

**Summer Training at  
Narayana Hrudayalaya,  
Bengaluru**

**Study on the Evaluation of Primary Bill Estimation During Admission and its  
Conclusion After Treatment**

**By  
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**Under the guidance of  
Dr. Monika Chaudhary**

**MBA Hospital and Health Management  
2015-2017**



**The IIHMR University, Jaipur  
2016**

**TO WHOMSOEVER MAY CONCERN**

This is to certify that **Mr. Shubhankar Bhattacharya** student of MBA Hospital and health Management from The IIHMR University; Jaipur has undergone internship training at **Narayana Hrudayalaya, Bengaluru** from **1<sup>st</sup> April 2016 to 31<sup>st</sup> May 2016**.

The candidate himself carried out all the studies related to his summer training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all his future endeavors.



Col (Dr) Ashok Kaushik  
Dean, Academics and Student Affairs  
The IIHMR University, Jaipur



Dr. Monika Chaudhary  
Associate Professor  
The IIHMR University, Jaipur

**Date: 31<sup>st</sup> May 2016**

### **INTERNSHIP COMPLETION LETTER**

This is to certify that **Mr. Shubhankar Bhattacharya**, 2<sup>nd</sup> year MBA Student, IHMR, Jaipur has successfully completed his internship project at **Narayana Health City, Bangalore** from 1<sup>st</sup> April 2016 to 31<sup>st</sup> May 2016.

During the course of internship, the intern has done 2 projects titled **“An evaluation on primary bill estimation during admission and its conclusion After the treatment”** and **“A Prospective Study On The Awareness And Management Of Biomedical Waste”** at **Narayana Institute of Cardiac Sciences, at NH Healthcity, Bangalore** under the guidance of **Mr. Joseph Pasangha – Facility Director, Narayana Institute of Cardiac Sciences, NH Health city, Bangalore.**

We found him sincere, hardworking and technically sound and result oriented. He worked well as part of a team during his tenure.

We take this opportunity to thank him and wish him all the best for his future.

For Narayana Hrudayalaya Ltd



Dr. Rakesh Verma  
Group Head – Learning & Development Department



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(Previously Narayana Hrudayalaya Pvt. Ltd.) CIN: U85110KA2000PLC027497

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## **ACKNOWLEDGEMENT:**

Apart from the efforts of myself, the success of this study depends largely on the encouragement and guidelines of many others. I take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this study. The guidance and support received from all the members who contributed was vital for the success of this study. I am grateful for their constant support and help.

- I wish to express my sincere respects, regards and deep sense of gratitude to my mentor Mr. Joseph Pasangha, Facility Director, Narayana Hrudayalaya, a well versed teacher, experienced in a plethora of fields, with an inherent rare human quality to listen and to render physical and mental courage on the onlooker. I sincerely express my boundless reverence for his excellent guidance, constant courage, encouragement, timely advice, thoughtful criticism and constructive suggestions to which this thesis owes its very existence. His administrative intuition has made him as a constant oasis of ideas and his passion in administration, which exceptionally inspire and enrich my growth as a student, researcher and administrator I want to be.
- I am also very grateful to Mr. Puneet Kumar Y. V, Billing Manager, Narayana Health, at Mazumdar Shaw Medical Center , Bangalore , for his immense support and inputs towards the study to be a success.
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## **ACCRONYMS:**

NH- Narayana Hrudayalaya

MSMC- Mazumdar Shaw Medical Center

NS- Nursing Superintendent

NA- Nursing Assistant

HK- House Keeping

# ORGANISATION PROFILE

## (Observational learning)

## **INTRODUCTION:**

Narayana Health, headquartered in Bangalore is one of India's largest and world's most economical healthcare service provider. Since its inception in 2000 by leading cardiac surgeon Dr. Devi Prasad Shetty, as a 225- beds cardiac hospital 'Narayana Hrudayalaya' in Bangalore, the NH Group of Hospitals has grown to a healthcare conglomerate with a network of 32 multispecialty and superspeciality hospitals with 6498 beds spread across 20 locations. The Group was rebranded as 'Narayana Health' in 2013 to convey organizational vision, values, and objectives beyond just cardiac care.

The NH group offers services in all areas of medicine with special thrust in the areas of Cardiology & Cardiac Surgery, Cancer Care, Neurology and Neurosurgery, Orthopedics, Nephrology & Urology, Gastroenterology, General Surgery, Solid Organ Transplant & Critical Care and is focused on awareness, disease prevention, screening and early intervention.

Over the decade and a half, NH has set up clusters in South, East and West of the country and plans to create similar clusters in Northern & Central India and globally. They have set their global footprint with the establishment of Health City, Cayman Islands, North America that replicates the NH model of healthcare delivery. NH plans to reach out to people in Tier II and Tier III cities of India systematically, ensuring and providing them with quality care. Recognized world over for its social enterprise model, NH is committed to the principles of Compassion, Quality and Affordability in healthcare and leverages technology to achieve this.

NH has also been striving to build a self-sustaining healthcare ecosystem through various initiatives like building Health Cities to bring down the overall cost, leveraging economies of scale, CSR initiatives/donations from corporates/charitable trusts, offering academic programs, vendor management, thus addressing healthcare dynamics in a systematic manner. For its ability to reconcile quality, affordability, scale, transparency, credibility and profitability NH has emerged as a global industry model.

Going forward, NH intends to stay predominantly asset-light, reinvest accruals and engage with the state governments and like-minded private organizations for affordable healthcare, while leveraging the economies of scale and technology to its advantage.

**Vision:**

To provide high quality health care with care and compassion at an affordable cost on large scale

**CORE VALUES (ICARE)**

I – innovation and efficiency

C- compassionate Care

A – Accountability

R- Respect for all

E – Excellence

What makes Narayana Health different?

- Clinical Excellence with 2 JCI (Joint Commission International ) accredited Hospitals
- 4 NABH Accredited Hospitals
- Service Excellence
- Affordability
- More than 90000 Cardiac Surgeries
- Amongst the largest Telemedicine networks in the world
- Patients from 76 countries
- One of the largest Dialysis units in India with 217 dedicated beds and 1,30,000 Procedures per year
- 80 bed dedicated post-operative pediatric cardiac ICU, largest in the world
- Digital Radiology
- Academic Excellence
- Financial Stability

- FLOOR WISE FACILITY DISTRIBUTION:
- BASEMENT

**BLOCK -A**

- RADIOLOGY DEPARTMENT-CT SCAN , X –RAY , ULTRASOUND, MRI
- NUCLEAR MEDICINE
- DEPARTMENT OF SOCIAL WORK
- TELERADIOLOGY

BLOCK -B

- IT DEPARTMENT
- OUT PATIENT SERVICES – ONCOLOGY
- MEDICAL RECORD ROOM
- FIRST FLOOR

BLOCK -A

- OUT PATIENT SERVICES(OPD)
- EXECUTIVE HEALTH CHECK
- EXECUTIVE OPD
- PAIN MANAGEMENT
- VOICE AND SWALLOW REHABILITATION

BLOCK -B

- OUT PATIENT SERVICES(OPD)
- RHEMATOLOGY
- VASCULAR SURGERY
- PAC
- DAY CARE UNIT
- BOARD ROOM
- SECOND FLOOR

BLOCK –A

- GENERAL WARD
- 1<sup>ST</sup> WING TO 11<sup>TH</sup> WING
- NEURO PHYSIO UNIT

BLOCK -B

- SEMI PRIVATE WARD
- PRIVATE RROMS
- DELUXE ROOMS
- SLEEP LAB
- INPATIENT PHARMACY STORE
- THIRD FLOOR

BLOCK -A

- GENERAL WARD
- HDU 1

- HDI 2
- 4<sup>TH</sup> WING
- 5<sup>TH</sup> WING
- 6<sup>TH</sup> WING
- ISOLATION WARD
- MEDICAL INTENSIVE CARE UNIT (MICU)

- BLOCK -B
- SEMI PRIVATE WARD
- PRIVATE ROOMS
- DELUXE ROOMS
- FOURTH FLOOR

#### BLOCK -A

- OT COMPLEX
- POST ANAESTHETIC CARE UNIT(PACU)
- SURGICAL ICU(SICU)
- TISSUE REPOSITORY

#### BLOCK -B

- SEMI PRIVATE WARD
- PRIVATE ROOMS
- DELUXE ROOMS
- INPATIENT PHARMACY STORE
- FIFTH FLOOR

#### BLOCK -A

- OT COMPLEX
- LABOUR ROOM
- NEONATAL INTENSIVE CARE UNIT
- PAEDIATRIC INTENSIVE CARE UNIT
- STEP DOWN PAEDIATRIC ICU
- TRANSPLANT INTENSIVE CARE UNIT

#### BLOCK -B

- PRIVATE ROOMS
- SEMI PRIVATE WARDS

- DELUXE ROOMS
- LABOUR SUITE
- COLONOSCOPY / PROCEDURE ROOMS
- GENERAL WARD
- OUT PATIENT SERVICES
- PAEDIATRIC
- OBSTETRICS AND GYNAECOLOGY
- SIXTH FLOOR

#### BLOCK -A

- DIALYSIS

#### BLOCK -B

- OUT PATIENT SERVICES OF HEAD AND NECK
- OUT PATIENT SERVICES OF ENT
- OUT PATIENT SERVICES OF BREAST ONCOLOGY

#### SEVENTH FLOOR

- BLOCK -A
- HEMATOLOGY DEPARTMENT

#### EIGHTH FLOOR

- BLOCK -A
- CORPORATE OFFICE
- BLOCK -B
- MAZUMDAR SHAW RESEARCH CENTER

## **Front Office:**

Location: Ground floor

### **Introduction**

Front Office is the First Interactive Point for a patient coming to a Hospital. Front Office executives do multiple tasks right from taking multiple incoming telephone calls from patients who want to schedule appointments, registration, billing, admission, replying to queries of the patients, dispatching of reports, preparing individual patient file to entering records in HIS **Manpower & Hierarchy :**

There are 36 people working under Front Office Department.

Hierarchy:



Figure 2.9.1: Organogram of Front Office Department

### **Different Departments in Front office:**

OPD Bill Counter

Corporate Bill counter

Report collection counter

Counselling room

OPD Counter A to F

Call centre

#### **OPD Bill counter**

It accounts for registration & billing, and patient's queries; even corporate billing, Lab Billing, Radiology Billing which have their separate counters. But it is not meant for billing for PHC.

Alongwith paying patients, cashless services are provided for ESI, ECHS and CGHS patients. For CGHS patients, if cash, Rs.58/- is being charged and Xerox of ID proof is kept by the Hospital. If credit, referral letter from CGHS Clinic is required, which is valid for 7days. Colored photocopy of card & bill has to be kept.

For ECHS patients, referral letter is required which is valid for 30days. Referral letter can be used for single time only. Cash patients need to pay Rs.58/- along with copy of ID proof.

#### Report collection counter

This is a report collection counter for Lab. Investigations, Radiology, cardiac procedures, Neuro procedures. Reports of endoscopy and PHC are given by the respective departments.

(Normal timings for reporting- if tests are done before 12pm, reports can be collected after 5pm on the same day. If after 12 pm then next day morning.)

#### Counselling Room

If patient gets admitted in the hospital, patients are explained the estimate of hospital stay, expenses, etc. in this room. And they are allotted room according to their choice and availability.

#### Bed Management

It is responsible for allotment of bed and shifting of beds on patient's request. If the desired bed category is not available then the patient is upgraded into the immediate above bed category.

#### OPD Counters A to F

##### **Counter A- Cardiology**

Manpower on Nursing Counter: 3 nurses.

Counter A also includes Cardiac Procedure room. The procedures performed in Cardiac Procedure Room and their Turn Around Time is as follows:

1. ECG-Electrocardiography: 5 min
2. Echocardiography/Color Doppler: 15-20 min
3. Treadmill Test(TMT): 25 min
4. Stress echocardiography: 35 min
5. Transoesophageal cardiography (TEE): 15 min

#### Procedures done per day (on an average):

ECG-7

ECHO-15

Stress ECHO-2

TMT-3

#### Manpower in Cardiac Procedure Room:

1 or 2 Doctors

1 Technician

1 Female Nurse

1 Medical Transcriptionist (M.T.)

**Counter B** involves following specialties:

Obs. and Gynae.

Paediatrics

ENT

Ophthalmology

**Counter C- Neurology**

This counter caters to patients coming for Neurology Consultation. Neuro Procedure Room also come under this counter where following Neuro procedures are being done.

1. EMG-Electromyography

2. EEG-Electroencephalography

3. NCV-Nerve conduction velocity test.

(Time taken by each procedure-45 min

**Counter D**

Counter D caters to patients coming for General and Lap. Surgeon consultation and this is also a Billing Counter for Lab. and Neuro procedures bill

**Counter E** includes:

Internal Medicine

Orthopaedics & Joint Replacement

Gastroenterologist

Psychiatry

Rheumatology

**Counter F** includes:

Neurosurgery

Urology

Haematology

Spine clinic

Psychiatry/Clinical Psychology

Nephrology

Dialysis unit

Dialysis unit has 5 dialysis machines and 1 dialyzer reprocessor. Dialysis takes 3-4 hrs. to complete the process. So the appointments given to the patients are in 4 shifts as mentioned under:

Morning 8-12

Afternoon 12-4

Evening 4-8

Night- 8-12

Manpower:

3 staff nurse  
3 technicians-  
1 GDA  
1 housekeeping personnel

Endoscopy suite

Consists of procedure room, pre- & post-procedure room and cleaning area.

Procedures done:

1. Colonoscopy
2. Endoscopy
3. Sigmoidoscopy
4. ERCP (done in OT)

TAT for the procedures:

Each procedure takes 10-15 min. If pre-care, post-care and reporting is added it takes 30 min. Only colonoscopy requires 30 min. (only for the procedure)

Manpower:

1 Doctor  
1 female nurse  
1 technician  
1 GDA

There are 34 OPD's in MSCC

30,000 to 35,000 Out patients in a month .HINAI is used to manage patient queue. QIKWELL is the chosen software of choice now.

Launched in three busy OPD's on ground floor of MSCC in April. These OPD's are Neurology, Urology and Nephrology.

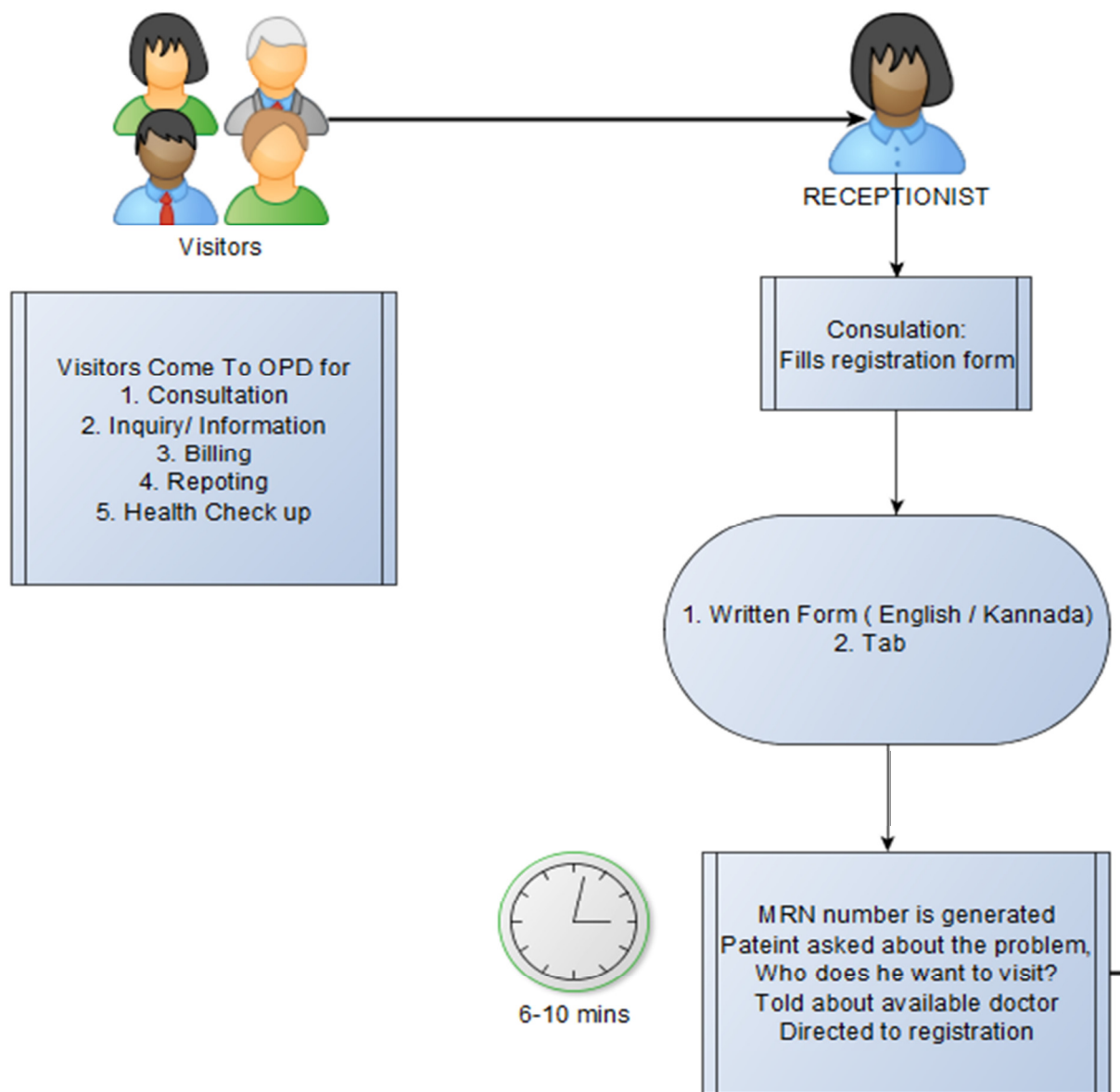
By the end of May this software has been scaled up to 9 other departments.

