Summer Training at
Aditya Birla Memorial Hospital, Pune
(April 8-June 8, 2013)

Concurrent Medical Record Evaluation, Time and Motion Study in OT and OT Equipment Utilization Study

By
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Under the guidance of
Dr. Vijay Pratap Raghuvanshi

Post Graduate Diploma in Hospital and Health Management
2012-2014

Institute of Health Management Research,
Jaipur
2013

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CERTIFICATE

This is to certify that Dr. Vijay Desai, student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from Institute of Health Management and Research, Jaipur Batch 17th has undergone summer training in Aditya Birla Memorial Hospital, Pune, Maharashtra and has done following projects:

1. Time and motion study in Operation Theatre
2. Operation Theatre equipments utilization study
3. Concurrent medical record evaluation study

The candidate has successfully carried out the mentioned studies assigned to his during summer training from 8th April 2013 to 8th June 2013 and his approach to study has been sincere, scientific and analytical.

I wish him success in all his future endeavors.

Dr. Vijay Pratap Raghuvanshi
Assistant Professor and Mentor
IHMR, Jaipur

Dr. Ashok Kaushik
Dean, Academics and Student Affair
IHMR, Jaipur

ADITYA BIRLA
MEMORIAL HOSPITAL
HOPE • HEAL • HEALTH • HAPPINESS

11th June 2013

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Vijay Desai** has successfully completed his Internship under guidance of Ms. Kanchan Srivastava, at Aditya Birla Memorial Hospital, Pune from **8th April 2013 to 8th June 2013.**

During this tenure, his behaviour and conduct was good.

We wish him "All the Best" in his future endeavor.

ADITYA BIRLA MEMORIAL HOSPITAL * CHINCHWAD, PUNE-33 * NURSING DEPT.

B S Angadi
General Manager – HR & Admin.

Acknowledgement

I respect & thank **Mrs. Rekha Dubey, COO, ABMH** for giving me an opportunity to do the projects on Concurrent Medical Record Evaluation, Time and motion study in OT and OT equipment utilization study.

The guidance and support received from **Dr Paramjit Singh Garcha, HOD, OT, ABMH** who contributed to these projects, was vital for the success of projects. I am grateful for their constant support and help.

I am also grateful to my mentors **Dr. Vijay Pratap Raghuvanshi** and **Ms. Kanchan Srivastava** for their help and guidance for these projects.

I am obliged to staff members of OT for the valuable information provided by them in their respective fields. I am grateful for their cooperation during the period of my assignment.

I also show my gratitude to all hospital staff who contributed in one way or the other in the course of the projects.

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Acronyms / Abbreviations

- ABMH: Aditya Birla Memorial Hospital
- JCI: Joint Commission International
- NABH: National Accreditation Board for Hospitals & Healthcare Providers
- ISO: International Organization for Standardization
- NABL: National Accreditation Board for Testing and Calibration Laboratories
- FRS: File Requisition System
- MRN: Medical Record Number
- PACS: Picture Achieving Communication System
- SOP: Standard Operating Procedure
- DM: Desk Monitor
- GS: General Surgery
- TAT: Turn Around Time

Observation Learning

Introduction

Aditya Birla Memorial Hospital (ABMH) is a multi-specialty medical centre located at Pimpri-Chinchwad, Pune. The quaternary healthcare centre provides high quality and cost-effective medical services. A tribute to the visionary founder of the Aditya Birla Group, the hospital fulfils the late Mr. Aditya Vikram Birla's dream of building a world-class healthcare facility in India. It is the first and only hospital in Pune to have coveted JCI (Joint Commission International) accreditation in addition to NABH, ISSO and NABL accreditation. It is a 500 bedded hospital with which was incorporated in the year 2006.

It is a private limited organization and Mrs. Rajashree Birla, chairperson of the Aditya Birla Foundation, is personally steering this project. Oncology centre is one of its major milestones of expansion.

Vision:

Excellence first and always

Mission:

Compassionate quality healthcare

- The hospital is committed to maintain the highest standard of care and respond to the needs of the community in a compassionate manner.
- To provide state-of-the-art, high quality and cost-effective healthcare services and latest information to improve and maintain health for the well-being of the community.
- To unrelentingly pursue the creation of value for our customers, shareholders, employees and society at large

- To foster a therapeutic relationship based on compassion that is felt, quality that is measurable and cost that is affordable.
- To become partners in health promotion with every section of society.
- Super specialty services

Cardiology and Cardiovascular thoracic surgery	Pain Management
Neurology and Neurosurgery	Oncology
Orthopedics & Joint Replacement	Hematology
Gastroenterology	Internal medicine
Minimal Invasive Surgery	Endocrinology
General surgery	Accident and Emergency
Pediatrics & Neonatology	Physiotherapy
Obstetrics and Gynecology Infertility Clinic	Radiology
Intensive Care	Bone Marrow Transplant Unit
Dietetics	Transfusion Medicine
Nephrology	Plastic surgery
Urology	Dentistry
Ophthalmology	Pulmology
Telemedicine	Preventive Medicine
ENT	Pathology
Blood Bank	Rheumatology

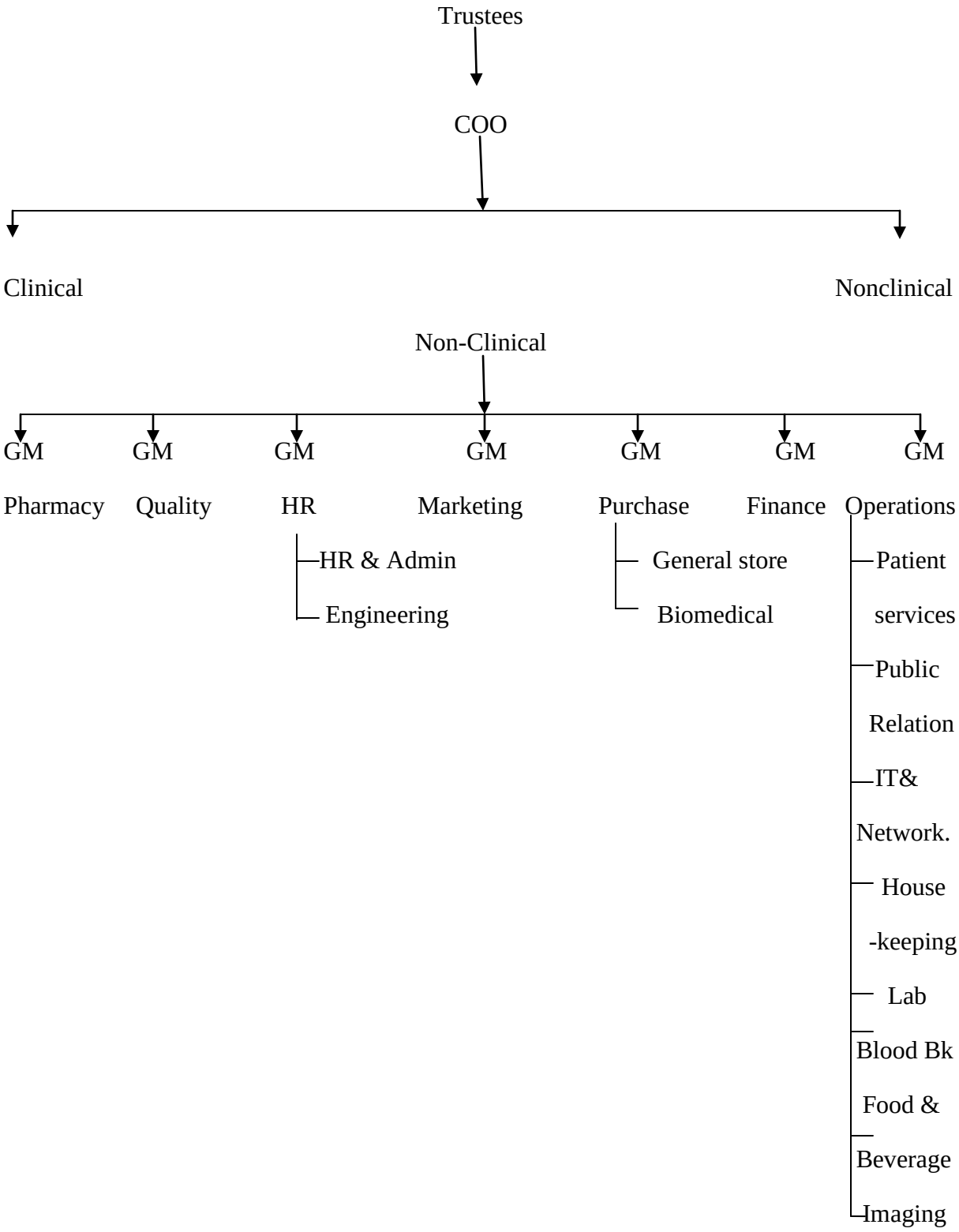
The hospital is constructed in a plot size of 53,000 square meters and the covered area of the building is 35,820 square meters. There are two buildings in the hospital one for OPD and one for IPD which are joined by atrium in the centre. In the OPD building there is ground plus 2 floors where as in IPD building there is basement plus ground plus 4 floors. There is a single basement which is having non-clinical departments like laundry, finance, HR, CSSD, Mortuary, Store and purchase etc in the IPD building. Parking space is well organized with staff parking at the basement with a space of 4,000 square meters and a separate paid parking, with a space of 6,000 square meters is provided for patients with in the hospital premises. There are 14 lifts in the hospital with a capacity of 26 people in each lift. Number of stair cases are 4 and there is one ramp for material access. Other amenities like cafeteria, coffee

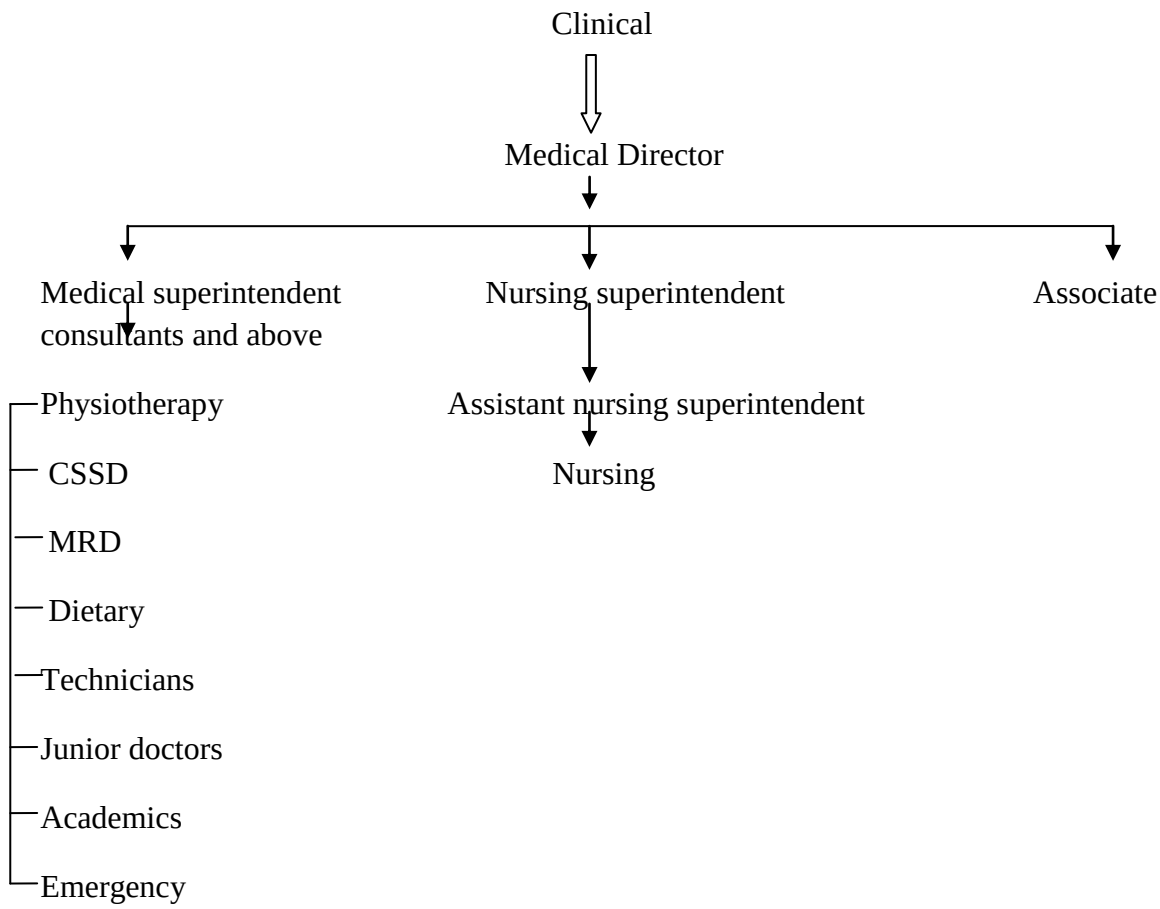
vending shop, shop for orthopedic equipments, stationary shop, photocopy shop, ATM and Idol of Lord Ganesha are present in the atrium.

