teaching regarding harmful effects of BMW mishandling so that they will be more careful while handling them correctly .

Awareness materials including hoardings, wall writing stickers should be used and provided to every area.

Demo teaching should be implemented for better understanding of GDA and housekeeping staff.

Weekly training should be given to the staff so that BMW can be handled in a better manner.

Recapping should be prohibited strictly to avoid NSI in future and all staff should be trained one hand method of recapping needles.

The storage room should be kept locked so that the biomedical waste is measured in presence of hospital people without gap.

Infection control team should be more strict regarding the segregation and management practices so that correct practices are followed by every staff.

Thus all that is needed is strict monitoring and evaluation of BMW practices so as to make the staff motivated to follow correct practices.

CONCLUSION:

Thus the study concludes that the awareness levels regarding the waste segregation is good as knowledge level is almost 100% about segregation but practicing part needs improvement. During site visits, photo documentation was done on various aspects of BMW management methods. These photos revealed that unscientific BMW management techniques are followed at various levels of segregation, treatment, transport and disposal. Attitude assessment also showed that most of the staffs do not follow the correct practices due to carelessness. Hence staff should be motivated to follow correct practices. So we can say that the practices need more monitoring and evaluation. The study concluded that BMW management practices followed needs lots of improvement.

REFERENCES:

Sawen Sara, A.I.Benjamin : Assessment of biomedical waste management in tertiary care teaching hospital in Ludhiana., volume 2 , December 2011.

Gayarthi V. Patil, Kamla Phokrel : Bio- medical solid waste management in an Indian hospital, Institute of Pharmacy, Bundelkhand University Jhansi, 28th July 2004.

E. Sarojini 1 , S. Jayanthi 2 , S. Jothi Venkatraman 3 and K. Prashanthini : Performance Study on Common Biomedical Waste Treatment Facility, Chettipalayam, Coimbatore , *September 2007, Chennai, India. pp.182-188* .

K.V.Radha : A Case Study on Biomedical Waste management in hospitals , Global Journal Of Health Sciences, volume 1, no. 1, 2009.

Shalini Sharma, Senior *member IACSIT* : Awareness about Bio-Medical Waste Management among Health Care Personnel of Some Important Medical Centers in Agra, International Journal of Environmental Science and Development, Vol. 1, No. 3, August 2010

Virendar Pal Singh, Gautam Biswas, Jag Jiv Sharma : Biomedical Waste Management - An Emerging Concern in Indian Hospitals. Vol. 1, No. 1 (2007-07 - 2007-12).

<http://envfor.nic.in/legis/hsm/biomed.html>

www.legalindia.in/bio-medical-waste-management-in-hospitals

http://wiki.auroville.org.in/w/images/7/7a/Chapter_10.pdf

<http://www.legalindia.in/bio-medical-waste-management-in-hospitals>

ANNEXURE I:

CHECKLIST

Checklist for assess biomedical waste management practices in wards, lab, ICU, private rooms, Labor room.(yes/ no)

Particulars	Deluxe rooms	General ward	ICU	Labor room	Lab	HDU	Rating /remark
Segregation							
1. Adequate no. of bins available.	Yes	yes	yes	Yes	Yes	Yes	Excellent
2. Is the waste segregated at the site of generation	No	no	yes	Yes	Yes	Yes	Good
3. Is the sharp infectious waste (needles, blades, broken glasses etc) to be disposed in white /blue puncture proof container?	Yes	yes	yes	Yes	Yes	Yes	Excellent
4. Is the non sharp infectious material (infected plastics, syringes, dressing, gloves, masks, blood bags& urine bags) to be disposed in red plastic bins/bags?	Yes	yes	Yes	Yes	Yes	Yes	Excellent
5. Is the soiled dressings etc are thrown in the yellow bin.	Yes	no	yes	Yes	Yes	no	good
6. Is the non infectious waste e.g. .packaging material. Cartons, fruits, needle wrappers, medicine to be cover to be disposed in black bin.	No	yes	Yes	Yes	Yes	yes	Good
7. Is the infectious and non infectious waste mixed at source of generation?	Yes	Yes	No	No	No	No	Poor
8. Is the puncture proof container sealed	No	No	Yes	Yes	Yes	Yes	Good
9. Are the needles recapped after use?	Yes	Yes	Yes	Yes	NA	Yes	Excellent
10. Is the waste carried in hands to the segregating	Yes	Yes	Yes	Yes	No	Yes	Good

site?							
11. Are the needles after use carried in hands to the segregating site?	Yes	Yes	Yes	Yes	No	Yes	Good