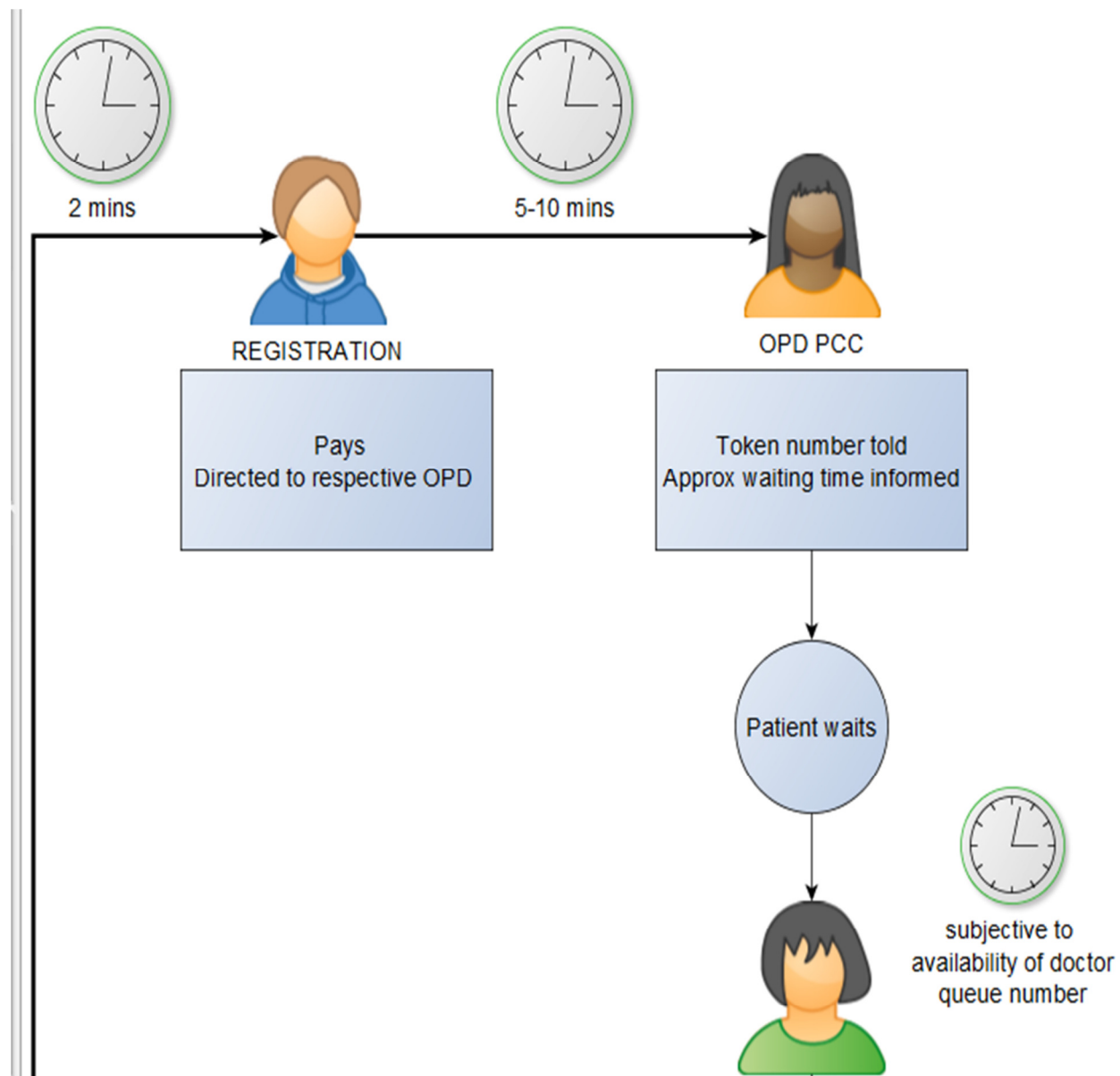
Gather's information from the doctors, about their OPD timings and consultation time devoted to new and follow up patients.

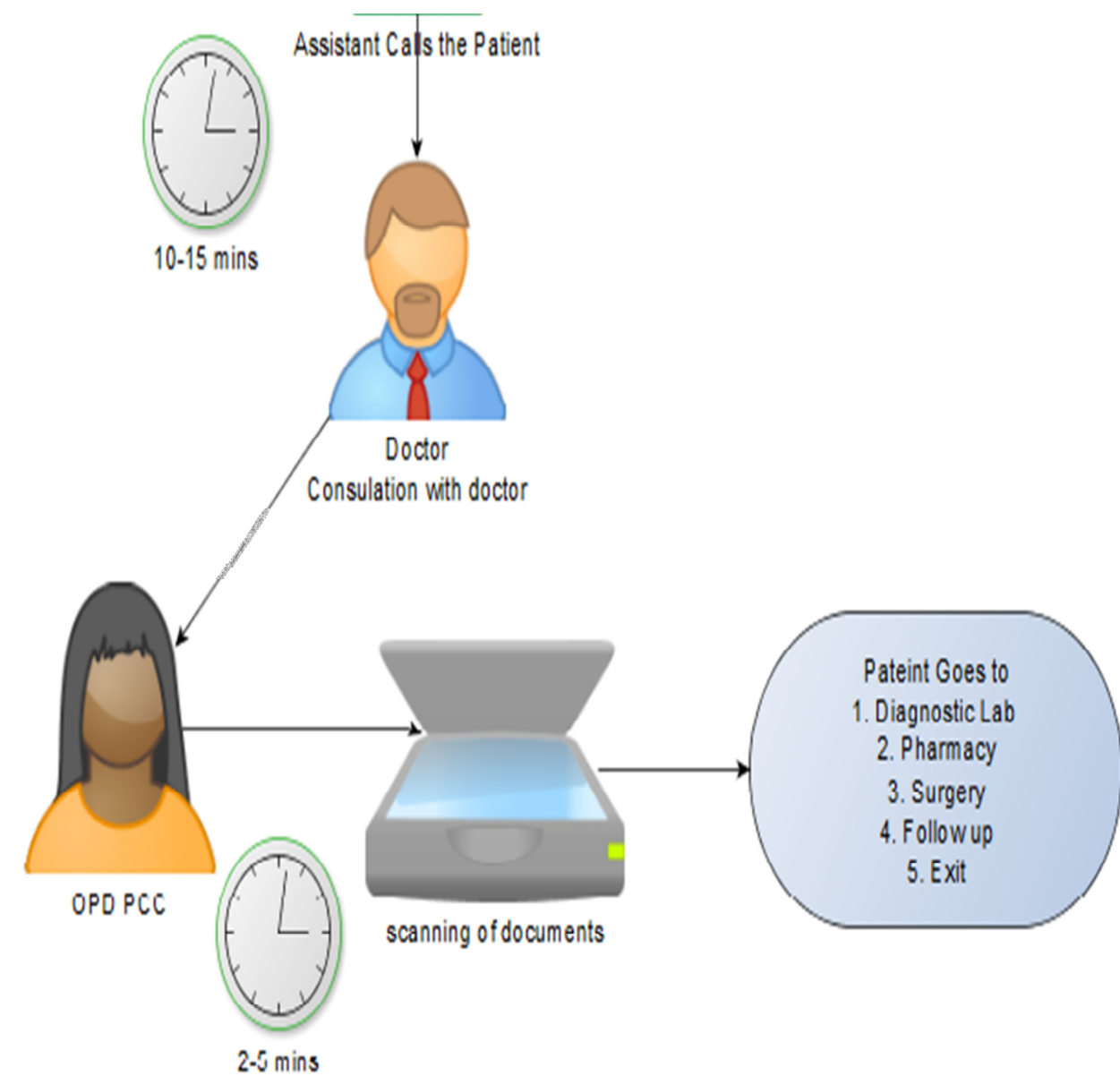
With this information a dashboard is created with the slot timings and OPD dates. The front desk secretaries were trained about booking the appointment for patients and the working of the system.

Apart from this, patients receive a message as soon as they are checked into the system by the secretary or if the appointments are booked online, for the live slots of appointment of doctors can be seen on the site. This also provides MSCC to out lay all its doctors on the net platform.

## OPD PROCESS FLOW HINAI

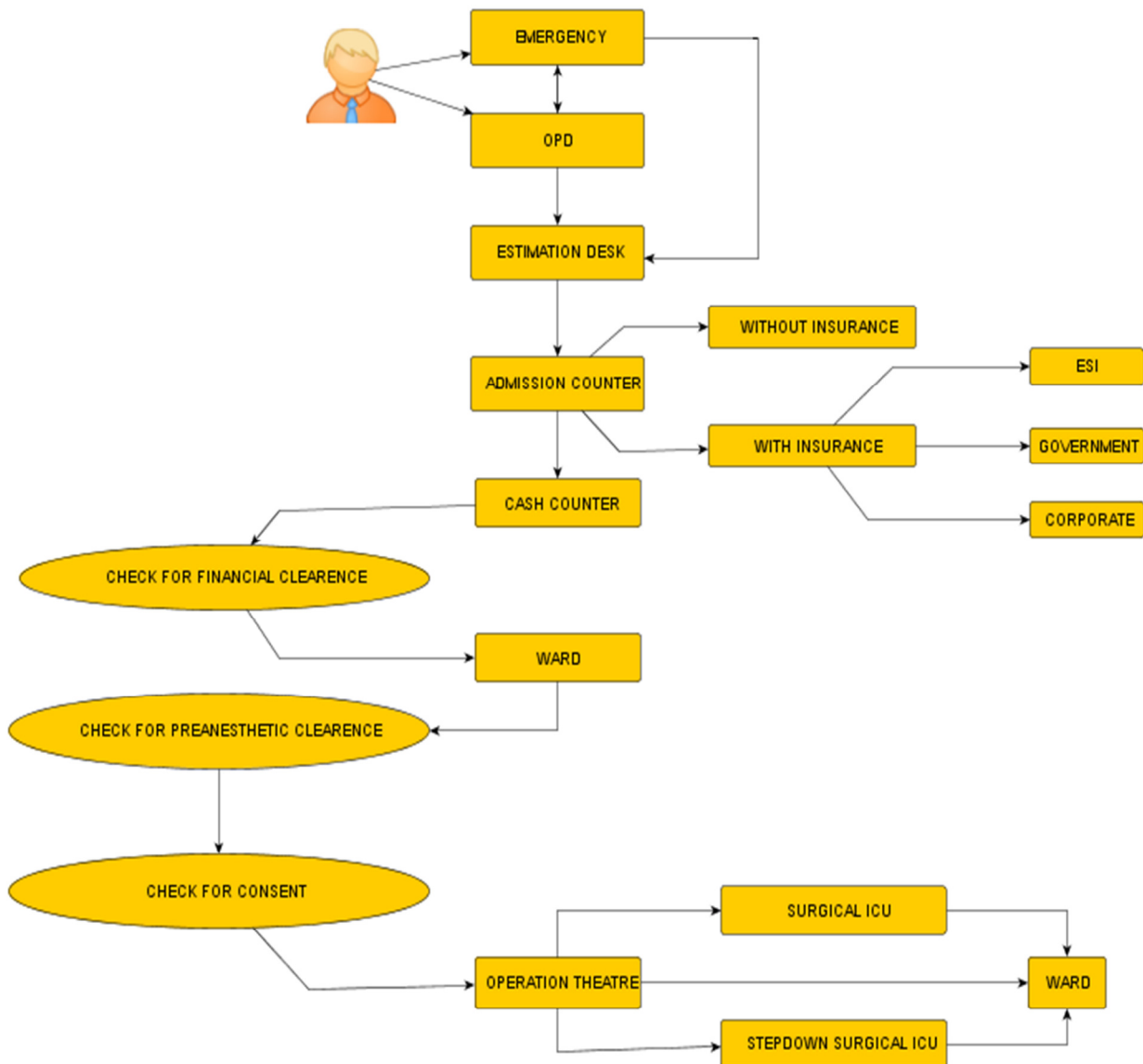






## **DEPARTMENT OF OPERATION THEATRE**

### **WORK PROCESS FLOW**



### **AREA**

The size of each operating room is 6 \* 9.2sq meters. Therefore the size of 13 operation theatres is 717.6 sq meters.

### **LOCATION**

It is located in 4<sup>th</sup> and 5 floors in 'B' Block adjacent to Surgical ICU and Step-down surgical ICU in Narayana health (Mazumdar Shaw Medical Centre), Bangalore.

There are total 13 Operation theatres, Out of that 11 Operation theatres are assigned to the particular departments and Operation Theatres 12 and 13 are assigned for Day care surgical procedures and Emergency cases respectively.

## **STAFFING**

The surgical department is organized around five main groups of staff – the surgeons, anesthesiologists, nurses, technicians and aides/orderlies, Surgeons and anesthesiologists are salaried staff. The surgeons group consists of surgeons from all specialties – general, orthopedic, neuro, cardiac, vascular, plastic and reconstructive surgery, ophthalmology, otolaryngology, gynecology, urogenital surgery, oral surgery, etc. Anesthesiologists are medical doctors who administer anesthesia and provide medical direction in the recovery room.

The third group in the operating room consists of the operating room supervisor who is generally a senior nurse, and staff nurses. The nursing team usually consists of a circulating nurse and a scrub nurse. Circulating nurse coordinates activities, gets and hands supplies and specimens into and out of the sterile area and marks all the checklist. The scrub nurse assists the surgeon and organizes and passes instruments. Besides the nurse, the surgeon may have another assistant, a medical doctor, during certain procedures

Technicians are commonly used in specialty and teaching hospitals where complex procedures like cardiac surgery, neurosurgery is performed. Orderlies and attendants are generally used for patient transportation, patient positioning, cleaning work, mopping of floors and disposal of trash. Aides clean, check and wrap instrument kits. The Cleaning and preparation time for operation room is 20 minutes and the waiting time of the patient for surgery in pre-operative room is 15 minutes

## **UTILIZATION**

The operating theatre is one of the most expensive departments of any hospital. Its capacity often limits the amount of routine surgical work that can be carried out. Surgeons, therefore, have a responsibility to ensure that theatre facilities are used as fully as possible, and also that good use is made of the operating time in the theatre. So Routine operation lists are prepared / planned in advance, so that each surgical team should be able to ensure that its share of theatre time is used as fully as possible, without being exceeded more often than necessary.