Aditya Birla Memorial Hospital is a quaternary health care centre with 18 specialties. It has got numerous accreditations like JCI (Joint Commission International), NABH (National Accreditation Board for Hospitals), ISSO, NABL (National Accreditation Board for Laboratories). There are a total of 500 beds in the hospital with around 350 functional beds. Wards are broadly divided into Gold Male, Gold Female, Gold pediatric, Gold plus, Platinum, Emerald, Ruby Deluxe, Sapphire and Diamond suits with different bed charges, consultant, nursing charges etc. Few departments are out sourced like laundry, housekeeping, security, engineering, canteen etc in which only man power is outsourced but the infrastructure is provided by the hospital.

Administration

Hierarchy:




Clinical
Medical Director
Medical superintendent consultants and above
Nursing superintendent
Associate
Physiotherapy
CSSD
MRD
Dietary
Technicians
Junior doctors
Academics
Emergency
Assistant nursing superintendent
Nursing

Department wise observations

OPD (Out-Patient Department)

There are 4 parts of OPD's building: Ground floor – South wing, Ground floor – North wing, First floor – South wing and First floor – North wing. These various parts of OPD building are described in table format as follows:

1. **Ground floor - South wing**

Area Visited: OPD - Orthopedic and spinal		
Sr. No.	**Topic**	**Observation**
1	Location	Ground floor - South wing
2	No. of consultation chambers	5
3	OPD timing	9am - 5pm
4	No. of procedure room	1 + 3 (PT room - 1, Hydrotherapy - 1, Cardiac Rehabilitation Unit - 1)
5	Approximately OPD covered area including circulation & ancillary area	

6	Area of each room	100 Sq ft
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	29
9	Facilities	Yes
10	No. of front desks	1 (Common for ortho, spinal, PT, Obesity clinic, Dietician clinic)
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	12 Consultants + 12 PT + 1 Receptionist + 1 Nurse + 1 Housekeeper + 2 Medical Assistants
13	Duty rosters	8.5 hourly

14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	50
19	Equipments	8 Physiotherapy Equipments - Interpharancial therapy, Ultrasound, Traction, Electric Muscle Stimulator, Ginjar machine, Suspension machine, Short wave diathermy, Parallel bars
20	Supportive Depts	Physiotherapy, Obesity Clinic, Dietician Clinic, Medical Social Worker Service

2. Ground floor - North wing

Area Visited: OPD - Internal Medicine, Oncology and Endocrinology		
Sr. No.	**Topic**	**Observation**
1	Location	Ground floor - North wing
2	No. of consultation chambers	Internal Medicine - 4, Oncology - 2 and Endocrinology - 1
3	OPD timing	9am - 5pm
4	No. of procedure room	
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	69
9	Facilities	Yes
10	No. of front desks	1
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	13 Consultants + 2 Receptionist + 2 Nurse + 1 Housekeeper
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400

15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	95 (Internal Medicine), 5 (Oncology)
19	Equipments	
20	Supportive Depts	Oncology, Endocrinology, Sample collection dept.

Area Visited: OPD - Pediatrics		
Sr. No.	**Topic**	**Observation**
1	Location	Ground floor - North wing
2	No. of consultation chambers	4
3	OPD timing	9am - 5pm
4	No. of procedure room	2
5	Approximately OPD covered area including circulation & ancillary	

	area	
6	Area of each room	100 Sq ft
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	24
9	Facilities	Yes
10	No. of front desks	1
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 10 + 2 Receptionist + 2 Nurse + 1 Housekeeper
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	95
19	Equipments	
20	Supportive Depts.	

Area Visited: OPD - Gynecology and Obstetrics		
Sr. No.	**Topic**	**Observation**
1	Location	Ground floor - North wing

2	No. of consultation chambers	4
3	OPD timing	9am - 5pm
4	No. of procedure room	2
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	42
9	Facilities	Yes
10	No. of front desks	1
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	7 Consultants + 2 Receptionist + 4 Nurses + 1 Housekeeper
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	60

19	Equipments	
20	Supportive Depts.	USG

3. First floor - South wing

Area Visited: OPD - Cardiovascular & Pulmonary medicine		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - South wing
2	No. of consultation chambers	8
3	OPD timing	9am - 5pm
4	No. of procedure room	2 (Cardio diagnostic lab - 1, Pulmonary function lab - 1)
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	100 Sq ft

7	Waiting area & sub waiting area	Yes
8	Sitting capacity	38
9	Facilities	Yes
10	No. of front desks	1 (common for Cardiology & Chest depts.)
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 9 + 1 Receptionist + 1 Nurse + 1* Housekeeper (*- only housekeeper work for all dept on 1st floor south wing) + 2 Medical Assistants
13	Duty rosters	8.5 hourly

14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	65
19	Equipments	2D Echo, ECG, Holter & ambulatory, 2 Treadmill machines
20	Supportive Depts.	

Area Visited: OPD - General Surgery		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - South wing
2	No. of consultation chambers	5

3	OPD timing	9am - 5pm
4	No. of procedure room	1+ 1(Telemedicine room)
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	24
9	Facilities	Yes
10	No. of front desks	1 (common for GS & Neurology depts.)
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 7 + 2 Receptionists© + 1 Nurse© + 1 Housekeeper* (© - common for GS & Neurology depts.©, *- only housekeeper work for all dept on 1st floor south wing)
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software

16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	40
19	Equipments	
20	Supportive Depts.	

Area Visited: OPD - Neurology Dept.		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - South wing
2	No. of consultation chambers	4
3	OPD timing	9am - 5pm
4	No. of procedure room	3 (EEG room - 1, EMG room - 1, Procedure room - 1)
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	100 Sq ft
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	24
9	Facilities	Yes

10	No. of front desks	1 (common for GS & Neurology depts.)
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 7 + 2 Receptionist© + 1 Nurse© + 1 Housekeeper* (© - common for GS & Neurology depts, *- only housekeeper work for all dept on 1st floor south wing)
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	30
19	Equipments	EEG, EMG machine
20	Supportive Depts.	

Area Visited: OPD - Dermatology & cosmetology - Reconstructive cosmetic & plastic surgery dept		
Sr. No.	**Topic**	**Observation**

1	Location	First floor - South wing
2	No. of consultations chambers	3
3	OPD timing	9am - 5pm
4	No. of procedure room	2
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	22
9	Facilities	Yes
10	No. of front desks	1
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 9 + 1 Receptionist + 1 Nurse + 1 Housekeeper* (*- only housekeeper work for all dept on 1st floor south wing)
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software

16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	20
19	Equipments	co2 Laser & Diode laser
20	Supportive Depts.	

4. First floor - North wing

Area Visited: OPD - Dental Dept.		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - North wing
2	No. of consultation chambers	2
3	OPD timing	9am - 5pm
4	No. of procedure room	1
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	8
9	Facilities	Yes
10	No. of front desks	1
11	Appointment system	Yes - Computerized - Rcare Magna software

12	Manpower with hierarchy	Consultants 7 + 1 Receptionist + 1 Nurse + 2 Housekeepers* (*- 2 housekeeper work for all dept on 1st floor north wing)
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	15
19	Equipments	
20	Supportive Depts.	

Area Visited: OPD - Nephrology Dept.		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - North wing
2	No. of consultation chambers	4
3	OPD timing	9am - 5pm
4	No. of procedure room	2 (Lithotripsy - 1, Urodyanamic - 1)

5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	100 Sq ft
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	24
9	Facilities	Yes
10	No. of front desks	1 (common for Nephrology & ENT depts.)
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 4 + 1 Receptionist© + 1 Nurse© + 2 Housekeepers* (© - common for Nephrology & ENT depts., *- 2 housekeeper work for all depts. on 1st floor north wing)
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software

17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	35
19	Equipments	Lithotripsy Machine
20	Supportive Depts.	

Area Visited: OPD - ENT Dept.		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - North wing
2	No. of consultation chambers	2
3	OPD timing	9am - 5pm
4	No. of procedure room	2 (Speech therapy - 1, Audiometry - 1)
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	16
9	Facilities	Yes
10	No. of front desks	1 (common for Nephrology & ENT depts.)

11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 4 + 1 Receptionist© + 1 Nurse© + 2 Housekeepers* (© - common for Nephrology & ENT depts., *- 2 housekeeper work for all depts. on 1st floor north wing)
13	Duty rosters	8.5 hourly
14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	25
19	Equipments	
20	Supportive Depts.	

Area Visited: OPD - Ophthalmology Dept.		
Sr. No.	**Topic**	**Observation**
1	Location	First floor - North wing

2	No. of consultation chambers	3
3	OPD timing	9am - 5pm
4	No. of procedure room	6 (Angiography - 1, Photo coyag laser - 1, A & B scan - 1, Yag laser - 1, Refraction room - 1, Perimetry room - 1)
5	Approximately OPD covered area including circulation & ancillary area	
6	Area of each room	100 Sq ft
7	Waiting area & sub waiting area	Yes
8	Sitting capacity	40
9	Facilities	Yes
10	No. of front desks	1
11	Appointment system	Yes - Computerized - Rcare Magna software
12	Manpower with hierarchy	Consultants 5 + 1 Receptionist + 1 Nurse+ 2 Housekeepers* (*- 2 housekeepers work for all depts. on 1st floor north wing)
13	Duty rosters	8.5 hourly

14	Tariff	First visit - 550, Follow-up visit - 400
15	OPD record keeping	Computerized - Rcare Magna software
16	Retrieval of records	Computerized - FRS (File Request System) software
17	Recording of follow up records	Computerized - FRS (File Request System) software
18	Daily Volumes-No. of OPD per day	30
19	Equipments	A & B scan, Yag laser, Photo Coyag laser, Angiography, Auto refraction machines
20	Supportive Depts.	Eye bank, Optician Shop

- There are 2 softwares used in OPD building as flows:

I. R care magna software: It is used for following services

R care magna software:
Lab
Patient A/C billing
Patient services
Admin
Dietary
ADT
Appointment scheduling
CSSD

HLL
Inventory
Registration
Procurement
CPR

II. FRS (File Request System): It is used for following services

FRS (File Request System)
OPD file request
OPD file receive
OPD file return

Diagnostic Departments

There are total 5 units in diagnostic department as follows:

Sr. no.	Procedure	Topic	Observation
1	ECG	TAT	5 min
		No. of Procedure per day	12
		Consent Form	No
		Tariff	Rs.275
2	USG	TAT	15 min
		No. of Procedure per day	40
		Consent Form	Yes (for Obstetrics pts)
		Tariff	Rs.1040
3	Tread Mill Test	TAT	25-40 min
		No. of Procedure per day	15
		Consent Form	Yes
		Tariff	Rs.1275
4	2D Echo	TAT	10 min
		No. of Procedure per day	25
		Consent Form	Yes
		Tariff	Rs. 1500

Endoscopy Department

Details of endoscopy departments as follows:

Sr. no.	Procedure	Topic	Observation
1	Gastroscopy & Duodenoscopy	Room Size	1000 sq ft (whole endoscopy room)
		No. of Procedures per day	3
		Equipments	Gastroscope - 1, Duodenoscope - 1, Cautery machine - 1, Anaesthesia machine - 1, Cardiac Monitor - 1, Endoscopy trolly - 1 (Fixed), Biopsy forcep - 1, Pulsoximeter - 1, Monitor - 1, Light source - 1, Processor - 1, Suction machine - 1, Ultrasonic disinfectant machine - 1, Difibrillator - 1, Accessories,
		Time per procedure	5 mins
		Tariff per procedure	Rs. 4200
2	Colonoscopy	Room Size	1000 sq ft (whole endoscopy room)
		No. of Procedures per day	1
		Equipments	Colonoscope - 1

		Time per procedure	10 mins
		Tariff per procedure	Rs. 4600
3	Bronchoscopy	Room Size	1000 sq ft (whole endoscopy room)
		No. of Procedures per day	1
		Equipments	Bronchoscope - 1, Monitor - 1, Endoscopy trolly - 1 (Portable), Light source - 1, Processor - 1, Accessories
		Time per procedure	15 mins
		Tariff per procedure	Rs. 17000
4	ERCP	Room Size	1000 sq ft (whole endoscopy room)
		No. of Procedures per day	1
		Equipments	ERCP machine
		Time per procedure	1.5 hour
		Tariff per procedure	Rs. 17000

Dialysis Department

Details of endoscopy departments as follows:

		Topic	Observation
1	Haemodialysis	Dialysis per day	45 (15 per batch * 3 batches)
		Manpower	Consultants - 2, Technician - 8, Nurses - 6, Guest relation officer - 1, Housekeeping - 4
		Medicines	from dialysis dept
		Consumables	from in house pharmacy
		Tariff per procedure	Rs. 1320
		Facilities	Yes
2	CAPD		

Blood Bank Department:

Structure and equipments

1. **Screening and physical examination room:**

   It is used for screening and physical medical examination of blood donor before donation of blood

2. **Blood donation room:** consists of beds-3 (for blood collection),

   Equipment: Blood collection monitor-3 (It collects fix quantity of blood automatically in blood bag, and it prevents blood from coagulation by keeping the blood bag continuously in motion.