Collection and storage	Deluxe room	General ward	ICU	Labor room	lab	HDU	Rating/remark
1. Is the waste thrown in covered bins?	yes	Yes	Yes	Yes	Yes	Yes	Excellent
2. Are the bins filled up to more than $\frac{3}{4}$ level	Yes(black)	Yes	Yes	No	No	No	Average
3. Are the bins cleaned with soap and disinfectant regularly.	no	No	no	no	no	no	Poor
4. Are the bins over filled.	yes	Yes	Yes	No	No	No	Average
5. Is the infectious and non infectious waste filled in same bins?	No	Yes	No	No	No	no	Good
6. Is the stored waste kept beyond 48 hours?	No	No	No	No	no	no	Excellent

Transportation	Deluxe room	General ward	ICU	Labor room	lab	HDU	Rating
1. Is the waste transported in closed containers?	No	Yes	Yes	Yes	Yes	Yes	Good
2. Are the waste collection bins/ trolley wheel barrow used for transporting waste?	Yes	Yes	Yes	Yes	Yes	Yes	Excellent
3. Is the pre defined route available for transportation of waste within health care facility .	Yes	Yes	Yes	Yes	Yes	Yes	Excellent
4. Is the infected and non infected waste transported together in same container?	No(black carried in hands)	Yes	No	No (black carried in hands)	No	No	Average
5. Is the transportation done during OPD time or any emergency?	No	No	No	No	No	No	Excellent
6. Is the label put on bags during storage non washable and prominently visible.	Yes	Yes	Yes	Yes	Yes	Yes	Excellent

Management of different waste stream	Dex.rm	Gen ward	ICU	Labor room	Lab	HDU	Rating
1. Is the sharp injury reported and is it reported within 7 hrs.	Yes	Yes	Yes	Yes	Yes	Yes	Excellent
2. Are the protective gears like gloves used while handing waste .	yes	Yes	Yes	Yes	Yes	Yes	Excellent
3. Is the sharp waste mixed with other waste at time of segregation?	Yes	Yes	No	No	No	No	Good
4. Is the sharp discarded in polybags?	No	No	No	No	No	Yes	Good
5. Are the vials and ampoules disposed in sharp container?	Yes	Yes	Yes	Yes	Yes	Yes	Excellent
6. Are the infected tubing's cut before final disposal	no	No	No	No	NA	No	Poor
7. Are the needles recapped after injection .	yes	Yes	Yes	Yes	NA	Yes	Poor
8. Are the needles burned before discarding every time?	no	Yes	Yes	Yes	Yes	Yes	Good

ANNEXURE II

Questionnaire on bio-medical waste management

Section I

1. Biomedical waste should be treated within.

☐ 48 hrs , ☐ 12 hrs, ☐ 56 hrs , ☐ 32 hrs

2. Human anatomical waste and microbiological/biotechnological waste, soiled waste, cotton dressings, other material contaminated by blood has to disposed into which dustbin?