## **SCHEDULING:**

Proper and judicious scheduling of cases and adhering strictly to schedule is important, as poor scheduling is often said to be the cause of lost OT time. The list of

people to be operated is scheduled in such a way that surgical and anesthetic time is synchronized, e.g. patients with infection is operated in the end, so that they do not contaminate the theatre .Experts allocates the right amount of OT time to each service on each day of the week So that rarely do services fill their allocated OT time and leave another case to schedule

### **Emergency Department**

The purpose of Emergency department is to ensure patients undergo an immediate care in an urgency that their treatment is initiated in a timely manner & to do triage assessment.

#### **1) Scope of emergency**

To cater all emergencies coming to hospital, their stabilization, admission, transfer or referral from emergency department within or outside the hospital.

ER provides a comprehensive & uniform emergency service/ care to patient (functional 24\*7).

All patients are assessed & triaged by a qualified & experienced medical & paramedical staff & provided appropriate level of care in ER department.

The ER department provides medical evaluation & treatment (including rapid resuscitation & stabilization) .Patients receive medical referral / transfer (including critically ill patients & or those are not in scope of services of hospital )

Emergency care services provided include-

Stabilization of life threatening conditions.

Life saving procedures.

Immediate treatment of medical & surgical emergencies.

Emergency treatment for minor injury or illness.

## **2) Admission process flow**

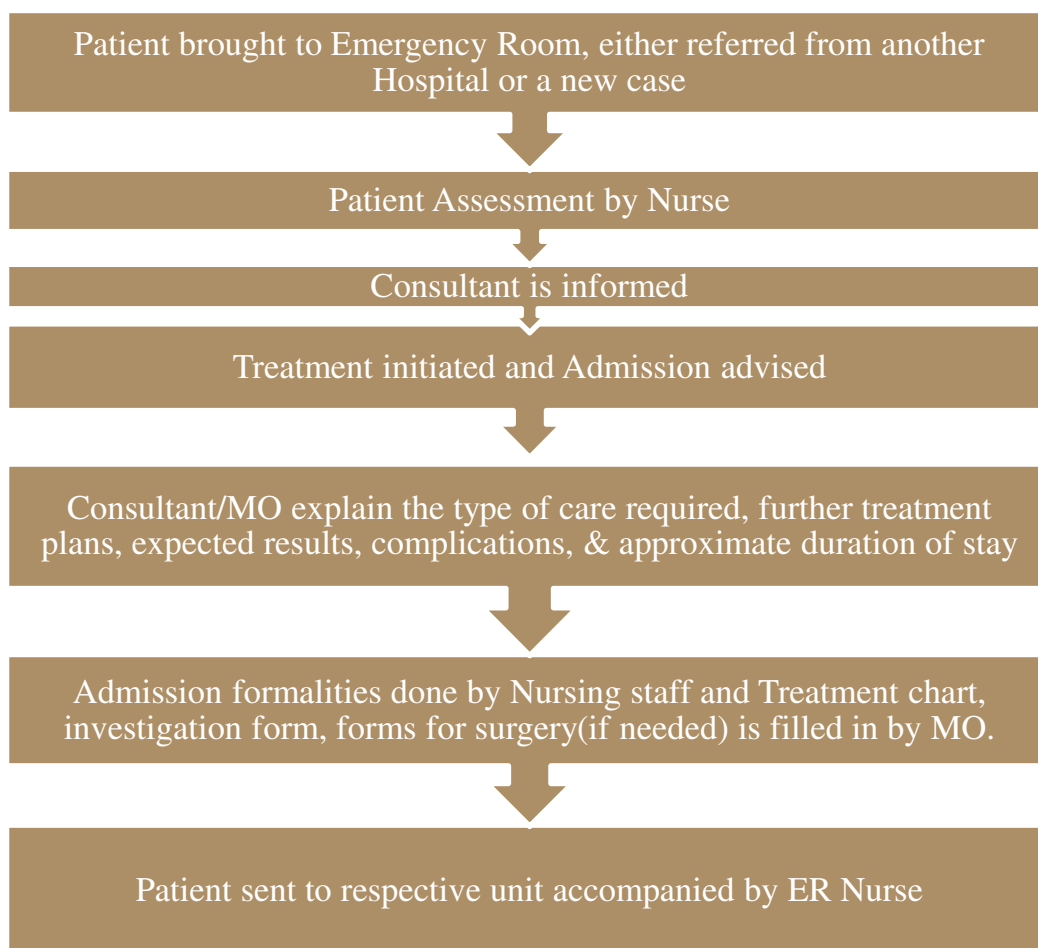


Figure 2.10.1: Process Flow showing admission process in Emergency Department

### **3) Process Flow in Triage**

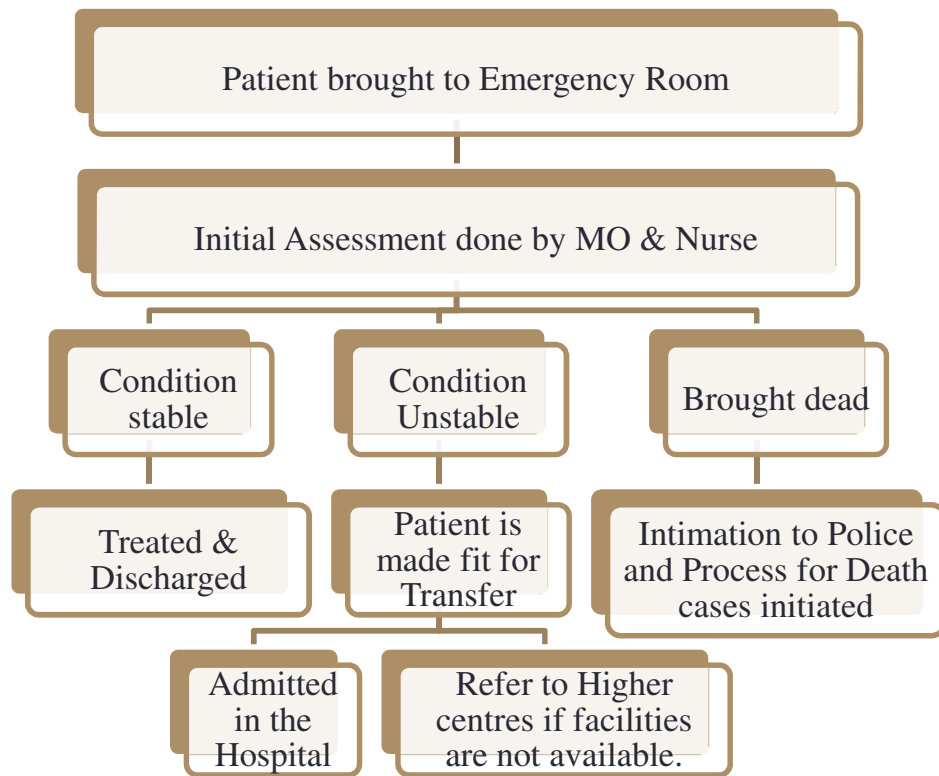


Figure 2.10.2: Process Flow in Triage

#### **4) Overview of the department**

ER department is situated at the Ground floor of Paras hospital. It is 24 hour functional & is eight bedded. Hierarchy is as shown:



Figure 2.10.3: Organogram of Emergency Department

#### **5) Important medications used in Emergency Department**

##### High alert medications

These are defined as those which could cause an immediate life threatening condition for the patient if an error in administration occurs.

##### Narcotic drugs & psychotropic substances (NDPS)

These are drugs which required special storage & issue to prevent misuse, pilferage etc e.g. fentanyl, morphine, pethidine, sufentanyl (also known as Schedule 2 drugs).

Each person independently compares the label & product contents in hand versus the written order & EMAR (if it is the first dose) or label. Double check of medications prior to administration by 2 registered nurses after reading the label is mandatory.

Hospital has made some policies regarding the use of Narcotic Drugs

##### General guidelines for the Medicines:

High alert medications dispensed, & administered only on prescription by credentialed personnel / OT/ ICU/ ER in charge doctors to critical care & special care areas

Double check of Medications prior to Administration by 2 Registered Nurses by reading aloud:

Right medication, Right dose rate, including double check of any calculation & verification of pump settings.

Right route , including line reconciliation., Right frequency, Right patient.  
High alert medications details will be recorded in Medication Administration Record.  
Storage as per manufacturer packaging instruction.  
Narcotics must be stored under double lock & key.  
In case of expiry/ breakage, excise inspector will be informed accordingly.  
Warning labels for all cytotoxic drug containers, as well as shelves.

#### **6) MLC cases**

It is a case of injury or ailment etc where attending doctor after taking history & doing clinical examination of patient thinks that some investigations by law enforcing agencies are essential so as to fix responsibility regarding the said injury or ailment etc according to law.CMO attending the case, label the case as MLC.

##### **Cases labeled as MLC-**

Trauma, burns, electrocution, poisoning, industrial accidents, sexual offences, cases requiring age estimation, criminal abortion, animal or snake bite, cases of coma where cause could not be ascertained, cases of starvation including hunger strike, unclaimed newly born, hanging, strangulation, drowning, suffocation etc, cases brought by police or sent by court for medical examination, BID, where death certification due to disease or natural cause is not possible being not apparent, result of medical malpractices.

#### **Central Sterile Supply Department**

It is responsible for providing seamless supply of sterilized instruments and other devices to the required departments for the smooth working of the Hospital alongwith maintaining the sterility. The aim of CSSD is to reduce hospital acquired infection level to zero.

#### **1) Structure of CSSD**

CSSD is divided into 2 areas: **Sterile and Unsterile Area**. Unsterile area is for receiving the unsterile supplies, washing and packing them to proceed for sterilization whereas sterile area is to store the sterile items to avoid any kind of contamination. In the unsterile area, gauze pieces and gamzee roll (of half metre size) are also made for wards and OT which then is packed and sterilized in the Autoclave. For OT, set of 10 gauze pieces are packed together with a single piece of 8 layers and of size 10 by 10 whereas in the ward, a set of 4 pieces are packed with a single gauze piece of 12 layers and of size 7.5 by 7.5

#### **3) Areas where CSSD supplies are required**

OT& ICU

Nursing counters & OPD

Issuing of sterilized materials are done 2 times a day from the Issue Counter in the sterile area.

##### **Receiving & Issue Time-**

Morning- 9am-10am; Evening-3apm-4pm; Night-9pm-10pm

For sterilization of metal instruments, firstly Ultrasonic machine is used for disinfecting the instruments with Rapid-multi enzyme cleaner(10 ml/litre) and a chemical-Neadishter Iar (10ml/litre) to prevent the instruments from rusting. This takes 15-20 min. to complete the procedure. After completion of the procedure, instruments are washed in running water and then dried. Then these are packed in sets in a double sheet. Finally the packed sets are autoclaved at a temperature of 132-134 degree Celsius and 15 lb pressure. The process takes 40 to 50 minutes. Autoclave in CSSD has double door with one door opening in the non-sterilized area from where non-sterilized items are moved to the autoclave and another door in the sterile area.

For sterilization of plastic and rubber items, ETO sterilizer is used. It has an inbuilt tray for the items. It uses Ethylene oxide gas for sterilization which comes in the form of 100ml cartridge. A single cycle takes 10 hrs 20 minutes

### 5) Process flow

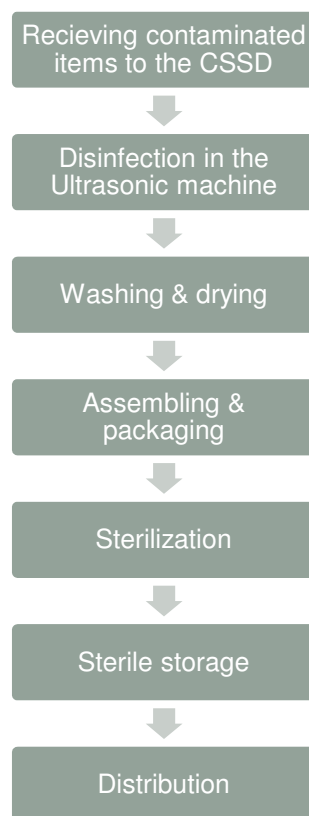


Figure 2.6.1: Flowchart of CSSD sterilization

### 7) Indicators of sterilization

Two types of Indicators are there: Chemical Indicator and Biological Indicator.

**Chemical Indicator** is an adhesive tape which is adhered to the packet which after the procedure turns its color indicating the process of sterilization has completed. For Autoclave, Green color turns to Black and for ETO, brown color turns to Green.

**Biological Indicator**-.Biological indicators are used to confirm autoclave's killing efficiency. A kit containing *Bacillus stearothermophilus* (for steam sterilizer) and

*Bacillus Subtillus* (for ETO machine) is kept inside the machines; the machines are run for their actual processing time. Then the kit is sent to the lab to identify if the bacteria died or not. After this, the machine is declared fit to run. This test is performed on weekly basis, every Tuesday. Investigation of this test takes 48 hrs.

**Other tests** to ensure functioning of CSSD Equipments:

For every load, **Steam sterilization Integrator** is also used in both Autoclave and ETO which resembles a strip and changes its color indicating the successful procedure. In case of Autoclave, color changes from White to Blue and in ETO, color changes from Yellow to Green.

**Bowie-Dick test** or DART (*Dynamic air removal test*) is performed every morning before starting any procedure. A strip is placed in the Autoclave for 15-20 minutes, after which its color turns from Blue to Pink. This test is for checking prevaccum autoclave's air removing ability and steam penetration.

**Fumigation** every week on Monday Night.

#### **8) Manpower and shifts**

CSSD In charge (8:00am-4:30pm)

4 Technicians

## 9) CSSD Layout

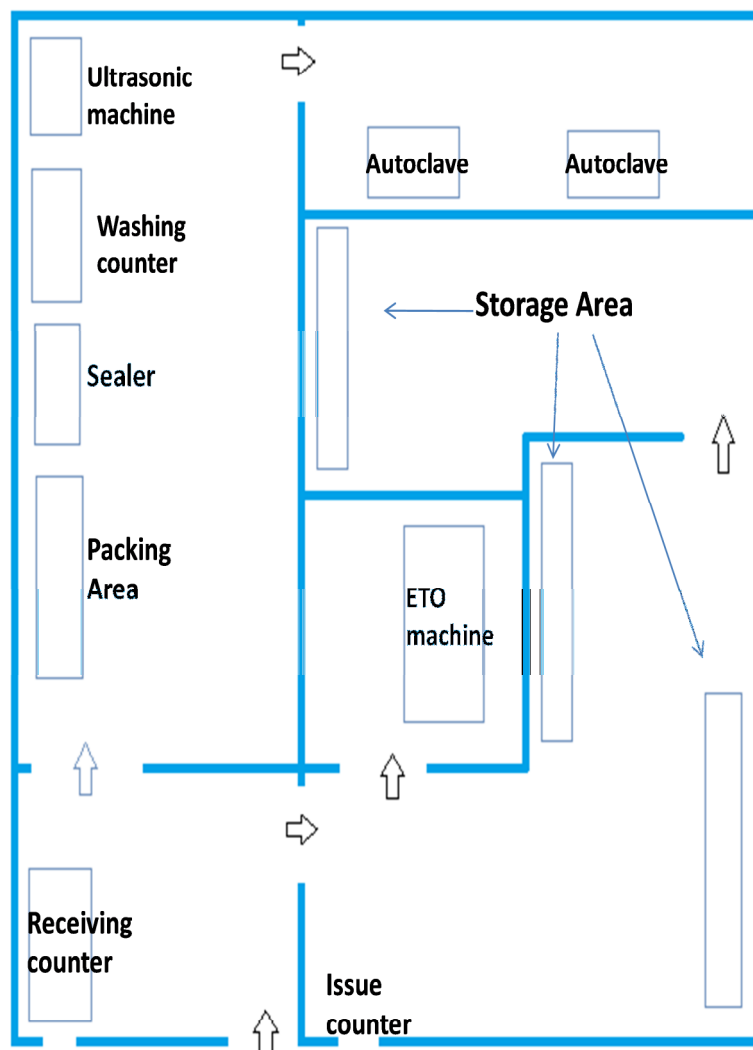


Figure 2.6.2: CSSD layout

### IP Pharmacy

IP Pharmacy majorly caters to IPD, OT pharmacy and Emergency department.