3. **Apheresis room:**

   It is used for apheresis which is a medical technology in which the blood of a donor or patient is passed through an apparatus that separates out one particular constituent and returns the remainder to the circulation. Whole blood enters the centrifuge and separates into plasma, leukocytes, and erythrocytes. Selected components are then drawn off.

   Equipments: Bed- 1, Amycus machine- 1 (for apheresis)

4. **Refreshment room:**

   It is rest room for blood donors after blood donation.

5. **Clean area room:**

   This room is used to separate blood components.

   Equipments:

   i. Laminar airflow machine: It is used for blood components separation under strict sterile conditions with the help of sterile airflow and ultra violet rays.

ii. Sterile docking machine: It is used to transfer some quantity of blood from mother bag to other bag. This machine keeps mother bag and the bag in which blood has been transferred unexposed to air and sterile.

6. <u>Component separation room:</u>

Equipments:

i. Centrifuge machine – 2: A centrifuge machine is used to separate the components of blood. The centrifuge works using the sedimentation principle, where the centripetal acceleration causes denser substances to separate out along the radial direction (the bottom of the tube).
ii. Untested blood storage cabinet – 1: It is used to store untested whole blood or RBC's. Temperature maintained 2-6 degree C
iii. Plasma storage cabinet – 2: It is used to store separated NHP (Normal Human Plasma) and cryoprecipitate. Temperature maintained below –25 degree C up to -40 degree C.
iv. Plasma freezer – 1: It is used to freeze plasma at faster rate. Temperature maintained below –40 degree C up to -80 degree C.

7. <u>Blood Grouping and serological lab:</u>

Equipments:

i. Plasma freezer – 1: In this freezer, plasma is arranged blood group wise for issuing. Temperature maintained below –25 degree C up to -40 degree C. There is arrangement of continuous measurement of temperature of freezer called thermograph which can record change in temperature in graphical presentation for 7 days. After 7 days, this thermograph is changed.
ii. Thawing bath – 1: It is used to bring frozen plasma to normal room temperature. Temperature maintained 37 degree C.
iii. Reagent storage cabinet – 1: It is used to store testing kit and anti sera stock. Temperature maintained 2-6 degree C.
iv. Micros 60 machine – 1: It is used to get haemogram of blood donor before apheresis as pre donation testing

v. Incubator – 1: It is for ELISA plate incubation.
vi. Quality control is done by discarding blood crossed expiry date and examining blood for microorganism culture.

8. **Washing and sterilization room:**

Equipments:

i. Outdoor camp equipments
ii. Hot air oven – 1: It is used for drying test tubes and slides.
iii. Autoclave – 1: It is used for sterilization of hiv positive or hbv positive blood before discarding.

9. **TTI (Transfusion Transmitted Infectious diseases) room:**

TTI test is done for HIV, HbsAg, HCV, VDRL and Malaria Parasite

Vacutainers are used for blood collection and storage. Red colored called plain vacutainer is used for testing blood for test other than blood grouping. Purple colored vacutainer called EDTA consists of anticoagulant used for blood grouping.

Pre donation testing is done only before apheresis which consists of haemogram, blood group and TTI test. It is not done for whole blood donation for which only 3 parameters are examined hemoglobin, BP and medical test – physical examination, history taking.

Equipments:

i. Rapid Machine – 1: It is used for ELISA testing for HIV and HbsAg
ii. Untested sample storage cabinet – 1: Temperature maintained 2-6 degree C.

10. **Record room:** Record of blood donation and issuing of blood is maintained for 5 years.

11. **Issue counter and cross matching room:**

Equipments:

i. Issue blood cabinet – 1: It is used to store blood bags blood group wise and reservation wise for issuing to patients. Temperature maintained 2-6 degree C.

ii. Platelets agitator – 1: It is used to keep platelets in continuous motion to avoid coagulation. . Temperature maintained 22-24 degree C.

iii. Cross matching equipments.

Organogram of Blood bank:

CEO
⇩
Medical Director
⇩
HOD
⇩
Senior Medical Officer
⇩
Technician

Labs in blood bank:

i. Donor lab
ii. Apheresis lab
iii. Grouping lab
iv. Medical record
v. Quality Control lab
vi. TTI lab
vii. BMW lab
viii. Component lab
ix. Compatibility testing lab
x. HIS/ software/ Computer

Criteria for whole blood donor selection procedure:

i. Donor registration
ii. Donor screening (medical interview and physical examination)

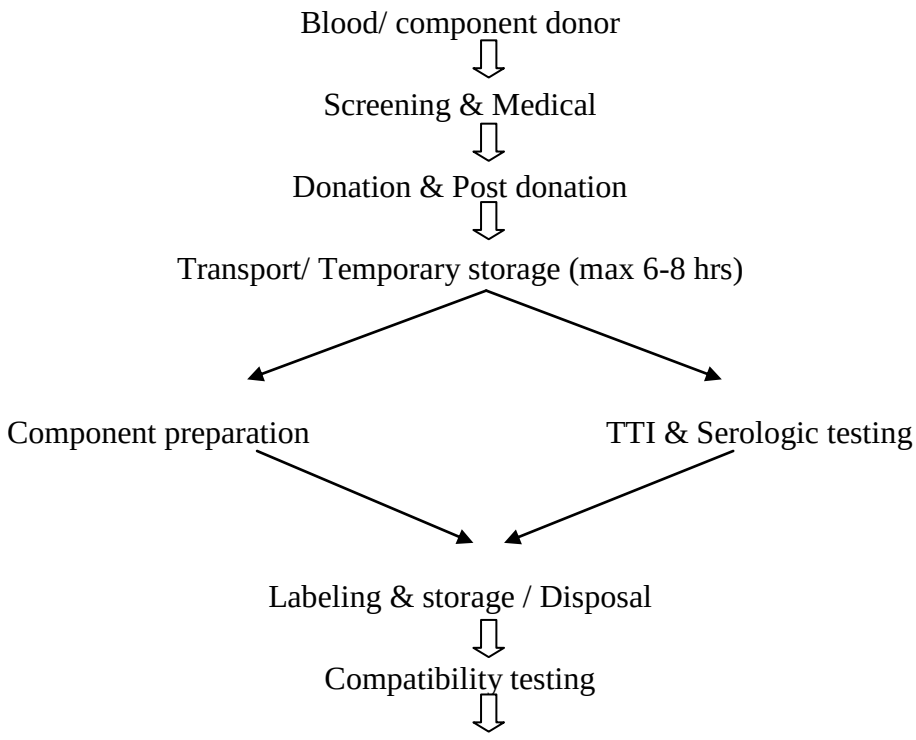
iii. Obtain informed consent of donor

iv. Generation of donor registration no.(blood unit no.)

v. Interpretation

vi. Documentation

Work flow in blood bank:



Issue of red cells containing components process:

Issue slip from concerned doctor is essential, then to verify the information on issue slips, such as patient name, registration no., and type of blood component required, ward & sign of doctor

Request from OT, in case of telephone, issue all the above details except doctor sign, ask name, documented and location

Using name & MRN no. of the patient from issue slip, identify blood bank id from issue register

Using PB no, take out requisition form of patient from pending issue file, tally name & MRN no. of patient on slip, and attach issue slip with requisition form

Take out required no. of units from storage, identify blood/component unit by crosschecking BD no., BG, date of expiry

While processing issue scan the donation no. from bag. Do not write after preparation of issue report & compatibility sticker

Check the unit for expiry date, abnormal appearance, leakage, discoloration, gas formation and haemolysis

Paste compatibility sticker on appropriate unit

Recheck details on compatibility sticker on respective unit

Confirm the information on issue report with that on blood unit

Unit is ready for issue. Blood unit should always be issued with issue report

Make all the remaining entries in the issue register against the respective patient. Mention date and time of issue in the column provided.

Issuing technician should put his / her sign in issue register and take sign of receiving person and mention name below.

Issue of non red cell containing components:

No prior processing / reservation are done for these components

All the frozen plasma components are issued only after thawing in 37 degree Celsius (for 30 min)

Prior to putting the frozen plasma for thawing, one attached segment is used for reverse grouping of the component by the tube method

Confirm the group with that on the label of the component bag

No information of the blood group for platelet concentration and cryoprecipitate is required

List of records in blood bank:

1. License file
2. TTI lab testing register
3. Discard record register
4. TTI reactive units records
5. Blood donor consent record
6. Emergency drugs record

7. SDP procedure record
8. Blood component stock register
9. Patient investigation register
10. Blood donor grouping register
11. Blood and component issue register
12. Consumable inventory register
13. Daily QC record for antisera
14. Master donor record
15. Issue lab equipment cleaning record
16. OC record for RBC and whole blood
17. QC record for platelets
18. QC record for cryoprecipitate and FFP
19. Component preparation record
20. Sterile docking procedure record
21. Indent receiving register
22. Technician over register
23. QC record for antisera

Blood bank licenses:

Central Drugs Standard Control Organization and the state licensing authorities issue licenses

Form of application for license for operation of Blood Bank/processing of whole human blood for components/manufacture or Blood Products for sale or distribution

Provided further that a licensee holding a license in Form 28-C or Form 28-E as the case may be for operation of blood bank/processing of whole human blood for components/manufacture of blood products shall apply for grant of license under sub-rule (1) before the expiry of the said license on Form 27-C or Form 27-E as the case may be and he shall continue to operate the same till the orders on his application are communicated to him.

Pathology Laboratory Department

There are 5 units of pathology laboratory as follows:

1. **Sample Collection Room:**

- Equipments:
    - Research Centrifuge machine
    - Pneumatic System
    - Barcode machine
    - Trays for sample segregation department wise: for Hematology, Biochemistry, Immunology, Microbiology and Clinical pathology
- Sample is received from various departments like OT, wellness, A&E, NICU, OPD, and blood bank through pneumatic system. While sample is received from IPD though housekeeping staff.
- After sample receipt, lab assistant make entries of sample reception in system (HIS)
- Centrifugation of sample is done.
- Sample receiving from OPD is already bar-coded, while sample received from IPD need to be bar-coded. After bar-coding of sample, CR number is generated in system.
- Samples are segregated unit wise in respective assigned trays and sent to respective units.