☐ Yellow ☐ Blue, ☐ black ☐ red

3. Waste sharps, broken ampoules, needles has to be put into

☐ black ☐ Blue puncture proof , ☐ Red , ☐ yellow

4. Infected waste other than sharp such as tubing catheter, iv sets, blood bags, gloves etc are discarded in

☐ red , ☐ blue , ☐ Black , ☐ yellow

5. Which color baggage is treated by incineration (burning)/deep burial

☐ Yellow , ☐ blue, ☐ Red , ☐ Black

6. Which all color baggage's will be treated by autoclaving (high pressure and temperature)/microwaving

☐ Red , ☐ Yellow , ☐ blue , ☐ black

7. Which color baggage is treated by disposal in secured landfill

☐ Black , ☐ Yellow , ☐ Red , ☐ Blue/white translucent

8. Major risks (diseases) associated with improper hospital waste handling are? _____

Section II

1. What restricts you to carry complete procedure of biomedical waste ?

() Overcrowding, () Shortage of time () Lack of facility () Lack of co-operation

() Other ,specify

2. Safe management of health care is not an issue at all.

Agree

Disagree

Can't say

3. Waste management is team work / no single class of people is responsible for safe management.

Agree

Disagree

Can't say

4. Safe management of health care waste is an extra burden on work.

Agree

Disagree

Can't say

5. Would you like to attend a program on hospital waste management?Yesno

Section III

1. Segregation of biomedical waste is the responsibility of.

() Doctor () Staff nurse () GDA/Housekeeping () All of above

2. Do you recap the needle after injection

.....Yes

.....no

3. Have you ever had needle stick injury?

..... Yes

.....no

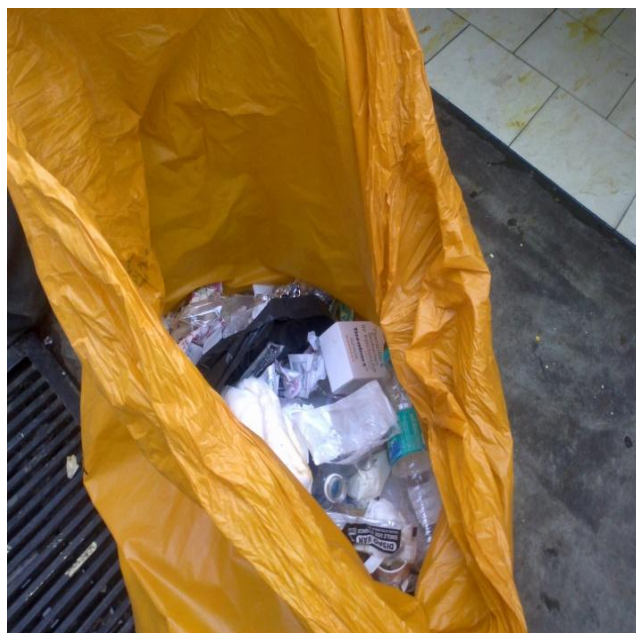
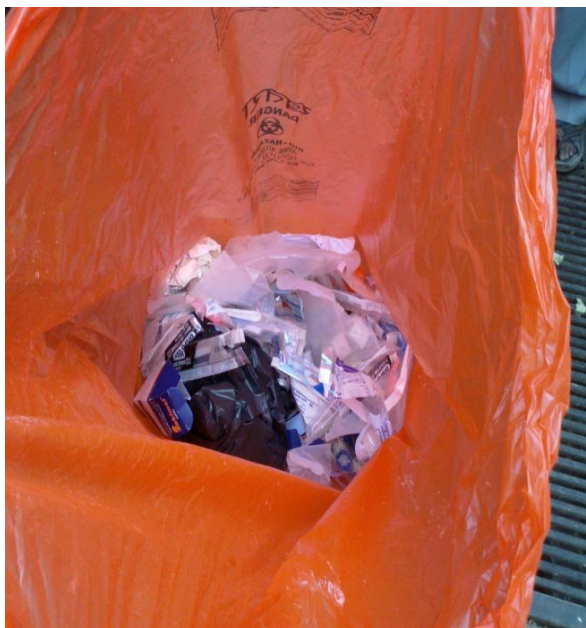
ANNEXURE III

Waste generated per day

S.NO	DATE	OCCUPANCY	YELLOW(kg)	RED(kg)	BLUE(kg)
1.	12 TH APRIL	178	63	25	9
2.	13 th	162	57	25	9
3	14 th	170	57	33	12
4	15 th	172	48	21	9
5	16 th	159	52	34	15
6	17 th	165	58	41	12
7	18 th	177	68	34	17
8	19 th	163	72	41	12
9	20 th	160	43	43	6
10	21 st	149	47	46	12
12	22 nd	149	48	28	4
13	23 rd	156	41	32	13
14	24 th	177	38	28	10
15	25 th	178	43	27	12
16	26 th	166	37	25	15
17	27 th	188	56	32	17
18	28 th	179	43	30	16
19	29 th	152	52	43	10
20	30 th	159	38	31	7
21	1 st	163	52	28	9
22	2 nd	169	81	20	7
23	3 rd	176	37	29	10
24	4 th	193	52	21	8
25	5 th	196	72	29	9
26	6 th	184	27	14	12
27	7 th	186	47	14	13
28	8 th	190	57	21	15
29	9 th	182	48	32	12
30	10 th	187	54	32	15
31	11 th	192	52	34	12
32	12 th	172	45	34	15

ANNEXURE IV

Wrong segregation of biomedical waste



Mismanagement of BMW