#### **1) Manpower**

Head of Department: 1

Deputy Manager: 1

Assistant Manager: 1

Executive: 2 (store)

Senior Pharmacist: 4

Pharmacist: 9

Pharmacy asst.: 5

**2) Emergency Drugs:**

A total of 35 critical life saving drugs and 48 high alert drugs are kept. High alert drug such as chemo drugs are those which need to be handled with care and prevent breakage etc.

Look alike and Sound alike drugs are kept in a different shelf and are marked as look alike and sound alike so that a person dispensing any of these drugs is more alert.

**4) Drug Ordering:**

Bulk orders are given on Tuesday and Friday but still depending on the stock at hand the department can put an indent every day. The ROL (Re order level) has a minimum stock marked for 7 days and a maximum for 15 days.

**5) Medicine Expiry:**

Every month in the last week, the IP Pharmacy staff checks the medicines which are three months before the date of expiry. Medicines found in that category are collected and returned to the respective vendor. Surgical device and vaccines can be kept before 6 months of expiry after which they are returned.

**6) Legal Norms:**

Forms 20 and Form 21 certify the pharmacy by the government to dispense medicines. As of now the pharmacy has three licenses issued in name of four people. Anyone of the four is expected to be at the hospital at all times.

For a person to qualify as a pharmacist, he or she is at least expected to have a Diploma in pharmacy. Also each pharmacist is expected to have a valid registration with the pharmacy council which has to be renewed every year. To stock narcotics, a separate permit is also required.

**8) Storing the drugs:**

Drugs are stored based on alphabetical order and are segregated based upon the types.

**9) Processes Taking Place in the Pharmacy:**  
Medicine Dispatch:

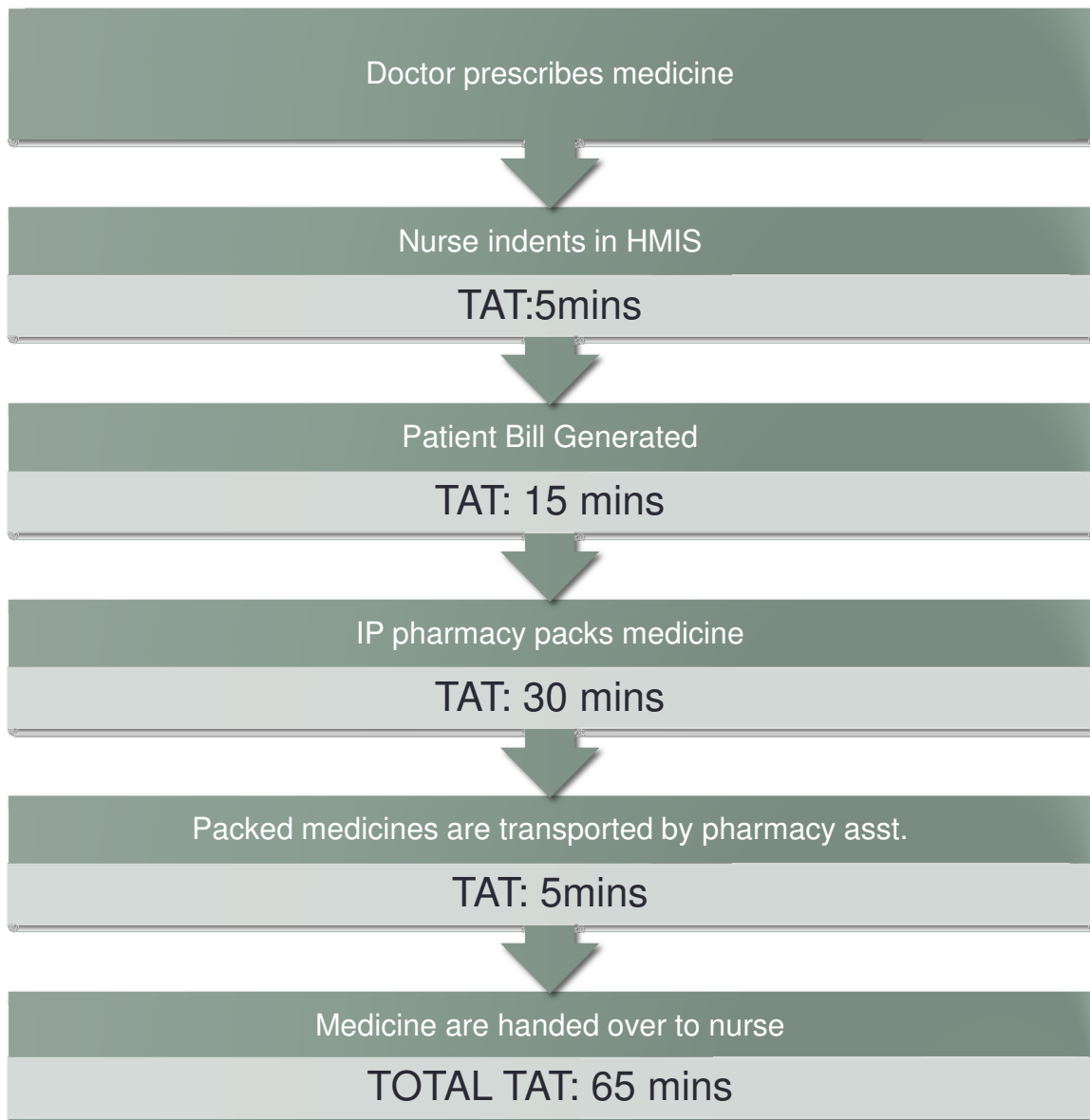


Figure 2.5.1: Process flowchart of medicine delivery

### Medicine Return:

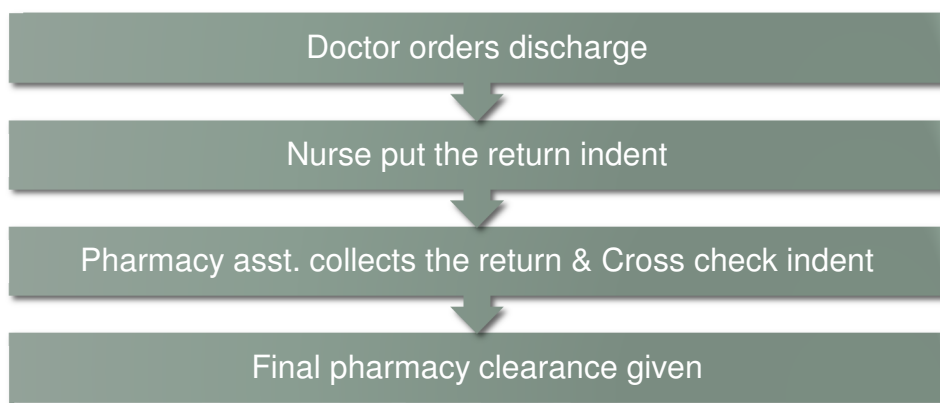


Figure 2.5.2: Medicine return process

The standardized hospital TAT for the above procedure is 40 minutes. Also medicine is returned against a credit note or cash in the form of cheque from vendor.

### Procurement of Medicine:

Everyday an indent can be put in if some new medicine is being prescribed by the doctors or if the store does not have a set of medicines. Bulk order days for pharmacy are Tuesday and Thursday.

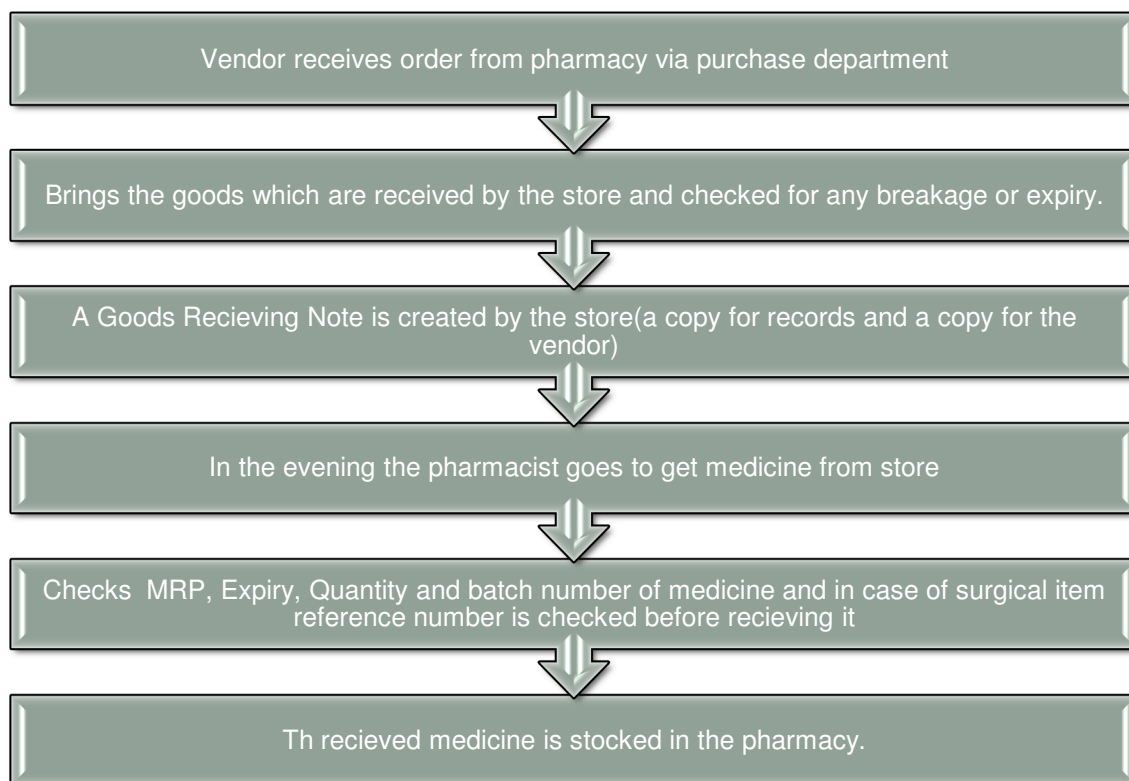


Figure 2.5.3: Process flowchart of procuring medicines

### **10) Manual Prescriptions are used for the following cases:**

Medicine for emergency department

New admission in the IPD

Chemo Drugs

Urgent drugs

Non available drugs.

### **13) Adverse reaction:**

In case of an adverse reaction of any medicine, an adverse reaction form is filled by the doctor and the batch no. of the medicine is noted. All the drugs of the batch are discarded from use and returned back to the vendor with the documents mentioning the reason.

### **Intensive Care Unit**

**Intensive care units (ICUs) provide intensive care (treatment and monitoring) for people in a critically ill or unstable condition.**

Paras Hospital has **7 ICUs**:

CTVS ICU: For patients admitted for Cardio Thoracic Vascular Surgeries or critical Cardiac patients.

Surgical ICU: For patients who have undergone surgeries or trauma patients.

CCU: For patients who are admitted for invasive procedures in Cath Lab.

MICU: For patients with Medical conditions

NSICU: For Neuro patients

PICU: For Pediatric patients

NICU: For care of Neonates after delivery.

### **1) Admission Process in ICU**

In ICUs patients get admitted via OPD, IPD or Emergency.

### **2) Discharge process from ICU**

Generally, patient is stepped down to the ward if the condition gets stable and then discharged. In some cases, if patients' relatives wants to take the patient against the Doctor's advice, then they are given LAMA (Leave against Medical Advice).

### **4) Equipments used & care in ICU**

Major Equipments used in ICUs:

Ventilator

Monitor

Crash Cart

Air beds to prevent Bed Sores

BIPAP

In each ICU, Bed Panels are there for each bed through which medical air, oxygen, vacuum for suctioning is supplied.<sup>2</sup> Portable machines are also dedicated for ICUs, mainly for the Chest X-Rays of the bed-ridden patients.

In case of infectious patients, nurse-to-bed ratio is one with separate gown for the Nurse and Doctor who sees that patient. For infected patients with Respiratory diseases, double mask are given to the patients to wear to control the spread of infection to other patients and ICU staff. Identification to Infectious patient is by 'Barrier Nursing' or 'High Risk patient' Tag.

### **7) Nurse-to-bed ratio**

For ventilated patients, nurse to bed ratio is 1:1

For non-ventilated patients, nurse to bed ratio is 1:2 or 1:3

### **6) Temperature in ICU**

In each ICU, temperature is maintained between 22-24 degree Celsius; reason being bacteria and viruses cannot thrive at lower temperatures.

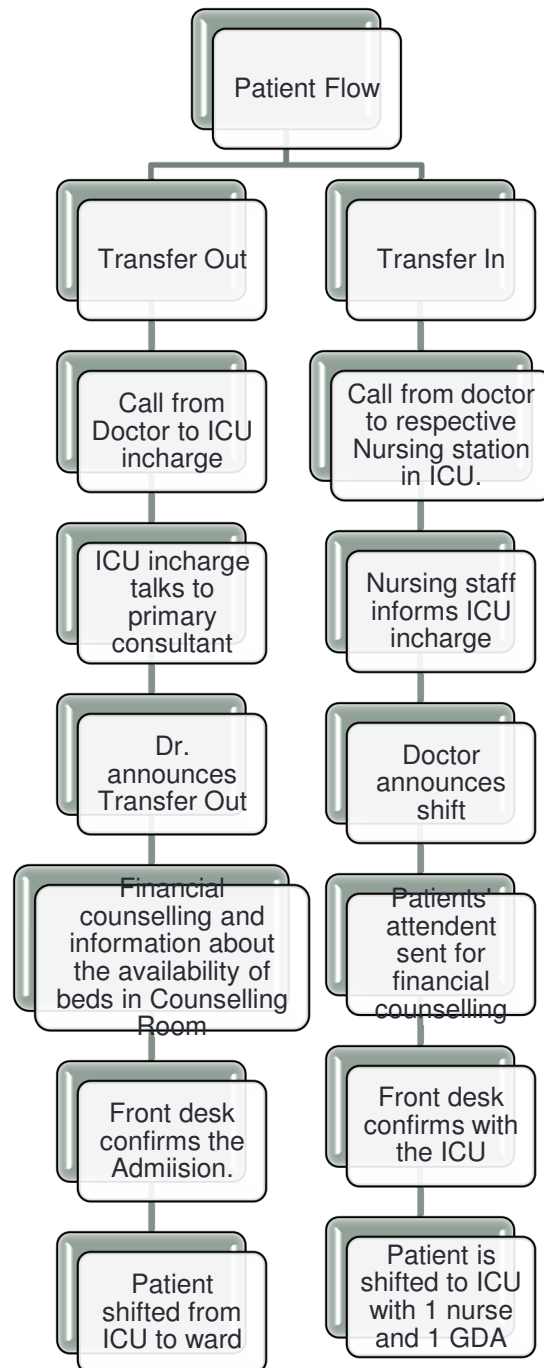


Figure 2.4.1: Transfer In Transfer out process chart

### 5) Infection Control in ICU

Hand washing.

Floor cleaning with Sodium Hypochlorite.

Proper Biomedical waste segregation.

Not more than 3 antibiotics

Fumigation once in a month.

Used items such as Ambu Bag, etc. are sent to CSSD for sterilization.

Use of Gowns, shoe covers and masks inside the ICUs.

After each Transfer Out or Discharge, bed is carbolized with sodium hypochlorite.

### **8) Food & beverages**

Patients' diet is decided by the doctor by consulting the dietician.

### **9) Store rooms**

Each ICU has store room where medicines, injectables, etc. are kept for the need of the hour. Generally medicines for the patients are called from IP Pharmacy through Drug Requisition in HMIS. On Daily Basis, each Nurse is assigned to check the items of the store for its expiry date.

### **10) Manpower & shifts-**

1 Senior Area Incharge (8:00am-4:30pm)

1 Area Incharge (12:00pm-8:00pm)

7 staff Nurses

Morning shift-8:00am-2:00pm (3 staff nurses)

Evening shift-2:00pm-8:00pm (2 staff nurses)

Night shift-8:00am-8:00pm (2 staff nurse)

### **11) Different Areas in ICU-**

Patient Area

Nursing Counter

Store Room

Utility Room

### **Specific to NSICU:**

Neuro Surgical ICU has an isolation room which is mainly for highly infectious patients negative air pressure is maintained in this so that infection does not spread.