2. **Haematology:**

- Equipments:
    - Single Analyzer
    - Batch Analyzer
    - Stago – PT, PTTK, Fibrinogen test can be performed
    - ACL Machine Analyzer: Fully Automatic
    - Microscope: 1
- Tests performed: CBC, ESR, Glycolated Hb, Reticulocye count, D-Dymer test, coagulation test
- FQAS

- Quality Control: External
- Technician- 9
- CAP

3. <u>Immunopathology:</u>

- Equipments:
    - Cobas e 411: at a time 30 samples can be processed
    - Electro Immuno Chemoluminiscence: hormonal assessment like T3, T4, TSH, Insulin, B12, etc tests can be processed. It processes serum sample. It takes half hour per sample for processing
    - Siemens VIDAS ROCHE
- QC: Everyday
- Sample processing per day:70 to 80

4. <u>Histopathology:</u>

- Registration number is generated after receiving specimen. Sample contains 1 gm of specimen and 10 times of formalin.
- Three types of tests are performed in histopathology
    - Surgical pathology
    - Cytology
    - Immunohistochemistry
- Surgical pathology: Specimen grossing and storage is done for biopsy
- Trimming of specimen is done and it is stored in fully automatic tissue processor.
- After tissue trimming, trimmed tissue is kept in small cassette. Then cassettes are placed in bucket. This bucket is then kept in tissue processor. It has 14 hours schedule program.
- Embedding of specimen is done in embedding machine.
- Embedded specimen is cut very fine and staining done.
- Specimen is mounted on slide. Then it is sent to pathologist for reporting

- This slide is stored for 10 years.
- Cytology:
    - Gynaecology cytology: PAP smear – vaginal and cervix.
    - Non Gynaecology cytology: all body fluids.
- Immunohisto chemistry: Marker tests are performed.
- Staff: Technician – 2, Pathologist – 2
- Daily number of tests performing:
    - Biopsy – 10
    - Cytology – 10
    - Marker test – 2
- Time required for completion of tests:
    - Small Biopsy – 3 days
    - Big Biopsy – 5 days
    - Cytology – 1 day
- Equipments:
    - Stained H&E Slide Storage cabinets – 2
    - Microwave Oven – 1
    - Microscopes – 3
    - Linear Stainer – 1
    - Cytospin Centrifuge
    - Paraffin Blocks
    - Water bath

5. <u>Biochemistry:</u>

- Equipments:
    - AVL 9180 – Electrolyte Analyzer – Na, K, Cl for urine, serum. Auto calibration: 4 hourly
    - Hitachi 902 – Fully Auto analyzer – 72 types of tests like serum BSL, urea, Sr Creatinine, etc – 30 samples can be processed at a time

- Cobas – b 121 – ABG Analyzer – fully automatic – models i) 5856, ii)6085, whole blood is processed in this equipment
- Cobas 4232 – for Trop-T and D-dymer test
- Vitros 4600 – Biochemistry Analyzer fusuion of dry + Wet chemistry – Automatic report transmission to HIS
- Vitros 250 – Dry biochemistry
- Vitros DT 6011 Biochemistry Analyzer
- DTSC II: Enzymatic test biochemistry semiautomatic

Radiology Departments

Radiology department is located at ground floor of IPD building. It includes x-ray, CT scan, MRI, Mammography, Color Doppler and ultrasonography:

1. **X-ray Department:**

- There are total 5 x-ray machine. These are located as follows:
  - X-ray Dept: 2 (Fixed: 1 for X-ray and 1 for Fluoroscopy)
  - Wellness Dept: 1
  - ICU: 2 (Portable)
- Cassette Rack: 11 cassettes (x-ray plates) available
- Available software in system for radiology dept.
  - PACS (Picture Archiving Communication System)
  - rChive software: for reading, reporting of images; viewing history, HIS orders, work list and scheduling.
  - Masterview software: for image cropping and contrast adjustment.
- **Process flow of in X-ray Dept:**

Patient registrations at reception counter in HIS

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Payment of X-ray charges at counter

⇩

X-ray procedure

⇩

X-ray plate is inserted in x-ray reader (Kodak Direct view CR975)

⇩

Printing of x-ray film (in Kodak Dry View 8900 Laser Imager)

⇩

X-ray film is given to patient

⇩

Radiologist views x-ray films in rChive software

⇩

Reporting of findings of x-ray by radiologist

⇩

X-ray film and report is automatically uploaded to PACS software in system, so, these film and report can be accessed by doctors and nurses in hospital through system

⇩

Printing of reports

⇩

Authorization of reports by radiologist

⇩

Printed report is given to patient

- TAT for X-ray procedure (from registration to completion of x-ray procedure): 15 mins
- TAT for reporting (from registration to printing of reports): 2 hrs
- No. of x-ray procedures per day:100
- Tariff: Rs. 350/film/view
- Staff:
    - Technician-6 (shifts: Morning-3, Afternoon-1, Night-1, Off-1)
    - Nurse-2 (for USG, Mammography, Color Doppler)
    - Housekeeping-3

2. <u>CT Scan:</u>

- Machine: Siemens-Sensation 64 slice
- Contrast used: Non-ionic IV contrast- Inj Iomeron 350mg IV, Oral contrast- Gastrovideo for abdominal scan
- Console Room: 1 (common for CT scan and MRI Scan)
- **Process flow of in CT Scan Dept:**

Registration at reception counter

⇩

Billing

↙ ↘

Plain → ⇩ → Immediate scanning ⇩

Contrast → ⇩ → Preparation- fasting for 4 hrs

(Patient coming from IPD is already prepared) ⇩

Documentation by technician

⇩

Images sent to PACS

⇩

Radiologist reporting in PACS system

⇩

Transcriptionist type report

⇩

Confirmation of report

⇩

Printing of report

⇩

Authorization of report by radiologist

⇩

Report is given to patient

- TAT for CT scan procedure (from registration to completion of CT scan procedure): 15 mins
- TAT for reporting (from registration to printing of reports): 2 hrs
- No. of CT scan procedures per day:15-20
- Tariff: Rs. 2500-12000
- Staff: (common for CT scan and MRI Scan)
    - Technician-5 (shifts: Morning-2, Afternoon-2, Night-1)
    - Nurse-1
    - Housekeeping-2
- Quality Control:
    - AERB(Atomic Energy Regulatory Board) visit per year

- TLD (Thermo Lumination Dosimeter) Badge for staff which is checked after every 3 months
- CT scan machine is checked by biomedical engineer daily.

3. <u>MRI Scan:</u>

- Machine: Siemens1.5 Tesla
- **Process flow of in MRI Scan Dept:**

Registration at reception counter

⇩

Billing

⇩

Schedule entry

⇩

Procedure is explained to patient

⇩

Consent form

⇩

MRI scan

⇩

Documentation by technician

⇩

Images sent to PACS

⇩

Radiologist reporting in PACS system

⇩

Transcriptionist type report

⇩

Confirmation of report

⇩

Printing of report

⇩

Authorization of report by radiologist

⇩

Report is given to patient

- TAT for MRI scan procedure (from registration to completion of CT scan procedure): 15 mins
- TAT for reporting (from registration to printing of reports): 2 hrs
- No. of MRI scan procedures per day:8-10
- Tariff: Rs. 8500-12000
- Quality Control:
    - AERB(Atomic Energy Regulatory Board) visit per year
    - TLD (Thermo Lumination Dosimeter) Badge for staff which is checked after every 3 months
    - MRI scan machine is checked by biomedical engineer daily.

4. <u>Mammography:</u>

- Machine for mammography:
    - Mammomat – Siemens 3000 Nova
    - Biopsy Unit – Steretortic Biopsy Unit
    - Cassette
- **Process flow of in Mammography Dept:**

Registration at reception counter

⇩

Billing

⇩

Schedule entry

⇩

Procedure is explained to patient

⇩

Consent form

⇩

Mammography

⇩

Documentation by technician

⇩

Images sent to PACS

⇩

Radiologist reporting in PACS system

⇩

Transcriptionist type report

⇩

Confirmation of report

⇩

Printing of report

⇩

Authorization of report by radiologist

⇩

Report is given to patient

- After each mammography, breast USG is done
- Mammography is done in separate room. It consists of operating cabin, system and change room.
- There is coding lock system of door and entry is given inside room only for staff to protect privacy of patients.
- TAT for mammography (from registration to completion of procedure): 25 mins
- TAT for reporting (from registration to printing of reports): 2 hrs
- No. of mammography procedures per month: 70-80
- Tariff: Rs. 1780

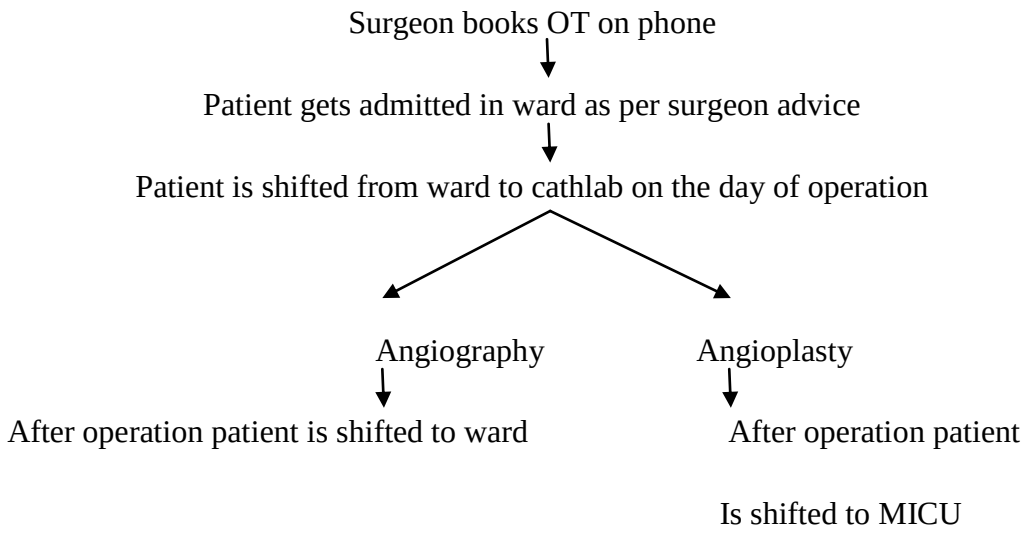
- Staff: Technician:1 (for general shift)

5. <u>Color Doppler and Ultrasonography :</u>

- Machine: Siemens – Acuson Sequoia 512
- TVS probe for internal sonography
- 4C1 probe for abdomen and obstetrics
- 5L8W linear probe for neck, breast and thyroid USG.

Cathlab Department

Process flow:



Equipments in cathlab OT:

1. C-arm – Siemens Axiom Artis
2. Anesthesia machine
3. Mechanical Respiratory Ventilator
4. Intra-aortic balloon pump – CS100
5. ECG machine
6. Defibrillator
7. Injector – Contrast
8. PTCA stent balloon
9. ETO balloon
10. Ceiling pendent
11. Syringe pumps
12. Permanent pacemaker implant tray
13. CAG kit
14. Suction machine
15. Warmer

16. Crash cart

Registers maintained:

1. Procedure book
2. OT booking register
3. Pharmacy charge register

Staff:

1. Consultants – 3
2. OT technician – 2
3. Nursing staff – 2
4. Housekeeping – 2

Duty roster:

For technician and nursing staff – 9 am – 5:30 pm and 12 pm – 8:30 pm

For housekeeping – 9 am – 6 pm and 11 am – 8 pm

No of procedures per day: 6-7

TAT:

1. Angiography – 15 min
2. Angioplasty – 45 min
3. Pacemaker implantation: 1.5 hr
4. ASD/VSD closure 45 min

Post Operative duration: 30 min

Recovery room:

Preoperative and postoperative beds: 6

Cathlab Pharmacy

Reporting room

In-Patient Department

- Types of beds: There are different types of wards with different name. Amenities are provided category wise. Details are mentioned as follows:

Sr No.	Category	Floor	Bed Charges	Nursing Charges	Consultant Charges	Room Amenities
1	Gold Male	3rd floor	1000	200	275	General
2	Gold Female	3rd floor	1000	200	275	General
3	Gold Pediatrics	3rd floor	1000	200	275	General
4	Gold Plus	3rd floor	1500	250	325	4 beds in single room, sofa cum bed for relative
5	Platinum A	3rd floor	2200	300	400	2 beds in single room, sofa cum bed for relative
6	Platinum B	3rd floor	2200	300	400	2 beds in single room, sofa cum bed for relative
7	Platinum 2nd floor	2nd floor	2200	300	400	2 beds in single room, sofa cum bed for relative
8	Emerald A	3rd floor	3900	500	550	Single room, TV, Sofa cum bed, Lockers, Telephone
9	Emerald B	3rd floor	3900	500	550	Single room, TV, Sofa cum bed, Lockers, Telephone
10	Safire	2nd floor	4750	550	750	Single room, TV, Sofa cum bed, Lockers, Telephone

11	Diamond	2nd floor	6750	600	1000	2 rooms (for patient:1, for relative: 1), oven, freeze, phone, lockers, TV, Telephone, Sofa cum bed
12	MICU	2nd floor	3200	500	600	NA
13	SICU	2nd floor	3200	500	600	NA
14	SICU 1st floor	1st floor	3200	500	600	NA
15	PICU (Level 3)	2nd floor	3000	500	650	NA
16	PICU (Level 2)	2nd floor	2500	500	600	NA
17	NICU (Level 3)	G floor	3000	500	650	NA
18	NICU (Level 2)	G floor	2500	500	600	NA
19	Obs & Gynaec Ruby Twin	G floor	2200	300	400	2 beds in single room, sofa cum bed for relative
20	Obs & Gynaec Ruby Deluxe	G floor	3900	500	550	4 beds in single room, sofa cum bed for relative
21	Obs & Gynaec Gold	G floor	1000	200	275	General

- Nursing stations are well equipped with all necessary and emergency equipments like ECG machine, Glucometer, Crash cart, etc
- Record Keeping: Manually in patients IPD files and in system like in softwares like Rcare magnum/ Magnum Hybrid, HIS, etc.
- IPD beds arrangement is open and also specialty wise.
- Manpower and hierarchy: Consultants, RMO's, Team leader – 1 and 12 nurses under TL, housekeeping

- Duty Rosters: Duties are done in morning (7:30 AM – 2:30 PM), Evening (1:30 PM – 8:30 PM) and Night (8:00 PM – 8:00 AM) shifts
- Daily patients volume: 16-17/day
- Quality Indicators: Medical auditing of files and other factors
- Process flow of admission:

Planned (OPD) and unplanned (A&E) admission

⇩

Admission note

⇩

Admission process is done at admission counter

⇩

Admission counter person calls in IPD, confirm bed availability and tells to keep bed ready

⇩

Transport of patient to respective ward

- Rounds of consultants: Morning and evening
- Medicines for patients are brought from IPD pharmacy.
- Dieticians takes round 3-4 times a day and decide and arrange food for patients
- Cleaning of wards is done thrice a day and washing is done after discharge
- Nurse call system: Medisystem
- Patient is prepared in IPD ward for operation before taking him to OT.
- Visiting hours of IPD is 4:00 PM to 8:00 PM
- BMW management is done according to standard protocols.
- Process flow of discharge:

Planned discharge

⇩

Return of medicines

⇩

Consultant signs on IPD papers

⇩

File goes to pharmacy

⇩

File goes to IP billing

⇩

File goes to admission counter or TPA counter

⇩

Payment

⇩

Discharge intimation is done

⇩

Discharge of patient and document handover

Operation Theatre Department

- Location: OT complex is situated on 1st floor. It consists of 6 operation theaters.
- Two more OT's are situated at ground floor; one for gynecology and obstetrics and one for In vitro fertilization.
- 6 O.T's are on 1st floor: (1for general surgery, 1 for urology,1 for orthopedics ,1 for neurology,1 for Ophthalmology,1 for Cardiac surgery)
- Pre-operative and post-operative number of beds:6
- Manpower and hierarchy:
    - Anesthetists: 11
        - Senior consultant (HOD): 1
        - Consultants: 4
        - Registrars and DNB students: 6
    - Nursing staff:25
        - Team leader:2
        - Senior nurse: 8
        - Nurse: 15
    - Housekeeping: 6-7 (inside OT)
    - Transport housekeeping: 1 (outside OT)
- Duty rosters: Morning- 7:30 AM to 4:00 PM, Evening- 1:30 PM to 8:30 PM and Night 8:00 PM to 8:00 AM
- Monthly volume of patients: 358
- Equipments:

C-arm Arcadis old	Heart Lung Machine 1
C-arm Mobil New	Heart Lung Machine 2
Harmonic Scalpel	Intra Aortic Balloon Pump
Ligasure	Activated Clotting Time
Video Trolley 1	Stryker Saw Cardiac

Video Trolley 2	Octopus
Video Trolley 3	Head Light Luxtek 1 and 2
Surgical Microscope ENT	Swiss Lithoclast Master
Surgical Microscope Neurology	Temperature Control Monitor 1
Surgical Microscope Ophthalmology	Temperature Control Monitor 2
Laser Urology	TCM Warm Touch
Drill Machine-ENT	TCM Bair Hugger
Drill Machine-Neuro-Codman	Phaco machine
Drill Machine-Neuro-Manman	Vitrectomy machine
Drill Machine-Ortho Manman	Shaver Ortho
Drill Machine-Ortho AO	Intelligent Tourniquet
Drill Machine-Ortho Stryker	Pulse Lavage (Irrigation machine)
Liposuction Trolley	Micro debrider
Anesthesia machines	Cardiac monitors
OT lights	Pulsoximeters
OT pedants	Defibrillators
Crash cart	Suction machines

- Design:
    - There is one scrub station and one induction room attached to every OT

- There is 1 perfusionist room, 1 fluid warming cabinet room and 1 theatre sterile supply room.
- Medical gas valve is attached to every OT.1 Biomedical engineer takes round daily for temperature, humidity and pressure control. Also Biomedical engineer takes round daily for medical equipments. Dirty corridor is attached to each OT,1 unsterile lift and 1 sterile lift is available in OT complex
- OT has rest rooms for staff like doctors lounge, lunch cafeteria, nurses lounge.

- After every case, OT is sterilized by echo shield.
- No fumigation is done routinely except when there is OT repair and when abnormal growth in OT is found. But terminal cleaning of all OT's is done daily
- Zoning:
    - Protective zone:
        - Reception
        - Waiting area for relatives
        - Change rooms for all OT staff with toilets and lockers.
        - Rooms for administrative staff
        - Pharmacy store
    - Clean zone:
        - Pre and post-operative area
        - Equipment store rooms
        - Emergency exits
    - Aseptic zone:
        - Operating rooms
        - Scrub rooms
        - Anesthesia induction rooms
    - Disposal zone:
        - Dirty utility room
        - Dirty (Disposal) corridor
- Temperature maintained in OT's: 22 degrees C
- Humidity maintained: 45-55%
- No. of air changes in OT: 30 times per hour

- Air filtration through HEPA filters
- Ventilation: OT no. 1 to 5 – Guided air ventilation, OT no.6 - laminar air flow ventilation.
- Processes:
    - OT Scheduling:

Surgeon calls from OPD or IPD and books OT on telephone

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Desk Monitor does necessary entry of OT booking in 'OT booking register'

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RMO or Registrar fill up 'OT booking form' and sent it to OT with housekeeping staff

⇩

DM signs on OT booking form as received and OT booked

⇩

DM keeps white and red carbon copied forms with her and stores in 'OT booking form' file

⇩

OT booking form book is returned to respective department

    - SOP in OT:

Patient comes in preoperative area

⇩

Preoperative verification is done

⇩

Patient in holding area is monitored by anesthetist and nurses

⇩

Patient is brought inside OT, time out is done

⇩

Surgery

⇩

After surgery patient is kept in post operative area till he/she is stable

⇩

Surgeon notes and other documents are noted down and signed by doctors and nurses.

- Standard operating protocols on quality assurance:

- Strict hand hygiene.
- Surveillance and monitoring of hospital acquired infections.
- Anesthesia equipment checklist prior to each of session.
- Preoperative check list.
- Post operative check list.

- MIS and computerization: HIS, Rcare Magna, etc softwares are used in system
- Billing: Billing is done by billing person in system.
- Lens and implants are bought from provider and used.

Intensive Care Unit Department

- Location:
    - Medical ICU (2 nd Floor) - 16 Beds, 2 Isolation beds,
    - Surgical ICU (1st Floor and 2 nd Floor), 2 Isolation beds
- Pediatric ICU(2 nd Floor) - 7 Beds
- Neonatal ICU (Ground Floor) 32 Beds.
- Type: Semi closed I.C.U., Cubicles
- Staff: 1 intensivist,1 senior consultant intensivist, 2 R.M.O's,1 Registrar, 8 nurses in each shift.

  (24 staff)-8 in each shift
- 8 ventilators MICU and SICU.
- Quality indicators:

  1. To achieve VAP rate below 5 per 1000 ventilator days by year end.

  2. To achieve CRBSI rate less than 5 per 1000 ventilator days by year end.

  3. To decrease urinary tract by 5 per 1000 urinary catheter days by year end.

- Ward rounds are done by intensivist daily. Intrahospital transportation of patients is monitored by I.C.U Nurses. Infection control nurse rounds daily for monitoring of ventilator and central line.
- I.C.U EQUIPMENTS:

- Monitor
- NBP Cuff.
- ECG
- Syringe pump.
- Oxygen flow meter.
- Ventilator.
- AMBU bag.
- Pressure bag
- Patient shifter

- DVT Pump.
- Vacutainer.
- Blood box.
- oxygen cylinder.
- TPA Stamp.

➢ Documents: Transfer in, transfer out form, shift out form, discharge form, nurse assessment notes, plan of care etc.

Accident and Emergency Department

- Triage station: Patients are being sorted according to the condition.
- Red zone: 2 Cardiac beds , 1 pediatric bed ,1 poly trauma bed
- Equipments: Cardiac monitors, Defibrillators, Ventilators, 1 crash cart, 1 emergency drug cubboard, 1 ECG machine, 1 syringe pump.
- Green zone: for stable patient.
- Yellow zone: for less critical patients .6 beds.
- Black zone:1 bed
- Ambulance: There are 2 Cardiac,2 non cardiac,
- 1 doctor, 1 housekeeping, 1 nurse, in cardiac ambulance.
- 1 housekeeping in non cardiac ambulance.
- Staff: 1 registrar, 3 doctors in each shift, 1 casualty medical officer, 3 nursing staff.
- 1 operation theatre for accident and emergency (Minor OT).
- 1 disaster kit room. (20-25 patients can be managed).
- 1 nursing manger room, 1 doctor room.
- 1 reception area, 1 billing area.
- 1 ambulance counter.

Medical Records Department (MRD)

- MRD is the medical records department where records of the patients are maintained by the hospital. Medical records are maintained for legal purpose and also for treatment.
- There are different types of medical records with different retention period for each department like

1. OPD records – Retained for a period of 3 years.
2. IPD records – Retained for 5 years.
3. Medico-legal records – Retained for 10 years.
4. Birth records – Retained for 21 years.

- In MRD there are 2 units

1. Transcription unit – which takes care of report typing
   8 Transcriptionist – 1 in cardiology, 2 in radiology (1 within the radiology department and 1 in MRD), 5 in IPD for preparing discharge summery.
2. Record keeping unit – which takes care of all the record keeping, retrieval, maintenance etc
   In this unit there are 7 technicians

- In addition to this there is 1 manager, 1 senior executive who take care of the department. There are 2 housekeeping staffs as well for support services.
- Arrangement of the medical record is done by MRN number.
- If the patient comes to OPD with prior appointment his/her records are already sent to the department if not after the file request is sent to the MRD it takes 20 minutes to send his record to the OPD. Electronic Medical record is also maintained through Magnum Hybrid for clinical purposes and through Magnum for general purposes.
- For the retrieval of the record if the patient is self payee he/she can retrieve their record by submitting a request form. For a TPA patient request form along with a deficiency letter from insurance company has to be submitted for the retrieval of any particular record.

Housekeeping Department

- Housekeeping is out sourced in this hospital. Manpower for housekeeping is supplied by two companies:

1. Sumeet- which supplies 96 staff
2. Rare hospitality- which supplies 130 staff.

- In this department there is a manger that is common for MRD and support services, below which there are 3 supervisors. These 4 staff is in house i.e. they are on ABMH pay scale. Under these 3 supervisors there are around 12 supervisors, 6 from Sumeet and 6 from Rare who takes care of all the remaining staffs.
- Housekeeping staff are given a training of around 1 week by their respective companies and after joining 3 days on duty training is provided to them by the hospital.

Dietary Department

- There are total 9 dieticians
- Medical superintendent

⇩

Chief dietician

⇩

Senior dietician

⇩

Junior dietician.

- Process: Patient admitted in hospital

⇩

Information from Hospital information system/nursing staff, dieticians round

⇩

Food is decided according to the diagnosis

⇩

Informed to room service

⇩

Diet sheet is given

⇩

Food is delivered according to the time.

- Staff: 85 staff. Below captain level all staff is outsourced.
- Kitchen location: Ground floor and basement. There are areas like cutting area (preparation area at basement), cooking area and washing of utensils area (at ground floor).
- There is separate cafeteria facility for staff (at basement), patients and visitors (at ground floor).
- License: FORM C, Given by FSSAI: Food Safety And Standard Act (Pimpri Chinchwad Municipal Corporation).

Biomedical Engineering Department

- According to need purchase is being made. Indent is raised by user, approved by management.
- Technical specifications are taken from different vendors for new equipments. Commercial specifications of equipments are done. After specifications it has to be recommended by doctors then again sent to management for further approval.
- Biomedical engineers take rounds daily in OT, ICU, pathology, radiology, and accident and emergency. Rest areas are visited according to need.
- Preventive and maintenance schedule is there for equipments. Calibrations are done once in year except blood bank and pathology.3rd party contract for collaboration. Internal auditing is done yearly; external auditing is done by I.S.O, NABH, and J.C.I.
- Staff: 1 HOD, 1 assistant manager, 3 biomedical engineers, 1 clerical staff.