### **Specific to CCU:**

Patients in CCU are admitted mainly for the Angioplasty or other Cath Lab Procedures. Before patient is sent to Cath Lab, below mentioned things are looked after:

Part Preparation of Radial and Femoral site.

Surgery Billing & Completion of Consent Forms

Investigations, mainly kidney Investigations are done because the dye given during the Cath Lab Procedure can affect kidney.

It also records the vitals for upto 72 hours.

### **Different Areas in ICU-**

Patient area

Doctor's Room

Store Room

Utility Room

**Specific to PICU:**

Pediatric ICU mainly caters children of age 1 month to 15 years. It is 8-bedded ICU.

**Specific to NICU:**

NICU mainly caters to the neonates of less than a month. Only low-birth weight babies are treated in NICU for upto 3 months. NICU is divided into 2 areas: One is for outside patients and another is for inside patients. There are total 9 beds in NICU, 3 for the outside patients and 6 for the inside patients.

In NICU, admissions are mainly due to Pre-term, meconium aspiration or Low Birth Weight.

Patients in NICU are treated according to the Level of care needed:

For Level 1- only patient warmer is used.

For Level 2- patient warmer, monitor, syringe pump & phototherapy is used.

For Level 3- patient warmer, syringe pump, monitor & ventilator is used.

**Equipments used in NICU-**

Neonatal warmers-9, which maintains the temperature between 36-37 degree Celsius.

Phototherapy unit -4

3 ventilators- 2 Pediatric and 1 adult

**A STUDY ON THE  
EVALUATION OF  
PRIMARY BILL  
ESTIMATION DURING  
ADMISSION AND ITS  
CONNNCLUSION AFTER  
TREATMENT**

(Project Report-1)

## **INTRODUCTION:**

With consumers increasingly being required to shoulder more responsibility for their healthcare costs, there is growing pressure on providers to simplify prices and billing statements to make them more easily understood by the general public. Called “pricing transparency” by those in the industry, this concept refers to making available to consumers the precise total costs for specific services provided by hospitals and other healthcare service providers. Ideally, estimated costs would be available to patients prior to a scheduled service and would incorporate their specific condition and insurance coverage.

Yet making prices more transparent is no easy task. The way in which hospitals set charges is intertwined with the way in which payers reimburse hospitals. And the reimbursement system is actually a multitude of quite varied processes cobbled together and modified over time.

However, in spite of the complexities that are inherent in pricing and largely beyond the control of hospitals, the hospital community believes that people deserve access to meaningful information about the price of their hospital care and have begun working on solutions.

As providers work on ways to create more transparency in their pricing, consumers should keep in mind the importance of assessing not just price when making healthcare decisions, but also the quality of care they are likely to receive. Just as consumers evaluate both price and quality when buying a car or hiring an electrician, patients should also evaluate a variety of factors beyond cost when selecting a healthcare provider.

To help generate a profit, hospitals do what those in other industries do – they adjust charges to reflect some amount above the cost of doing business. For hospitals this translates into modifications to the charge master. To keep up with inflation, hospitals must increase the rates charged for services.

Technological advances that spur improvements in the ability of hospitals to provide care also sometimes result in higher charges for services that require more expensive equipment and more staff resources. Financial and competitive pressures further impact the charge master, as hospitals strive to remain viable in the market.

The general process flow in MSMC for the estimation of patient bill includes:

1. The patient after getting surgical advice comes to the estimation office for an approximate estimation of the procedure.
2. It is mainly done manually where pre fixed prices are taken into consideration and previous patient data are also considered, expenses like fees for surgeon team, implant or stent costs and some medicine costs are included.
3. Around 80% of the estimated amount has to be paid for the admission of the patient, which is kept as deposit and any extra amount of bill has to be paid during discharge or if the bill comes lower than that then refund is processed.

### **PROBLEM STATEMENT:**

The approximate bill amount estimated for any surgery or procedure could not be made perfect in every IP case due to gaps in some clinical and non-clinical aspects.

### **AIM:**

To evaluate the various issues and gaps for primary estimation process prior to any surgery or procedure and to make suitable recommendations to fulfil the same.

### **RATIONALE:**

The requirement of the study lies in various aspects like :-

1. The billing may be done both in a small or big scale but it should give a much close figure in its estimation for any process on a primary basis which will be beneficial for both patient and the Hospital.
2. The financial impact of the process can be assessed and probable errors and uncertainties can be minimised.
3. A good estimation may increase patient flow in the IPD.

### **SPECIFIC OBJECTIVES:**

- To understand the gaps based on estimation and to provide suitable solution for the same.
- To streamline the entire estimation process and to close up the values with that of IPD final billing.
- To bring about advanced methods of billing estimation and minimise the probable errors and patient queries.
- To simplify the process for urgent and emergent care.
- To make the patients more aware of the variations caused for different reasons and thereby increase the OP To IP conversion ratio.

### **MODE OF DATA COLLECTION AND COMPILATION:**

The data has been collected from the past 1 month by considering the estimation records of the various day care and admission patients coming for estimation of any procedure or surgery as asked by the concerned doctor as well as their final payable bill amount.

The data includes the estimated bill amount for package and non-package surgeries and procedures for various departments like general surgery, vascular science, gynaecology, paediatrics, urology, nephrology, neurology, CMF surgery, surgical oncology as well as day care.

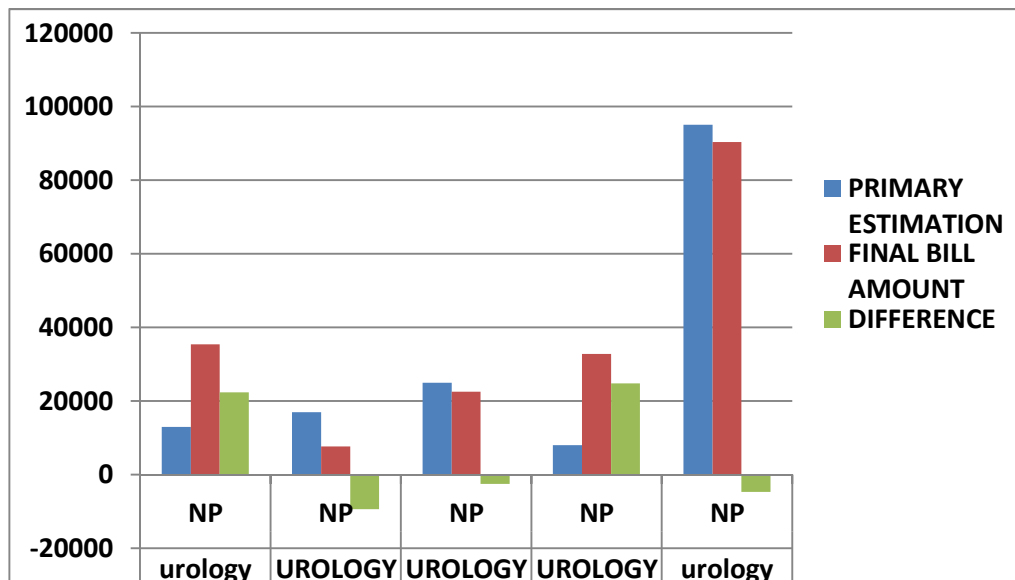
The total data received from various departments were compiled randomly and a sample of 70 estimated and final bill amount were taken for comparison and interpretation.

**DATA ANALYSIS:** The data was processed, compared and analysed by use of simple mathematical calculations.

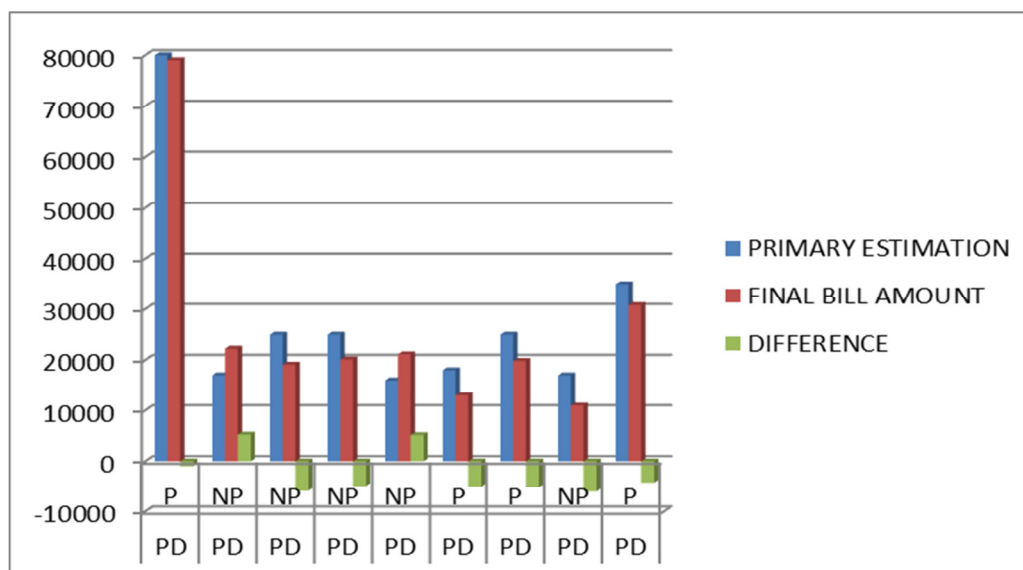
## **INTERPRETATION- I:**

i.) List of major variation for few departments:-

The highest variation for Rs. 24780 of final bill from the estimated price for surgery procedures in Urology department, paid by the patient and around Rs 9347 refunded by the hospital.

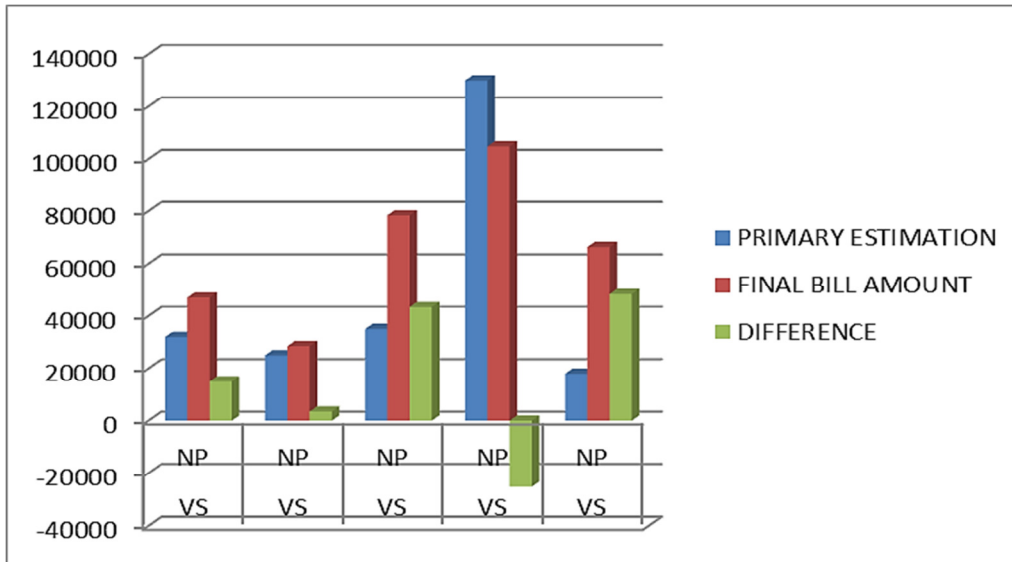


In Paediatric Department the final bills come to almost close to the estimated amount due to more use of packages.

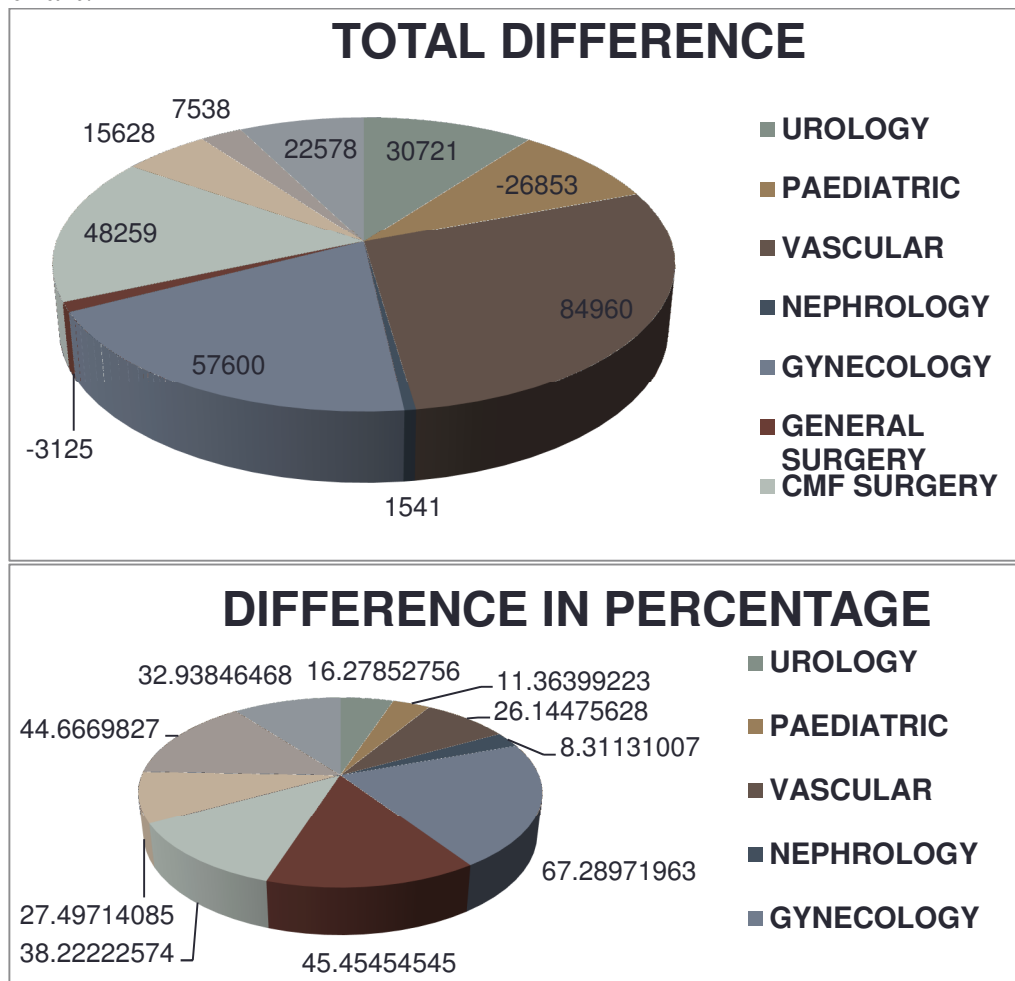


## **INTERPRETATION- II:**

ii.) The variation in Vascular Science Department is quite high compared to other departments with the highest bill difference of Rs. -25216 which had to be put as refund.



The overall variation of various departments can be shown through the following chart:-



### **REASONS FOR VARIATION IN ESTIMATION:**

- For complicated cases always it is not possible to estimate the exact or approximate amount due to unknown procedure undertakings in the future which may include expenses like medical and surgical costs.
- Also in any surgical procedure or in some emergency cases the number of exact days cannot always be calculated on the basis of primary examination.
- Another reason may include the cross consultation by any other specialist during or after the procedure.
- Cost for different implants and other related items cannot be calculated during estimation due to huge variation in the cost and sometimes it is unknown.

- Sometimes the entire process is altered prior to the surgery or decided during the process itself.

## **RECOMMENDATIONS:**

- ☐ Packages can be introduced to cover up maximum procedures/surgeries which will give a definite instead of approximate amount to the patient.
- ☐ The codes mentioned in the tariff details should be used by all the medical and non-medical staffs to avoid any error due to lack of understanding of the procedure mentioned.
- ☐ Patient should be made more aware of the variations that may happen during or after the procedure/surgery like due to medicines or any other add on procedure.
- ☐ For this there should be clinical persons involved more at the ground level and also the price recordings in the system can be updated on a regular basis for different separate implants and different types of stents.
- ☐ Also there can be more online or intranet work included for the entire process which can make it more simple and accurate like there can be a setup of Patient Charge Estimator software and onsite training, scripts for discussing estimates with patients, and documented evaluations and recommendations.
- ☐ A given procedure typically requires one or more Current Procedural Terminology (CPT) codes. There can be an estimator tool which can automatically calculate the charges for all the appropriate codes, which provides an accurate estimate of patient out-of-pocket responsibility.

## **CONCLUSION:**

The process of estimation being an important one, at present it is satisfactorily good with the present workload, which can even be better.

This project is focused towards creating an integrated bill estimation system towards every in patient. The use of combined/ integrated database system has not yet been developed fully which should be brought in use soon in order to also minimise the error which may occur from traditional papering system.

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## **ANNEXURE:**

Primary and secondary data for estimated bills of various departments:-

| DEPARTMENT         | TYPE(PKG/NON<br>PKG) | PRIMARY<br>ESTIMATION | FINAL BILL<br>AMOUNT | DIFFERENCE |
|--------------------|----------------------|-----------------------|----------------------|------------|
| urology            | NP                   | 13000                 | 35397                | 22397      |
| UROLOGY            | NP                   | 17000                 | 7653                 | -9347      |
| PD                 | P                    | 80000                 | 79021                | -979       |
| PD                 | NP                   | 17000                 | 22247                | 5247       |
| PD                 | NP                   | 25000                 | 19119                | -5881      |
| UROLOGY            | NP                   | 25000                 | 22521                | -2479      |
| PD                 | NP                   | 25000                 | 20134                | -4866      |
| PD                 | NP                   | 16000                 | 21152                | 5152       |
| UROLOGY            | NP                   | 8000                  | 32780                | 24780      |
| VS                 | NP                   | 32000                 | 47000                | 15000      |
| PD                 | P                    | 18000                 | 13000                | -5000      |
| PD                 | P                    | 25000                 | 19848                | -5152      |
| VS                 | NP                   | 25000                 | 28458                | 3458       |
| VS                 | NP                   | 35000                 | 78377                | 43377      |
| urology            | NP                   | 95000                 | 90370                | -4630      |
| GENERAL<br>SURGERY | NP                   | 10000                 | 6875                 | -3125      |
| VS                 | NP                   | 130000                | 104784               | -25216     |
| VS                 | NP                   | 18000                 | 66341                | 48341      |
| PD                 | NP                   | 17000                 | 10987                | -6013      |
| NEPHROLOGY         | NP                   | 17000                 | 18541                | 1541       |
| GYNECOLOGY         | NP                   | 28000                 | 85600                | 57600      |
| PD                 | P                    | 35000                 | 30791                | -4209      |
| CMF SURGERY        | NP                   | 78000                 | 126259               | 48259      |
| VS                 | P                    | 25000                 | 15647                | -9353      |
| VS                 | NP                   | 64000                 | 45987                | -18013     |
| PD                 | NP                   | 35500                 | 14979                | -20521     |
| urology            | NP                   | 66000                 | 61469                | -4531      |
| GENERAL<br>SURGERY | NP                   | 45000                 | 56897                | 11897      |
| HEAD & NECK        | NP                   | 145000                | 156478               | 11478      |
| CMF SURGERY        | NP                   | 25000                 | 35648                | 10648      |
| urology            | NP                   | 65000                 | 70365                | 5365       |
| NEPHROLOGY         | P & NP               | 58500                 | 61235                | 2735       |
| NEUROLOGY          | NP                   | 12500                 | 15646                | 3146       |
| GYNECOLOGY         | NP                   | 58000                 | 52365                | -5635      |
| GENERAL<br>SURGERY | NP                   | 12500                 | 16458                | 3958       |
| CMF SURGERY        | NP                   | 47000                 | 45698                | -1302      |
| PD                 | NP                   | 78000                 | 82365                | 4365       |
| PD                 | NP                   | 23500                 | 45646                | 22146      |
| GYNECOLOGY         | NP                   | 55000                 | 75689                | 20689      |

|             |        |        |        |        |
|-------------|--------|--------|--------|--------|
| GYNECOLOGY  | NP     | 32000  | 45659  | 13659  |
| HEAD & NECK | NP     | 125000 | 127568 | 2568   |
| VS          | NP     | 56000  | 58976  | 2976   |
| GENERAL     |        |        |        |        |
| SURGERY     | NP     | 12500  | 14568  | 2068   |
| PAEDIATRIC  | NP     | 45600  | 56598  | 10998  |
| NEUROLOGY   | NP     | 26500  | 23568  | -2932  |
| CMF SURGERY | NP     | 58000  | 85647  | 27647  |
| PAEDIATRIC  | NP     | 46500  | 65697  | 19197  |
| NEPHROLOGY  | NP     | 45000  | 34568  | -10432 |
| urology     | NP     | 55000  | 65487  | 10487  |
| urology     | NP     | 49200  | 68974  | 19774  |
| HEAD & NECK | NP     | 65000  | 78221  | 13221  |
| PD          | NP     | 78500  | 95462  | 16962  |
| GYNECOLOGY  | NP     | 85000  | 89745  | 4745   |
| GENERAL     |        |        |        |        |
| SURGERY     | NP     | 75600  | 78652  | 3052   |
| VS          | NP     | 45000  | 96897  | 51897  |
| NEUROLOGY   | NP     | 65000  | 67895  | 2895   |
| NEUROLOGY   | NP     | 75600  | 79652  | 4052   |
| VS          | NP     | 95000  | 102566 | 7566   |
| PAEDIATRIC  | NP     | 85000  | 564989 | 479989 |
| HEAD & NECK | NP     | 75000  | 78954  | 3954   |
| GENERAL     |        |        |        |        |
| SURGERY     | P & NP | 85600  | 95642  | 10042  |
| urology     | NP     | 45600  | 65621  | 20021  |
| CMF SURGERY | NP     | 55000  | 78954  | 23954  |
| PD          | NP     | 45600  | 49512  | 3912   |
| urology     | NP     | 56000  | 64789  | 8789   |
| NEUROLOGY   | NP     | 62000  | 56478  | -5522  |
| NEPHROLOGY  | NP     | 85600  | 76521  | -9079  |
| VS          | NP     | 25000  | 37895  | 12895  |

#### Secondary data for bill difference:-

| DEPARTMENT        | TOTAL<br>DIFFERENCE | DEPARTMENT        | DIFFERENCE IN<br>PERCENTAGE |
|-------------------|---------------------|-------------------|-----------------------------|
| UROLOGY           | 30721               | UROLOGY           | 16.27852756                 |
| PAEDIATRIC        | -26853              | PAEDIATRIC        | 11.36399223                 |
| VASCULAR          | 84960               | VASCULAR          | 26.14475628                 |
| NEPHROLOGY        | 1541                | NEPHROLOGY        | 8.31131007                  |
| GYNECOLOGY        | 57600               | GYNECOLOGY        | 67.28971963                 |
| GENERAL SURGERY   | -3125               | GENERAL SURGERY   | 45.45454545                 |
| CMF SURGERY       | 48259               | CMF SURGERY       | 38.22222574                 |
| NEUROLOGY         | 15628               | NEUROLOGY         | 27.49714085                 |
| ENT HEAD & NECK   | 7538                | ENT HEAD & NECK   | 44.6669827                  |
| SURGICAL ONCOLOGY | 22578               | SURGICAL ONCOLOGY | 32.93846468                 |

# **A PROSPECTIVE STUDY ON THE AWARENESS AND MANAGEMENT OF BIOMEDICAL WASTE**

(Project report-2)

## **INTRODUCTION:**

Hospital is one of the complex institutions which are frequented by people from every walk of life in the society without any distinction between age, sex, race and religion. This is over and above the normal inhabitants of hospital i.e. patients and staff. All of them produce waste which is increasing in its amount and type due to advances in scientific knowledge and is creating its impact. The hospital waste, in addition to the risk for patients and personnel who handle these wastes poses a threat to public health and environment. 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.

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.

The hospitals, nursing homes, clinic, dispensary, animal house, pathological lab etc., are therefore required to set in place the biological waste treatment facilities. It is however not incumbent that every institution has to have its own waste treatment facility. The rules also envisage that common facility or any other facilities can be used for waste treatment. However it is incumbent on the occupier to ensure that the waste is treated within a period of 48 hours.

Biomedical waste is any solid, fluid or liquid waste, including container and any intermediate product, generated during diagnosis and treatment in the hospitals. Hospital waste is generated and discarded and is not intended for further use in a hospital. It is of paramount importance that there are significant voids that need to be addressed including efficient segregation, use of coded and colored bags, better handling and transfer means which need adequate training and awareness programmes for the medical and paramedical personnel. Improper handling of solid waste in the hospital may increase the airborne pathogenic micro-organisms, which could adversely affect the hospital environment and the community as well. The current status of employees awareness about biomedical waste management will help the authorities to create strategy for improving the status in future. For proper biomedical waste (BMW) management, lot of seminars, workshops and symposia are needed for the awareness of the medical and paramedical staff.

Over the years there have been tremendous advancements in the health care system. However it is ironic that the health care settings, which restore and maintain community health, are also threatening their well-being. Poor waste management practices pose a huge risk to the health of the public, patients, professionals and contribute to environmental degradation. The present study was conducted to study the awareness amongst the hospital staff, about biomedical waste management, so

that policies for improved status are formulated in future.

Handling, segregation, mutilation, disinfection, storage, transportation and final disposal are vital steps for safe and scientific management of biomedical waste in any establishment. The key to minimisation and effective management of biomedical waste is segregation (separation) and identification of the waste.

### 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 used 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.                      |

There are a few basic steps that hospitals have to follow in order to deal with Bio-Medical Waste.

The first and the most crucial step being that of segregation. Segregation of waste refers to the basic separation of the different categories of waste generated (as given earlier) at the source of their generation.

The Bio - Medical Waste (Management and Handling) Rules, 1998 have stipulated the following method of segregation on the basis of a simple colour-coded system:

| Category | Waste class                             | Type of container                     | Colour                 |
|----------|-----------------------------------------|---------------------------------------|------------------------|
| 1        | Human anatomical waste                  | Plastic                               | Yellow                 |
| 2        | Animal waste                            | -do-                                  | -do-                   |
| 3        | Microbiology and Biotechnology waste    | -do-                                  | Yellow/Red             |
| 4        | Waste sharp                             | Plastic bag puncture proof containers | Blue/White Translucent |
| 5        | Discarded medicines and Cytotoxic waste | Plastic bags                          | Black                  |
| 6        | Solid (biomedical waste)                | -do-                                  | Yellow                 |
| 7        | Solid (plastic)                         | Plastic bag puncture proof containers | Blue/White Translucent |
| 8        | Incineration waste                      | Plastic bag                           | Black                  |
| 9        | Chemical waste (solid)                  | -do-                                  | -do-                   |

In MSMC, Bio medical wastes generated in various wards, ICUs, Labs and Operation Theatres are segregated and managed according to different rules mentioned in Schedule- II, III and IV of the Bio medical waste handling and management rules, 1998. It is mainly handled by the nursing and housekeeping staffs inside the hospital.

It is put in separate containers in and around the nursing station where an in charge is responsible for monitoring its timely removal. The house keeping staffs removes and carries it again in separate colour coded bags in closed trolleys.

It is put outside the hospital from where it is taken for disposal by an external agency-  
“SHINE”

## **PROBLEM STATEMENT:**

The inadequate handling and disposal of healthcare waste may lead to transmission of infectious diseases. The groups most at risk are nurses, paramedical staff, waste management operators, and scavengers. An adequate awareness about the process can improve this always.

## **AIM:**

To find the level of awareness about the management systems for biomedical waste and its related issues.

## **RATIONALE:**

The various requirements of the study include:

- The present survey is conducted to study the awareness of paramedical and housekeeping staff, about biomedical waste management and advances in this area.
- To prevent occupational hazards among these staffs arising from handling biomedical wastes.
- To reduce and prevent various nosocomial infections and other environmental hazards arising through these wastes.
- The management of hospital waste requires diligence and care from a chain of people, starting with the healthcare staff, continuing through collection workers, and finishing with disposal operators. If any of these lack knowledge or get careless in their work, or allow scavengers or children access to the waste, the chain would be broken and dangers of infection would follow.
- To increase the basic awareness for biomedical waste management among various paramedical staffs working in all departments.

### **SPECIFIC OBJECTIVES:**

- a) To understand the routine activities in hospital waste management including its storage, transport in accordance with schedule 2 and schedule 3.
- b) Knowledge on biomedical waste management and its treatment among nurses and paramedical staffs at MSMC.
- c) To observe the development of adverse effects of waste handling in the specified environment.
- d) Recommendations for improvement on awareness and strengthen the whole process of biomedical waste management at the hospital.

### **DATA COLLECTION:**

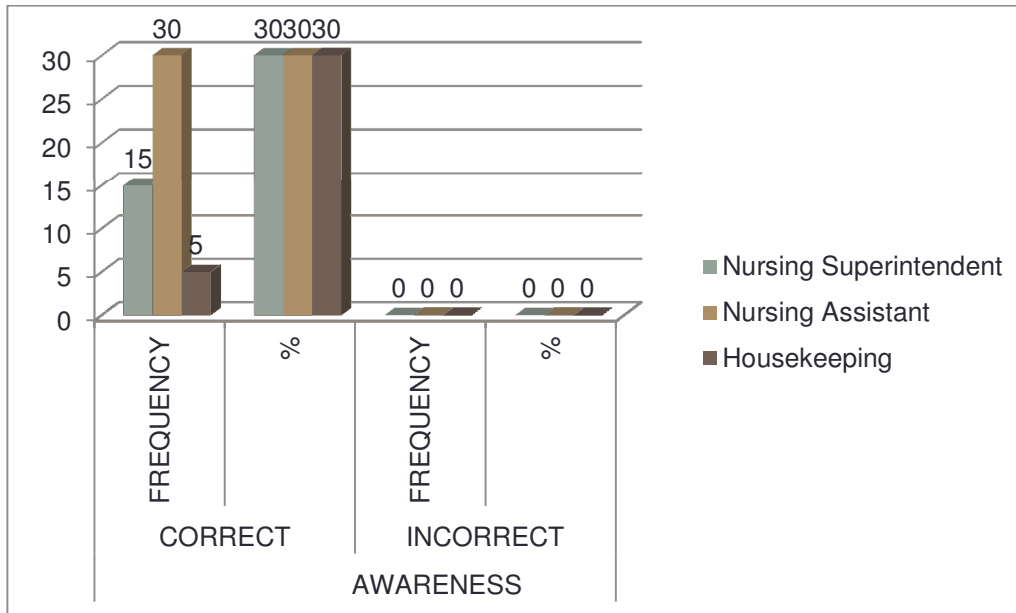
- Both primary and secondary mode of data collection.
- Survey method was mainly used for this study. The study was based on the knowledge of staff about biomedical waste management. Staff of paramedical and housekeeping staff was selected for the study on a random manner.
- The research instrument used for the study was a structured Interview Schedule. It consisted of 20 questions and all are multiple choice type of question. This is so done as not to disturb them in their busy schedule. For each question there are four answers out of which one of the most appropriate answers has to be tick marked by the staff.
- Some secondary data was collected from books, journals, magazines, and also from internet etc.