Material Management Department

- This department takes care of all the stationary items like materials needed for plumbing, electrical, civil, chemicals for water treatment plant, furniture, computers, printers, computer related parts, linen, shoes, slippers etc. There are a total of 4 staffs in this department- 1 supervisor, 2 assistant, 1 housekeeping staff.
- Analysis of the material is done by three ways:

1. ABC Analysis (Always Better Control Analysis) - This is based on the consumption value
    - A class goods – High consumption as well as high individual cost – one month stock is maintained for these goods.
    - B class goods – Medium consumption and cost is also at the mid level – 15 days stock is maintained.
    - C class goods – Individual cost is also low as well as consumption is also less – 2-3 months stock is maintained for these goods.
2. HML Analysis – High, Medium and Low value Analysis – This is based on unit value.
3. FIFO – First in and first out analysis – Goods which are purchased first are sent out first.

- Process flow

For regular items purchase requisition is generated from store/ for non regular items purchase requisition is generated from the respective department.

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Approval sign for the purchase is taken from CEO

⇩

Purchase and ordering process is carried out by the department (quotation)

⇩

Order is signed by the management and the order is placed.

⇩

Vendor sends the material with the bill and invoice.

Goods receiving note along with invoice is sent to finance department for the payment.

- There are various forms which are maintained by the department like- purchase from, requisition form, stock form etc.

Pharmacy Department

- There are 4 pharmacies in the hospital &1 central store pharmacy, 1O.P.D Pharmacy, 1gynaec pharmacy, 1 O.T pharmacy, 1 IPD pharmacy.
- Narcotics drugs are licensed by National drug and psychotropic substance act. O.P.D pharmacies and O.T pharmacies have license of narcotics. Quota of narcotics is fixed. For transport distributor has to take permission from drug office. Major documents for narcotics is nursing narcotic request book, narcotic central drug book, narcotic consumption book for unused medicine record. Doctor's sign is must. Rubber stamp mandatory. Empty ampoules are returned back to pharmacy. Permission is taken from drug office to discard the drugs. These are crushed then discarded. Narcotics are stored in double lock and key cupboards. Daily 3 times inventory of narcotics are checked for how much drugs are sold and the remaining drugs. If misplaced then informed. Prescription of narcotics is stored for 10 yrs.

- Inventory management:
    - A B C : (Priority wise)
    - A-Costly Drugs constitutes 10% of pharmacy.
    - B- constitutes 30 TO 35%
    - C-Value of items less, no. of items in the store more.
    - VED Analysis: Vital and essential drugs. These drugs amount are always kept in excess.
    - FIFO: First in and first out.
    - Look alike medicines are kept at different places.
    - Tallman labeling: To reduce error main part is highlighted.
    - Different place of storage of lookalike drugs.
- Process: Indent is sent from every pharmacy to central pharmacy through Hospital information system. Auto indenting system from every pharmacy to the central store at12:00 am night .Stock is filled for 4 days from central store to each pharmacy in the hospital. Empress stock used in emergency in nursing station. It is also maintained and replaced from in patient pharmacy. Purchase return is made for the near expiry drugs before 3 months.

- Purchase: Particular vendor is authorized by company and then demand is send to the vendor, they will send the supply.
- Pharmacy training is being given for correct method of handling cytotoxic spillage.
- Cytotoxic admixture unit on 3rd floor: For diluting antibiotics and cytotoxic drugs.2 HEPA filters are there for safe handling of drugs.
- 1 Clinical pharmacy :2 pharmacist are there for rechecking of drug dosage of the patients in I.P.D
- Audits: JCI, NABH and ISO.
- License of whole sale in central pharmacy. Food and drug association gives license. FORM 21B and 20 B license, O.P.D pharmacy Form 20 G +NDPS 2, O.T: NDPS 2, I.P.D: FORM 20+21 +21 C. Licenses are issued according to location, storage, pharmacist qualifications.
- Staff: 13 Staff in inpatient pharmacy, 6 staff in o.p.d, 1 incharge, 1 senior placement, 1 data interpreter. Rest all are pharmacist.

Central Sterile Supply Department (CSSD)

CSSD department consists of 3 areas:

A) Decontamination area:

- This area receives used instruments, dressing, linen from OT, OPD, IPD, etc
- This area has unsterile lift to receive infected instruments from OT.
- These infected instruments are washed in hot water with the help of pressure air guns and water guns.
- Then these instruments are cleaned at 45 degree C temperature in Ultrasonic washer machine (Trans-o-sonic).
- After thorough cleaning, instruments are disinfected in washer disinfectant at 90 degrees C.
- Instruments are dried in dryer and sent to assembly area for set preparation

B) Assembly area:

- Sets of instruments are prepared according to requirement of operations.
- These sets are then packed in fabric linen which has expiry date of 7 days from packing date or Non oven which has expiry date of 3 months from packing date or paper package which has expiry date of 1 month from packing date or peal pouches which has expiry date of 1 year from packing date.
- These are packed with help of fix sealing machine.
- A chemical indicator strip is placed in instruments set before packing.
- There are two types of sterilizer:
    - Steam sterilizer: It is high temperature steam sterilizer used to sterile instruments. There are 2 steam sterilizers in CSSD dept; Steris Amesco century 250 liters and 760 liters. It generate steam of 134 degree C. It works on 3 parameters; time required for quality of steam exposure to instruments, 97% saturated steam and temperature of 134 degree C.
    - ETO (Ethylene Oxide) Sterilizer – Steris Amsio Eagle: It is low temperature (37-55 degree C) sterilizer used for sterilization of plastic tubing. It conducts

actual sterilization cycle of 14-16 hours. But it takes 48 hours to complete one cycle of sterilization.

C) Sterile storage area:

- This area stores all sterilized instruments set and linen set.
- This area has sterile lift to provide sterilized instruments and linen to OT

D) Quality assurance and sterilization process monitoring:

- Bowie-Dick Test Packs are used daily to evaluate the performance of air-removal (vacuum) system of dynamic pre-vacuum type sterilizers. Available as test cards or preassembled test packs.
- Biological indicators are used for sterility testing
    - 1 lacs Bacillus Sterothermophillus are used for steam sterilization. Color of chemical indicator strip inside container changes from purple to yellow.
    - Bacillus Subtillis or Atrophaeus is used for ETO sterilization. Color of chemical indicator strip inside container changes from green to yellow.
- Chemical indicators are used in each and every pack for sterilization testing.
    - Color of chemical indicator strip inside pack changes from red to green in case of steam sterilization
    - Color of chemical indicator strip inside pack changes from red to dark brown or black in case of ETO sterilization

Bio Medical Waste (BMW) Management Department

In every department there are various color coded bins for proper segregation of the waste generated in the hospital. Various color coded bags and the waste collected in them includes

- Black bag – For general, domestic and kitchen wastes etc.
- Red bag – for plastic tubing's, syringes and other plastic items.
- Yellow bag – only for infectious wastes such as soiled dressing, cotton, laboratory, cultures and specimens etc
- Red colored plastic container – Needles, blades, Insulin Syringe
- White container – all glass articles (broken and unbroken) in puncture proof white container.

There is a supervisor and 2 housekeeping staff who takes care of all the bio medical waste management. Waste from all the departments of the hospital is collected 3 times a day:

Morning: 7am to 8am

Afternoon: 1:30pm to 2:30pm

Evening: 7:30pm to 8:30pm

Process flow

Waste generated from the hospital is collected 3 times a day.

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All the waste is transferred to BMW yard present in the hospital premises.

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Waste from the yard is collected once every 24 hours by the vehicle of Pasco environment solutions limited which has been authorized by PCMC (Pimpri Chinchiwad Muncipal Corporation) to transport and dispose off the waste.

Laundry Department

- Manpower in laundry is outsourced to Sparkle associates, where as machines and the infrastructure is provided by the hospital. Laundry department is taken care by support service supervisor under whom there are a total of 16 staffs in laundry- 2 supervisors, 2 washer man, 5 pressman and 7 for collection.
- In laundry there are 3 large washing machines- 85 kgs machine for while linen, 60 kgs machine is for green linen and 25 kgs machine is for infected linen. In addition there is a regular washing machine for guest laundry. In drying area there are 2 machines of 45 kgs each for drying clothes. There are 3 flat presses for ironing the linen. In addition there is a calendar press for pressing and drying. Each machine is attached to big tubes for steam which in turn is attached to hot water tank present behind the hospital.
- From the hospital linen is collected 2 times in a day once between 7am to 8am and again between 3:30 pm to 4:30 pm during which infected and soiled linen is collected from different departments and replaced by equal number of fresh linen. The infected linen is collected in a dirty utility room, and then it is taken into the chemical room where it is soaked in the chemical and then washed separately in the 25 kgs washing machine.
- For the staff's uniform is given and collected on a daily basis by the staff from the laundry. There is a separate uniform room in the laundry where uniform is stored or stacked according to the ID number. Requirement for the new clothes are sent to purchase department and is then stored in the store.

Recommendations

1. In OPD's, Signposts should be in local Marathi language along with English, so that it would be easier for patients to locate dept.
2. Information to prevent and recognize cardiovascular diseases like hypertension, myocardial infarction, coronary artery diseases can be given through wall poster. This information also can be given through magazines and TV installed in waiting area in cardiology OPD.
3. Information about preventive health check up of cardiac & pulmonary diseases can be given through wall posters and pamphlets in cardiology OPD.
4. In dental OPD, Information related to taking care of teeth, healthy cleaning habits and treatment procedure available for tooth caries can be given through pamphlets and TV installed in waiting area.
5. As cataract, glaucoma and refraction error are leading causes of blindness, information related to diseases and treatment available for these diseases can be given with help of wall posters and booklets in ophthalmology OPD.
6. Wall posters of exercise of eyes to relieve eyes stress can be stuck in waiting areas in ophthalmology OPD.
7. People can be made aware about eye donation after death through information, education and communication in ophthalmology OPD.
8. Information to prevent and recognize orthopedic diseases can be given through wall poster. This information also can be given through magazines and TV installed in waiting area in orthopedic OPD.
9. Information about do's and don'ts about eating habits can be given through wall posters and magazines outside obesity and dietician clinic.
10. Preventive and promotive health information can be given through wall poster like early diagnosis and treatment of diseases, healthy food habits and life style diseases. This information also can be given through magazines and TV installed in waiting area.

11. Information of preventive and promotive health services like immunization and nutrition of children can be given through wall poster. This information also can be given through pamphlets and TV installed in waiting area of pediatric OPD.
12. More entertaining environment can be created by making available more toys and colorful picture in waiting area of pediatric OPD.
13. Waiting area can be made soundproof as children make noise and cries frequently in pediatrics dept. It would prevent disturbance to surrounding areas
14. Dietician services can be given to mothers in gynecology and obstetrics dept.
15. Wall posters consisting of pictures and encouraging messages can be stuck into waiting area of gynecology and obstetrics dept to increase confidence of mothers and to support them mentally.
16. Patient flow in cathlab is less compared to other hospitals in pune. Therefore cathlab utilization is less. Attempts should be made to increase patients through marketing as cathlab contributes major part to hospital revenue.
17. Systematic proper scheduling in cathlab should be done and it should be followed.
18. Cardiologists are usually busy in OPD's in morning, so all scheduled cases in morning gets rescheduled to afternoon. Therefore, Cathlab remains unutilized in morning on most of days.
19. Patients were complaining of non availability of consent form in Marathi. Consent form for haemodialysis should be available in Marathi language.
20. In haemodialysis dept, waiting area should be increased, as each patient is accompanied by one relative.
21. Renal Failure patients have to stand in queue of OPD pharmacy to buy medicines and consumables required for dialysis. There should be small, different pharmacy counter for dialysis unit, as patients need to buy medicines and consumables frequently. This would save their time and work.
22. Patients were complaining about dietary services provided at dialysis unit. Dietary service can be improved by asking patient about their choices in menu of food.
23. Consumables can be provided in package price of dialysis by increasing package rate of dialysis so patients don't need to queue up in OPD pharmacy

Project on

Concurrent Medical Record Evaluation

Background

Safety and quality services are just two of the most important priorities in medical settings. Quality services promote the fast recovery of the affected individuals. This can only be achieved through highly organized and systematic operations within a facility that observes compliance and ethical processes. This should be observed in all aspects that are considered crucial. One of the important areas that should be given enough attention is record keeping, in which it is necessary to continuously implement quality improvement initiatives such as clinical documentation improvement program and medical record audit. Non compliance in medical records can lead to a lot of risks and financial fines to hospital. It is important to implement audits on different aspects related to reimbursement, medical data, and legal documents to ensure risk free operations.

Efficient medical-records initiatives are important when facing these cases:

• Most forms of injury litigation

• Various kinds of tort lawsuits including negligence, malpractice, intentional torts, and products obligation

• Workers' settlement

Insurance providers need correct medical record evaluations to figure out for necessity of therapy obtained by their client pursuing an accident.

Improve the quality of clinical record keeping within the organization

Objectives

- Assess current records to see if they meet best practice.
- Identify discrepancies in current medical records.
- Analyze discrepancies and reason behind those discrepancies.
- Recommend solutions to reduce medical records discrepancies.

Criteria & Standards

ABMH had provided concurrent medical record evaluation form.

If criteria is compliant, it is marked as Y in front of criteria, If not compliant then as N, If not applicable then as NA.

Concurrent Medical Record Evaluation Form	1		
	Audit Date		
	Audit by		
Y - If compliant, N - If not compliant, NA - If not applicable	**Patient Identification data**		
	MRN		
	Ward		
	Bed No.		
	Observation	**Discrepancies noted**	**Remarks**
Patient ID			
Location			
General consent Signed			
H&P filled within 24 hrs			
Date & Time			
Consultant's sign within 24hrs			
Allergies identified			
Discharge Plan filled			
Doctor's Progress Notes			
Reflect Pain Assessment			
Effect of medicine			

Document patient education			
Reflect Plan of Care			
Record legible			
Consultation			
Nursing Admission Assessment			
form within 24 hrs			
Pain Assessment			
Functional Assessment			
Social Assessment			
Psychological Assessment			
Nurse Daily Assessment Form			
Document effect of medicine			
Reflect Pain Assessment			
Document patient & family education			
Reflect Plan of Care			
Medication Management			
Physician orders			
Capital letters			
Date, Time & Sign			
Dose, strength, frequency & route			
Unapproved abbreviations			
Allergies on order sheet			
Timeliness of medicine			
Administration			
Checked by second nurse			
Notifying adverse drug event			
Notifying the error			
IDTR			
Invasive procedure/ surgery			
Privileges			

Consent			
Site making and time out			
Operative notes			
Anesthesia			
PAC form filled			
Intra Operative & Post Operative			
Monitoring Form			
Blood Administration			
Consent			
Patient & family education			
Documentation			
Transfused within time limit			
Restraint Assessment documented			
Safety measures in place			
In-house Transfer Form filled			
Incident Form filled			
Discharge Summary			
Nutritional Assessment & Screening Form			
Physiotherapy Progress Notes			

Population & Sample

- **Sample method:** Simple Random Technique
- **Sample Size:** 122 files
- **Percentage of sample size of total no. of IPD admissions:**

Total No. of admissions from 12/04/2013 to 19/04/2013	Sample size (No. of files audited)	Percentage of sample size of total no. of IPD admissions
360	122	34%

- **List of IPD wards** had been provided by ABMH in which concurrent medical record evaluation was carried out

Wards
Platinum A (3rd Floor)
Platinum B (3rd Floor)
Emerald A (3rd Floor)
Emerald B (3rd Floor)
Gold Male (3rd Floor)
Gold Female (3rd Floor)
Gold Plus (3rd Floor)

Critical Care Beds
NICU (Ground Floor)
MICU (Medical) (2nd Floor)
SICU (Surgical)

Mother & Child Wing
Ruby Gold
Ruby Twin
Ruby Deluxe

Review of Literature

Medical record audit assesses patient care and is used for quality improvement. [1]

Safety and quality services are just two of the most important priorities in medical settings. Safety may mean the welfare of the patients receiving the medical services and also the financial or administrative stability of a medical institution. Quality services promote the fast recovery of the affected individuals. This can only be achieved through highly organized and systematic operations within a facility that observes compliance and ethical processes. This should be observed in all aspects that are considered crucial. One of the important areas that should be given enough attention is record keeping, in which it is necessary to continuously implement quality improvement initiatives such as clinical documentation improvement program and medical record audit. [2]

Medical record audit solutions are provided to guarantee that the best procedures for medical records are being implemented. Further, they are provided to establish medical institutions to be prepared for the different changes that may take place. We know that non compliance can lead to a lot of risks and financial fines to a medical organization. This is aside from the different problems that may destroy your reputation. Any hospital generally has a busy environment which is why physicians couldn't possibly allot enough time to achieve the best results from a medical record audit. Thus, it would be better to outsource the tasks to a more capable and reliable service provider. [3]

A medical record audit is a systematic and organized review of medical records and clinical documentation practices in a health care institution. The professional auditors will evaluate and examine the effectiveness of the current procedures to ensure accuracy, compliance, and efficiency on all operations affected by clinical documentation. Consequently, the implementation of a medical record audit also helps evaluate a clinical documentation improvement program. It is important to implement audits on different aspects related to reimbursement, medical data, and legal documents to ensure risk free operations. [4]

Medical records serve as the foundations of medical procedures which then determine the quality of life of a certain patient. With the sensitivity of the services involved, it's mandatory to provide accurate and specific data about a certain patient from the moment of admission to the time of release. All the medical solutions, diagnoses, response, and potential risks should be put into records. Not only is the welfare of the patients being protected by reliable clinical documentation but the interests of the provider as well. Thus to ensure compliance, billing accuracy, and integrity, a medical record audit is conducted. [5]

An audit is a very important task for improvement to meet high quality requirements in any kind of industry. In health-related institutions, a medical record audit is necessary to maintain good quality medical information leading to reliable healthcare solutions. It calls for systematized analysis of processes used for tests, examination, therapy, and care. All methods are analyzed to realize their connection to professional medical actions. Using an audit, the effects of health care services to the quality of health and the complete wellness of the affected individuals are identified. [6]

Healthcare records help in identifying the need for a medical solution. These documents need to be precise, comprehensive, and include the history, circumstances and treatments for the patient. Having the records together in thoroughly arranged format and examining them is vital with regards to matters involving lawsuits. Medical record audit is very important for insurance firms, attorneys, chart and medical audit companies, independent auditors, medical professionals and other institutions. They have to carry out reviews to discover the suitability of health care provided as well as the timeliness of such treatment.

When Medical Record Audit is Required

Efficient medical-records initiatives are important when facing these cases:

• Most forms of injury litigation

• Various kinds of tort lawsuits including negligence, malpractice, intentional torts, and products obligation

• Workers' settlement

If an individual is seriously injured through medical neglect, he or she must prove his injuries in order to make a legitimate claim. The very first documents that his lawyer will require are his medical documents. The lawyer will need to conduct healthcare claims review in order to provide proof of his client's injuries and must also win the case for compensation. Medical record audit offers a clear understanding of the clinical documentation elements of a case and is very important when planning for the situation. If it's a case of worker's settlement, there has to be proof of damages in the place of work. Also, the attorney must evaluate the medical records to acquire information and sum it up it for the case.

Professional medical peer evaluation is yet another case when patient documents are reviewed. This is accomplished by a doctor or even the quality assurance division in a hospital to gauge if a particular doctor has complied with all the accepted specifications of care, or whether there's been any negligence or malpractice. Insurance providers need correct medical record evaluations to figure out for necessity of therapy obtained by their client pursuing an accident. This helps in the arrangement of claims and to avoid fraud. Insurers might also require such reviews to ensure data in a life insurance claim.

As healthcare documents play crucial roles in the area of medical care, there's a need for an audit service that can make sure that they're regulated and completed based on standards suitable to approved healthcare organizations. Medical record audit services seek to promote standard medical solutions and more secure institutions by means of correct documentation. [7]

It's very important to maintain very clear documents to reflect the billing aspects of the services rendered. Without clear records to back up the claims, a hospital can be subjected to financial and legal risks. With an audit, the best improvement programs can be determined to correct known issues in record keeping and avoid the downsides of traditional practices. [8]

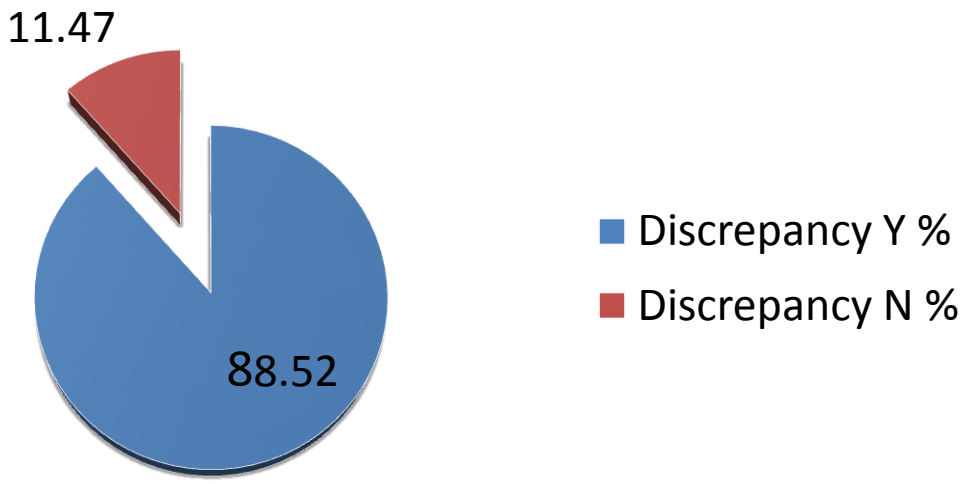
Data Collection & Analysis

- Concurrent medical record evaluation of IPD files was done at respective wards.
- Data collected electronically.
- Data collected over period of 7 days from 12th April to 19th April 2013
- Data analyzed in MS excel.

Audit Results

- 14 major discrepancies were observed after doing concurrent medical record evaluation.
- Rests of criteria were being met with standards.
- Major discrepancies and their statistics were as follows:

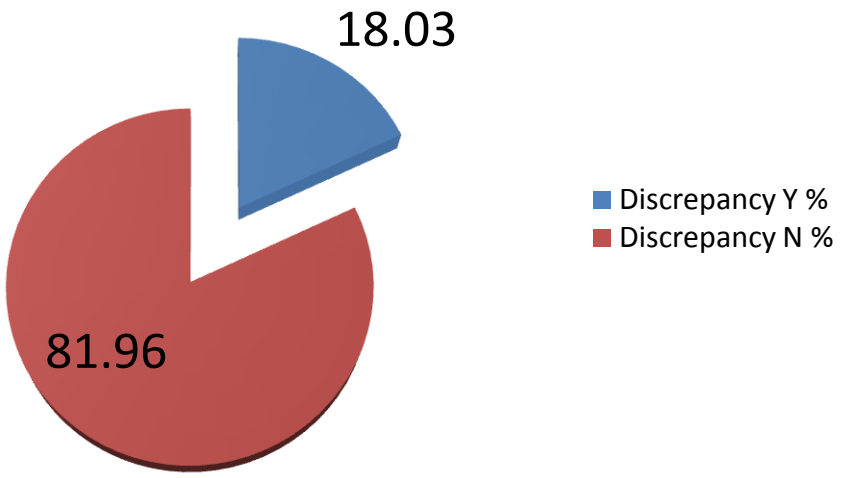
1. **Medicine names were not written in capital letters on form 7 (Admission history & physical assessment form) & Doctor progress sheet, but on Physician order sheet it was written in capital letters.**



Graph 1: Graphical Representation of discrepancy 1

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
108	14	122

2. **Consultant had not signed Form 7 (Admission history & physical assessment form) and form no. 6d (Plan of care). Consultant had only signed on progress sheet.**