### **DATA COMPILATION AND ANALYSIS:**

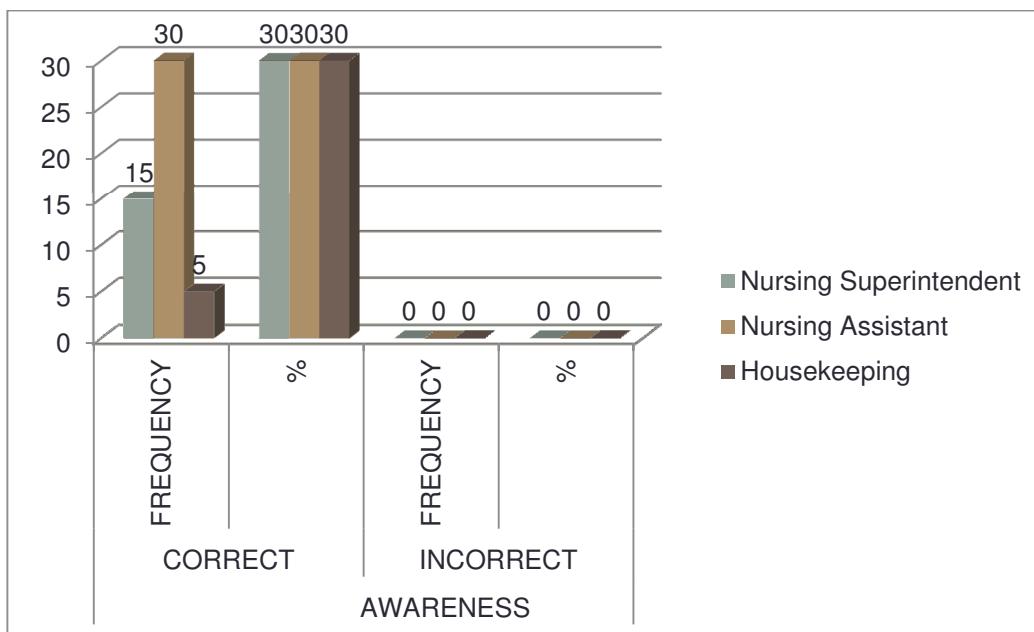
- The data collected from various departments was compiled and a sample of 50 was taken for analysis.
- Data Analysis: All 20 MCQ type questions has 4 answers out of which one of the most appropriate answer has to be ticked by the concerned staff.
- Tools for Data Analysis
- Percentage analysis: Poor awareness- 0-30%, Moderate/Good awareness- 30-60% & Excellent awareness- 60% and above.
- Graphs

## **INTERPRETATION-I:**

- The basic awareness about what biomedical wastes includes shows nursing supervisors and assistants has excellent awareness response and around 5 to 15 % of housekeeping staffs has moderate awareness.

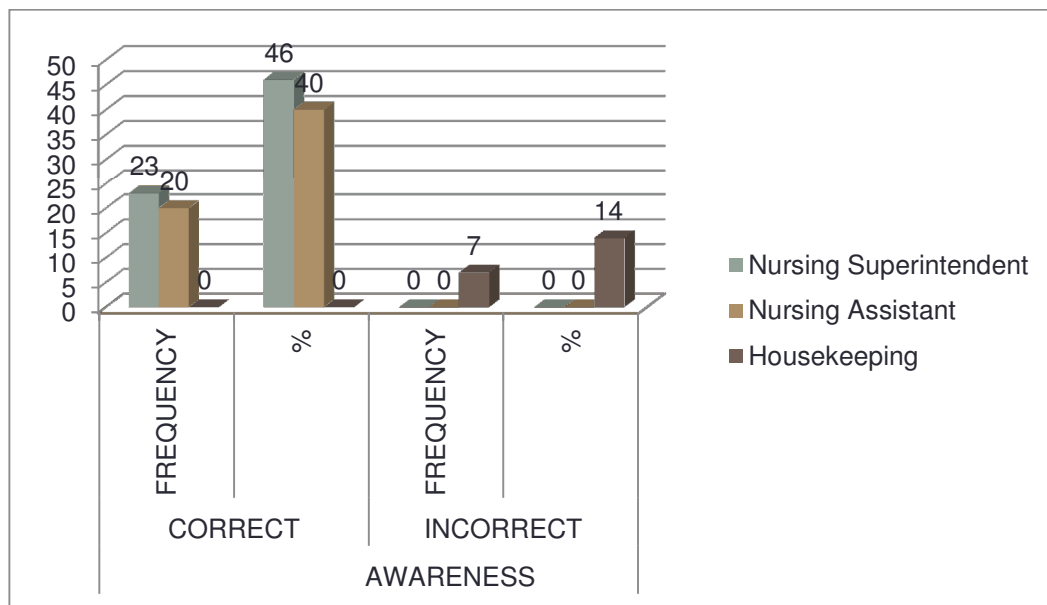


- The awareness regarding type of biomedical wastes generated in various departments among staffs shows all are well aware of the same.

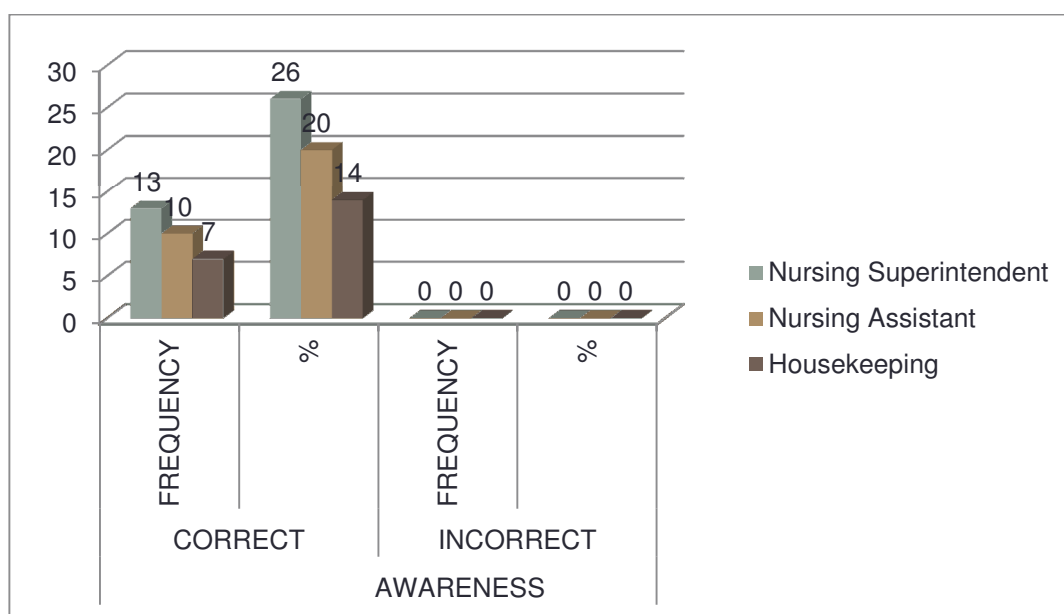


## **INTERPRETATION-II:**

- Awareness regarding waste generated in the labs shows good information among Nursing supervisors and Nursing assistants but poor responses from Housekeeping staffs.

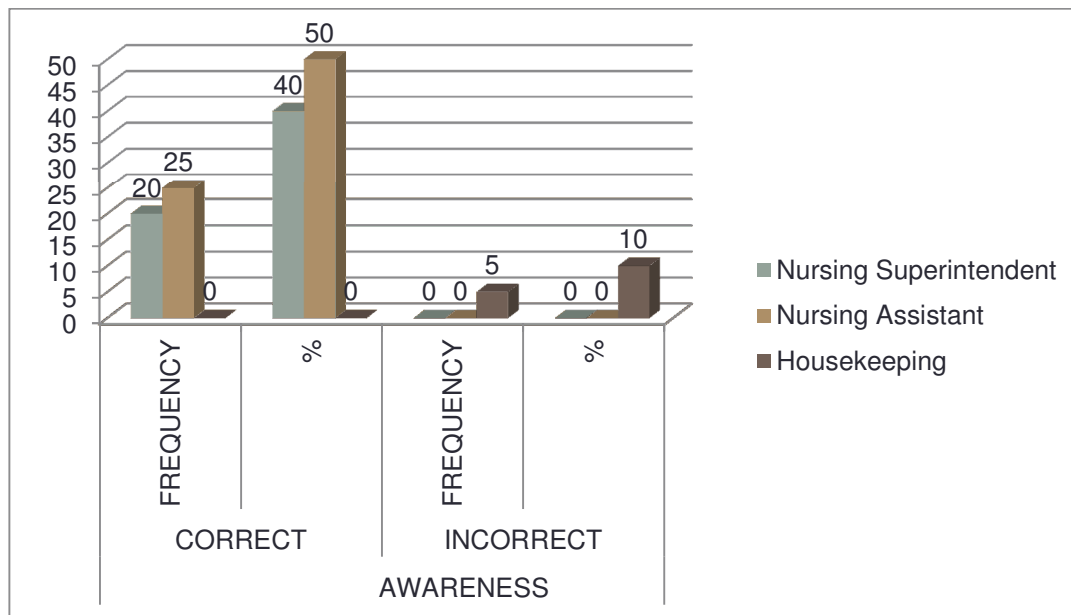


- Awareness regarding waste generated in blood banks provides moderate to good responses from Housekeeping and Nursing assistants and excellent from Nursing Supervisors.

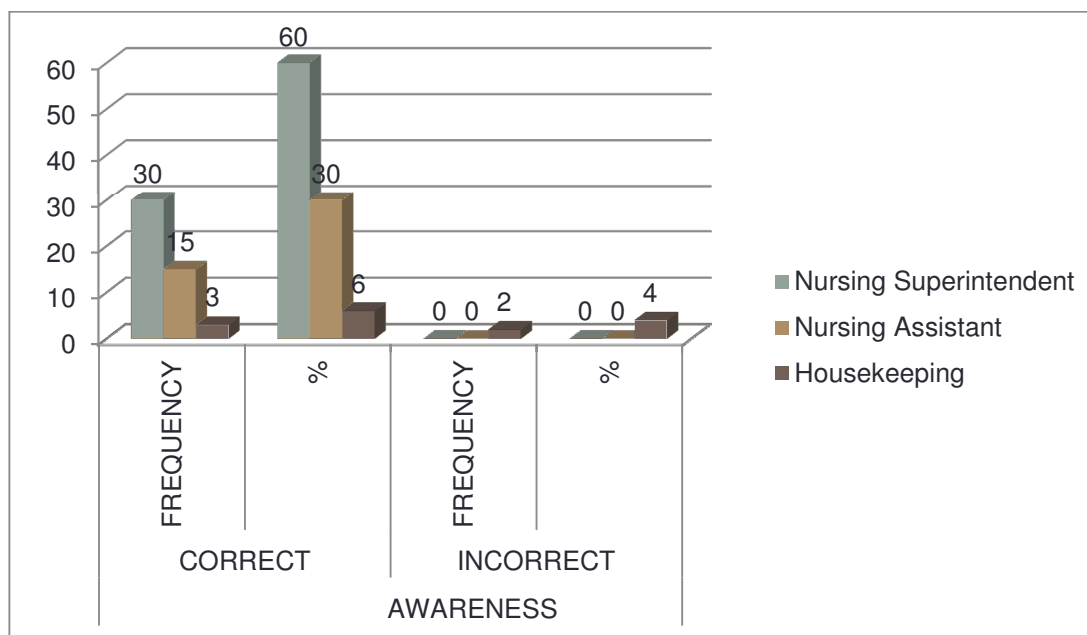


### **INTERPRETATION-III:**

- Awareness for treatment of biomedical wastes shows moderate level knowledge among nursing staffs and poor among house keeping staffs.

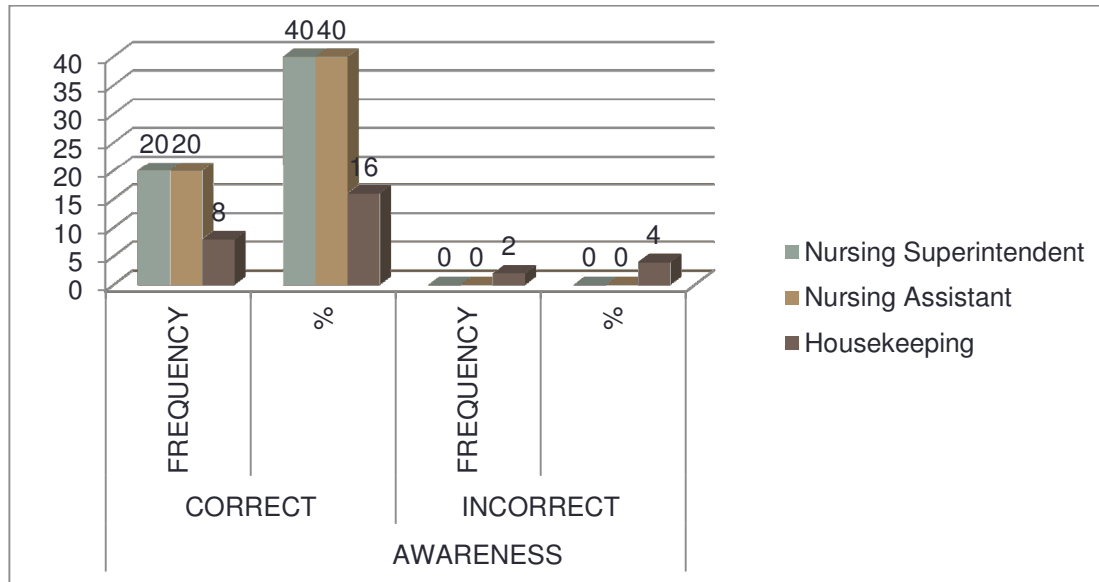


- Awareness for colour coding of different types of wastes shows excellent level of information among Nursing supervisors, medium level in Nursing staffs and poor among House keeping staffs.

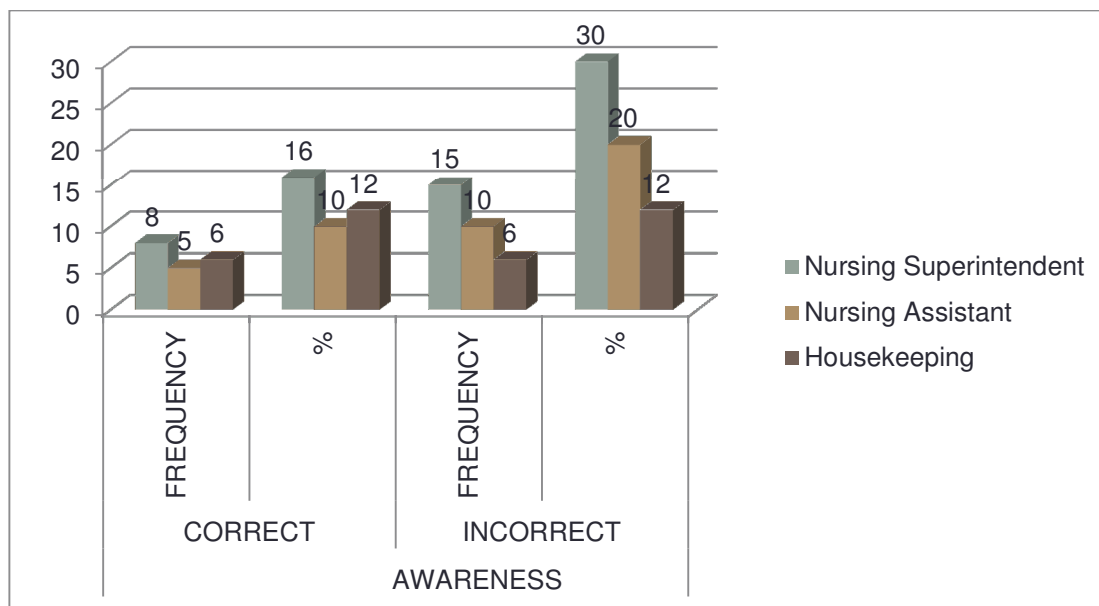


## **INTERPRETATION-IV:**

- Awareness for solid waste sharps disposal shows poor to medium level information among various staffs. Almost 40% staffs has some awareness.

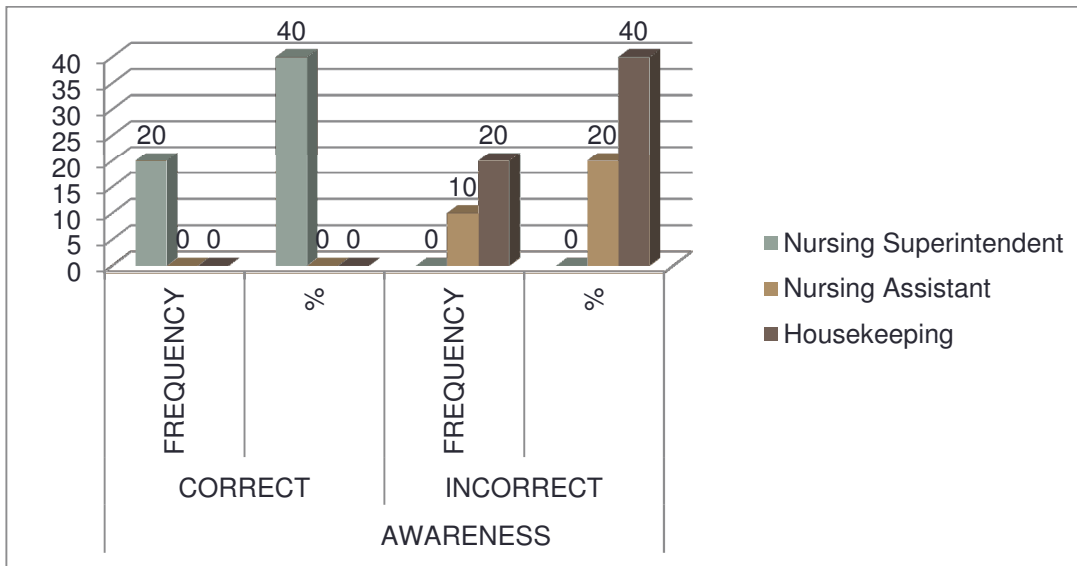


- Awareness for disposal of cytotoxic drugs shows very poor knowledge among various nursing and housekeeping staffs. Most of the staffs are not fully aware of the process.

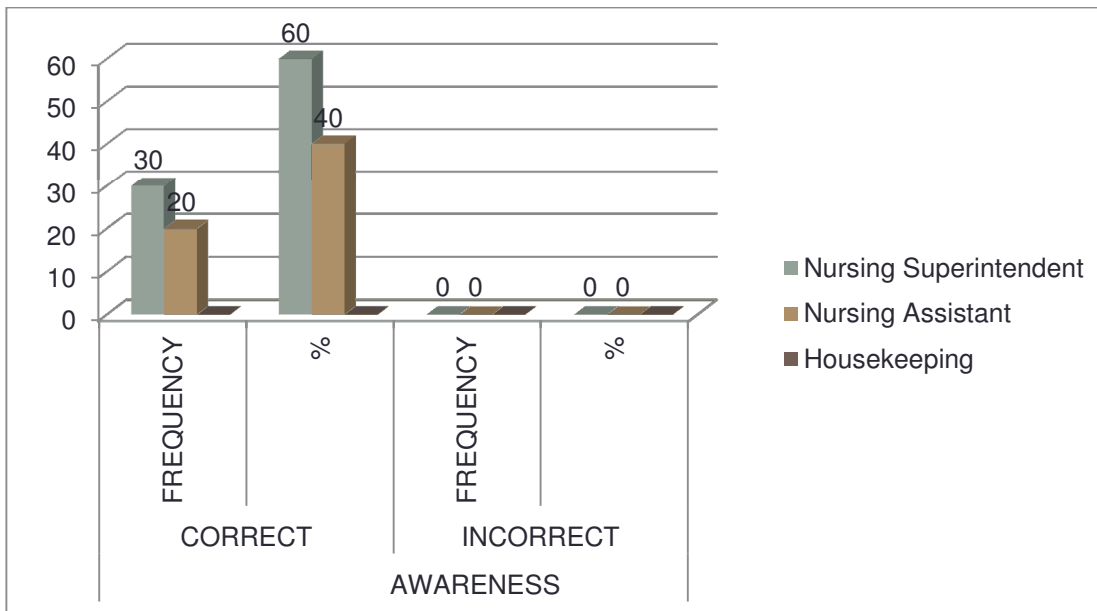


## **INTERPRETATION-V:**

- Awareness for disposal of waste in secured landfill shows moderate to high response for Nursing supervisors only and poor awareness among other staffs.

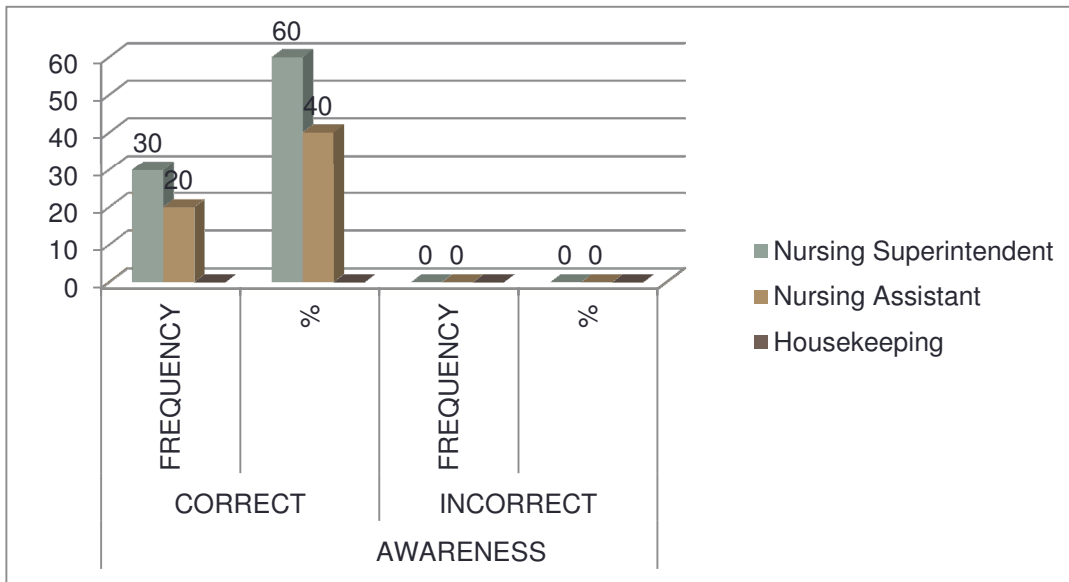


- Awareness regarding associated diseases in handling of biomedical wastes shows good awareness among all the staffs.

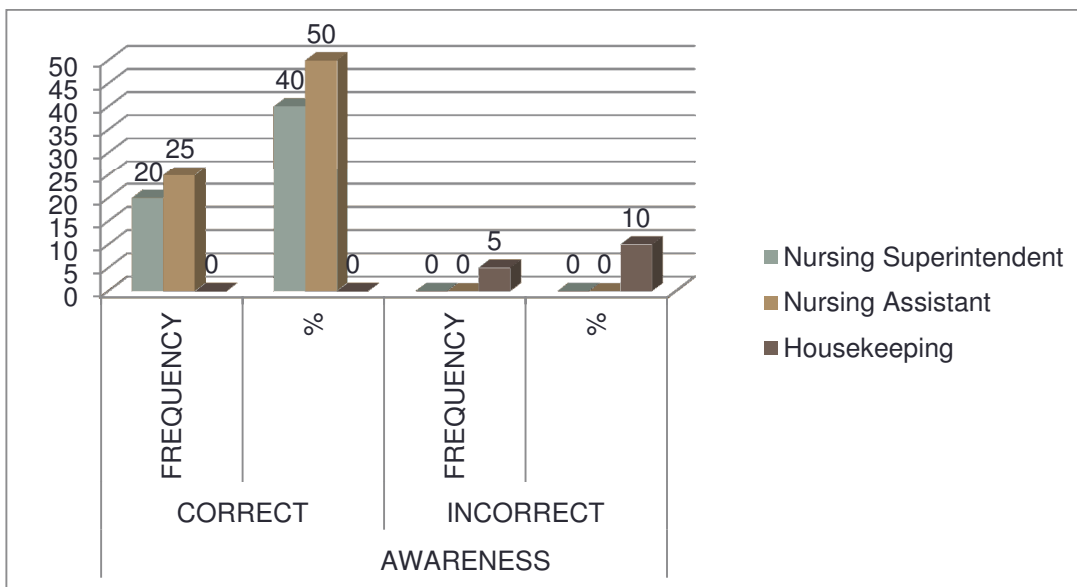


## **INTERPRETATION-VI:**

- The responses for specific symbol for biohazard shows good awareness for nursing and all other staffs.



- The responses for specific ionisation symbol shows fair awareness among nursing staffs and low awareness level among housekeeping staffs.



## **FINDINGS:**

- Housekeeping staff wear protective devices such as gloves, face masks, gown etc. while handling the waste.
- There are labels on waste carry bags and waste carry trolley and also poster has been put on the wall adjacent to the bins (waste) giving details about the type of waste that has to be disposed in the bag as per biomedical waste management rule. Carry bags also have the biohazard symbol on them.
- Closed trolley is being used for carrying wastes
- All the nursing and housekeeping staff have moderate level knowledge about colour coding of waste carry bags.
- The nursing staff has good knowledge about contents of waste carry bags.
- About 40 to 60% of the nursing staffs have knowledge about routes of disease transmission which is not there among housekeeping staffs.
- About 40% of the nursing staff has knowledge and 40% of housekeeping have very poor knowledge about methods used for disposal of various wastes in secured landfill.
- About 40% of the nursing and all the other paramedical and housekeeping staffs have very poor knowledge about biohazard symbols and its meaning.
- About 10 to 20% of Nursing staff and 30% of housekeeping staff the knowledge about disposal of cytotoxic drugs is not adequate.

## **RECOMMENDATIONS:**

- Basic awareness should be made more among various paramedical and other staffs through particular training programmes which should be conducted preferably before induction.
- There should be continuous guidance for all the paramedical staffs for appropriate waste handling by the concerned in charge and also periodic training programmes can be arranged for the same on a definite interval. We need to follow the continued education for nursing and staff, by addressing this issue repeatedly in their meetings and in their curriculum.

- Various demonstration programmes for example poster exhibitions can be conducted for those personnel who are in direct contact of BMW to increase their level of understanding and associated risks. BMW management should be strictly.
- Collected information on various methods of disposal and updated technology can be made available to all categories of health care personnel.

## **CONCLUSION:**

- Safe handling of Bio-medical waste continues to be a matter of serious concern for health authorities in India. The segregation of waste in almost all hospitals was found to be not satisfactory. Most of the health care settings do not have proper waste treatment and disposal facilities. In the cities where common treatment facilities have come up, many medical establishments are yet to join the common facility. It shall be the duty of every occupier of a health care setting generating biomedical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment. The challenge before us, therefore, is to scientifically manage and make aware of the growing quantities of biomedical waste that go beyond past practices. If we want to protect our environment and health of community we must sensitize ourselves to this important issue not only in the interest of health managers but also in the interest of community.

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## **ANNEXURE:**

### Sample Questionnaire

#### 1. Primary source for biomedical wastes are

- ( 0 ) Industries
- ( HK- 2 ) Households
- ( NS- 18 + NA- 30 ) Hospital, nursing homes, diagnostic centres [CORRECT]- C
- ( 0 ) IT companies

#### 2. Biomedical waste includes

- ( NS- 20 + NA- 15 + HK- 12 ) Infectious and non-infectious waste. [CORRECT]- A
- ( HK- 3 ) Waste due to wear and tear of the equipment used.

#### 3. Biomedical waste generated in general wards, departmental wards, ICU and emergency care includes

- ( NS- 15+ NA- 10 + HK- 5 ) Bandages, syringes, urine bags, paper and food waste. [CORRECT A & B]
- ( NA- 20 ) Contaminated gloves, caps, masks, hospital gowns.
- ( 0 ) Petri dishes, test tubes, slides, contaminated samples.
- ( 0 ) Blood bags, unused blood bags (expired), infected blood bags.

#### 4 Waste generated in operation theatre

- ( NS- 20 + NA- 10 ) Contaminated gloves, caps, masks, hospital gowns.
- (HK- 4 ) Blood bags, unused blood bags (expired), infected blood bags. [CORRECT]- C
- ( NA- 16 ) Urine bags, paper and food waste.
- ( 0 ) Petri dishes, test tubes, slides, contaminated samples

#### 5. Waste generated by the labs includes

- ( 0 ) Blood bags, unused blood bags (expired), infected blood bags.
- ( NS- 23 + NA- 20 ) Petri dishes, test tubes, slides, contaminated samples.
- ( 0 ) Contaminated gloves, caps, masks, hospital gowns. [CORRECT]- B & C
- ( 0 ) Bandages, syringes, urine bags, paper and food waste.

#### ( HK- 7 ) Don't know

#### 6. Biomedical waste generated in blood banks

- ( NS- 13 ) Petri dishes, test tubes, slides, contaminated samples
- ( NA- 10 ) Blood bags, unused blood bags(expired), infected blood bags [CORRECT]- A, B & C
- (HK- 7 ) Contaminated gloves, caps, masks, hospital gowns.
- ( ) Bandages, syringes, urine bags, paper and food waste.

#### 7. Biomedical waste should be treated within

- (NS- 20 + NA- 25) 48 hrs , ( HK- 5 ) 12 hrs , ( ) 56 hrs , ( ) 32 hrs [CORRECT]- A

8. Different colors of baggage's used in biomedical waste management are

- ( NS- 30 + NA- 15 + HK- 3 ) Black, yellow, red, white/blue translucent  
( ) Green, pink, orange, red  
( ) Grey, violet, purple, white [CORRECT]- A  
( HK- 2) Orange, yellow, violet, green

9. Human anatomical waste and microbiological/biotechnological waste, soiled waste has to disposed into \_\_\_\_\_

- ( NS- 20 + NA- 20 + HK- 10 ) Yellow , ( ) Blue, ( ) Orange , ( ) Grey [CORRECT]- A

10. Microbiological/biotechnological waste, soiled waste can be disposed in to

- ( ) Blue , ( ) Red, ( ) Violet , ( HK + NA- 11 ) Black ( NS- 19 + NA- 20 ) Don't know [CORRECT]- D

11. Waste sharps, soiled waste has to be put into

- ( ) Orange , (HK- 2 ) Blue/white translucent , ( ) Red , (NS- 20+ NA- 20 + HK- 8 ) PPC [CORRECT]- D

12. Discarded medicines and cytotoxic drugs, incinerator ash, chemical, solid waste to be disposed into baggage colored

- ( ) Green , ( ) Pink , ( NS- 8 + NA-5 + HK- 6) CT Container , ( ) Grey ( NS- 15 + NA- 10 + HK- 6)

DON'T KNOW( )

[CORRECT]- C

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

- ( NS-10 + NA- 10) Yellow , ( ) Pink , ( ) Red , ( NS-5 + NA-10 + HK- 15) Black [CORRECT]- A

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

- ( 0 ) Red and blue translucent. , ( 0 ) Yellow and black , (0 ) Pink, red and yellow , ( 0 ) Yellow, red and black

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

- (NS- 20 ) Black , ( NA- 10 HK- 20) Yellow , ( 0 ) Red , (0 ) Blue/white translucent [CORRECT]- A

16. Major risks (diseases) associated with hospital waste handling.

- ( NS-30 + NA- 20) AIDS, hepatitis, typhoid fever ,T.B [CORRECT]- A  
( ) Malaria, psoriasis, Diabetes mellitus  
( ) Hypertension, sinusitis  
( ) Anemia, parkinsonism, beri beri

17. Different types of disinfection methods used are

- ( NS- 10 ) Chemical,autoclave,hydroclave,microwave [CORRECT]- A & D  
( 0 ) burning  
( NA- 10 HK- 20 ) Only fumigation

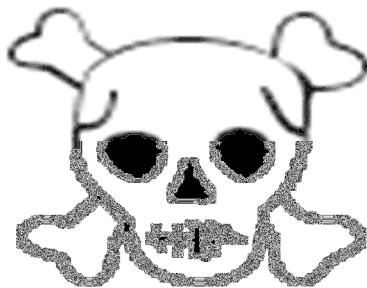
( NS- 10 ) Using disinfection fluid

18. Recognize the symbols used in labeling



- Biohazard (NS- 30+ NA- 20 + HK- 0) [CORRECT]- A
- Handle with care
- world health organization
- pollution hazard

19. Recognize this symbol



- biohazard
- ionizing radiation (NS- 20 + NA- 25 + HK- 5) [CORRECT]- B
- toxic waste
- skeleton with cross bones

20. Recognize this symbol



- radiation hazard

- biohazard

.Thermal hazard ( NS- 20 + NA- 8) [CORRECT]- C

Don't know ( 22 )

- poison
- fan

### Thank you###