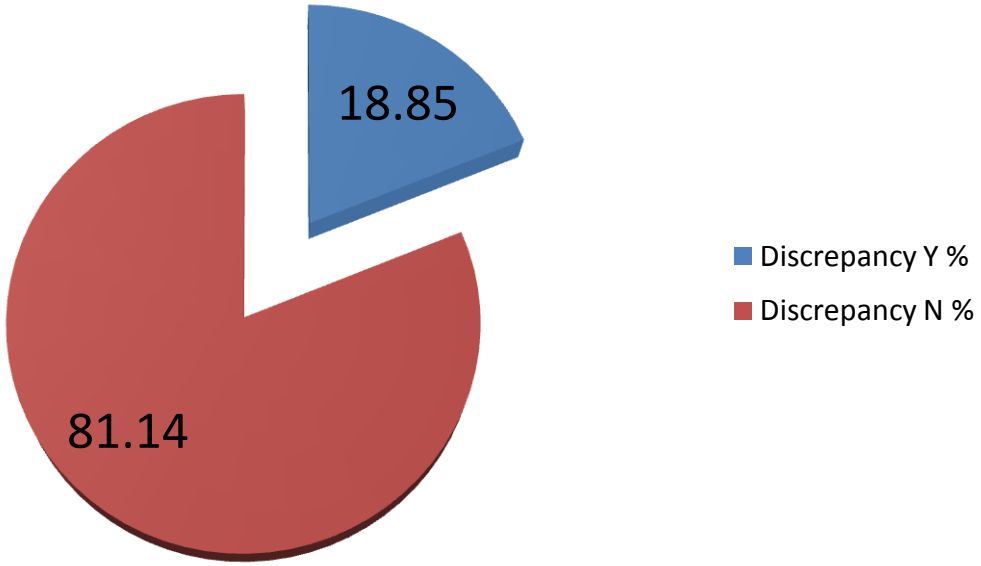


Graph 2: Graphical Representation of discrepancy 2

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
22	100	122

3. Allergies were not identified on form no. 7 (Admission history & physical assessment form)

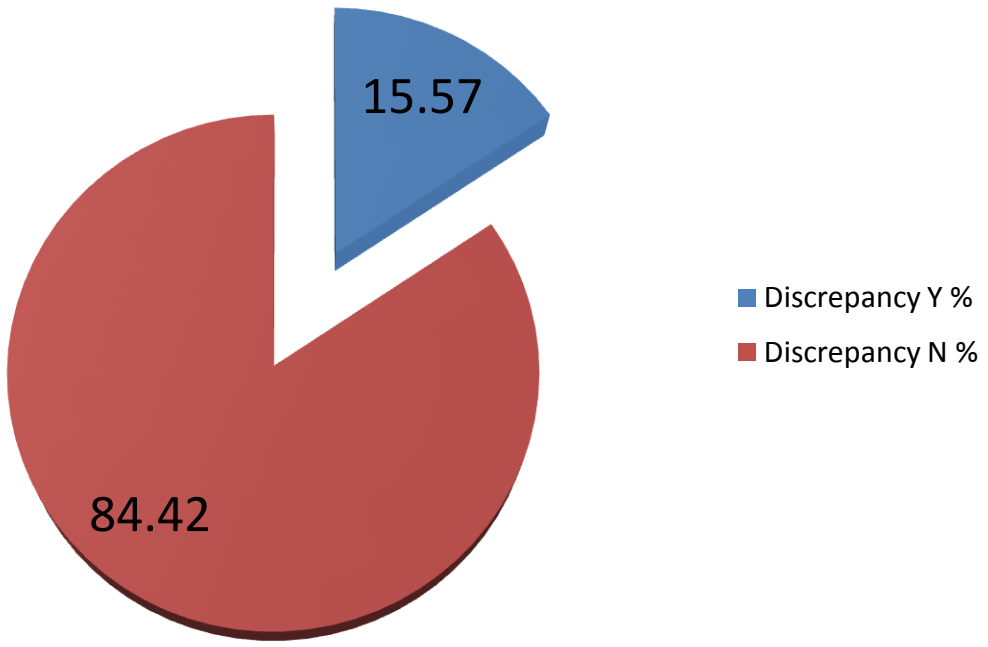
Remark: Allergy identification chart is given in only form no.7 Admission history & physical assessment form - General. It is not given in admission H&P assessment form for pediatric, A&E, gynaecology, etc.



Graph 3: Graphical Representation of discrepancy 3

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
23	99	122

4. Discharge Plan was not filled on form no. 6d (Plan of care)

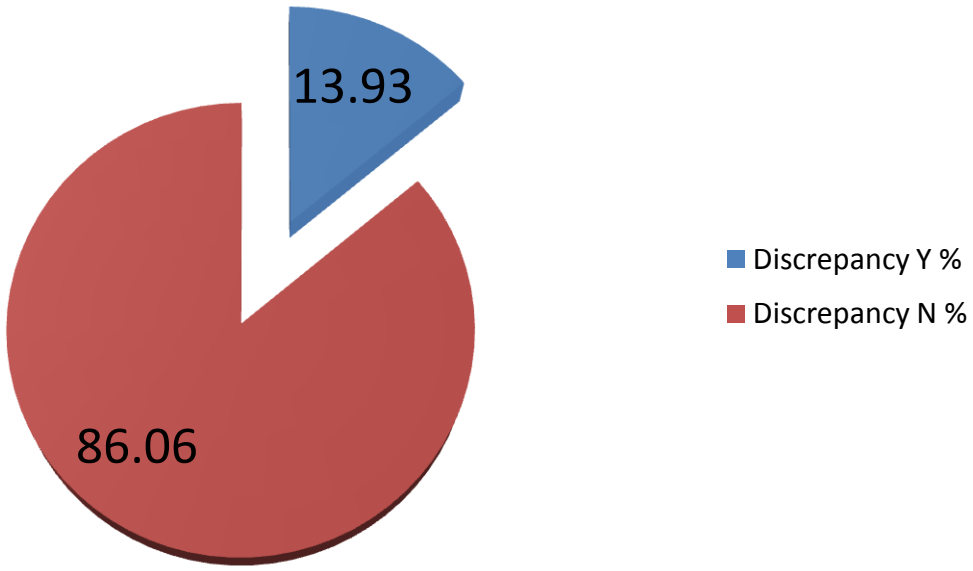


Graph 4: Graphical Representation of discrepancy 4

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
19	103	122

5. Pain Assessment was not done in form no. 7 (Admission history & physical assessment form)

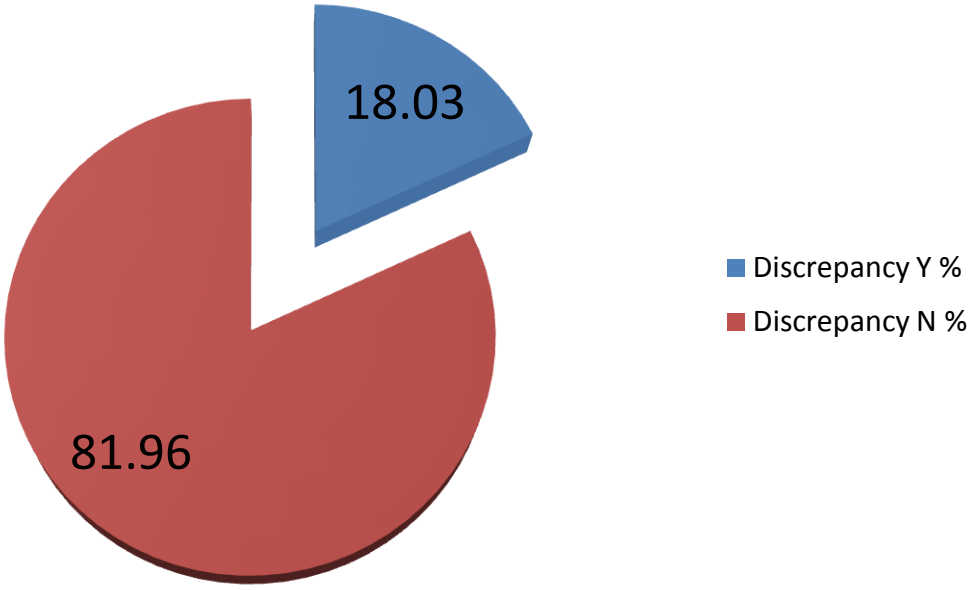
Remark: Pain assessment scale is given in only form no.7 Admission history & physical assessment form - General. It is not given in admission H&P assessment form for pediatric, A&E, gynaecology, etc.



Graph 5: Graphical Representation of discrepancy 5

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
17	105	122

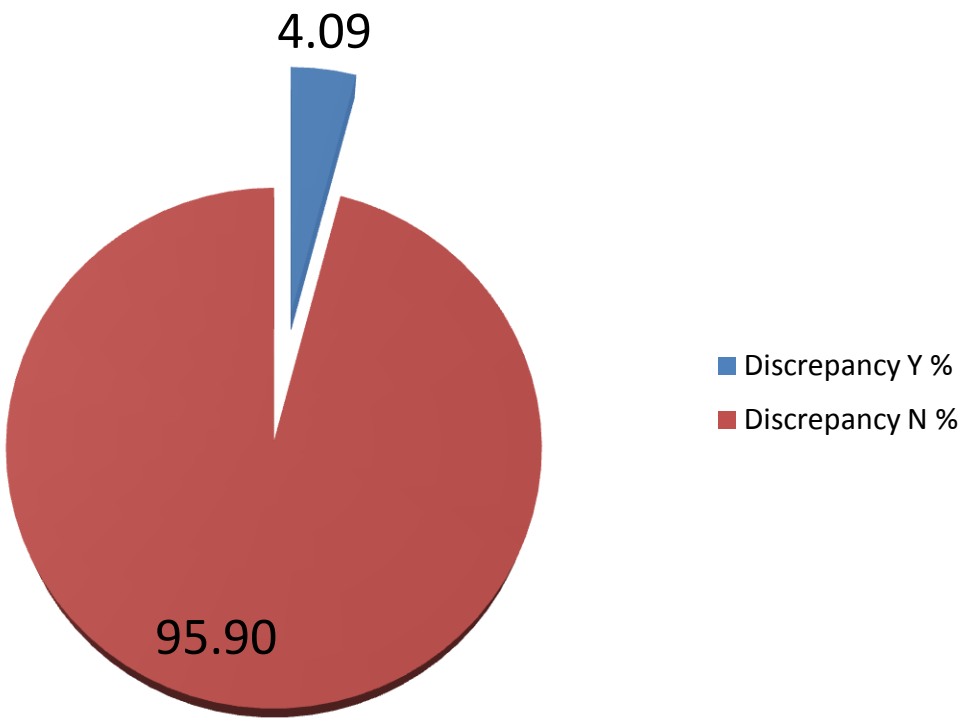
6. **Consultant had not signed Form 7 (Admission history & physical assessment form) and form no. 6d (Plan of care), therefore records (form no. 7 & form no. 6d) were not legible.**



Graph 6: Graphical Representation of discrepancy 6

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
22	100	122

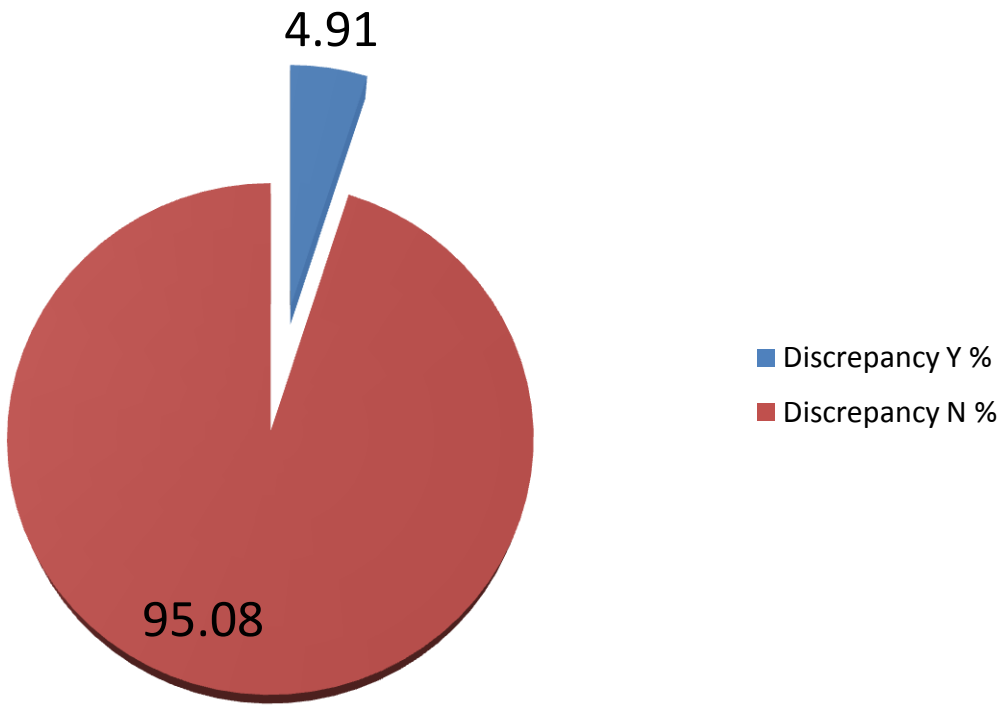
7. **PAC (Pre Anesthesia Checklist) form was not filled.**



Graph 7: Graphical Representation of discrepancy 7

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
5	117	122

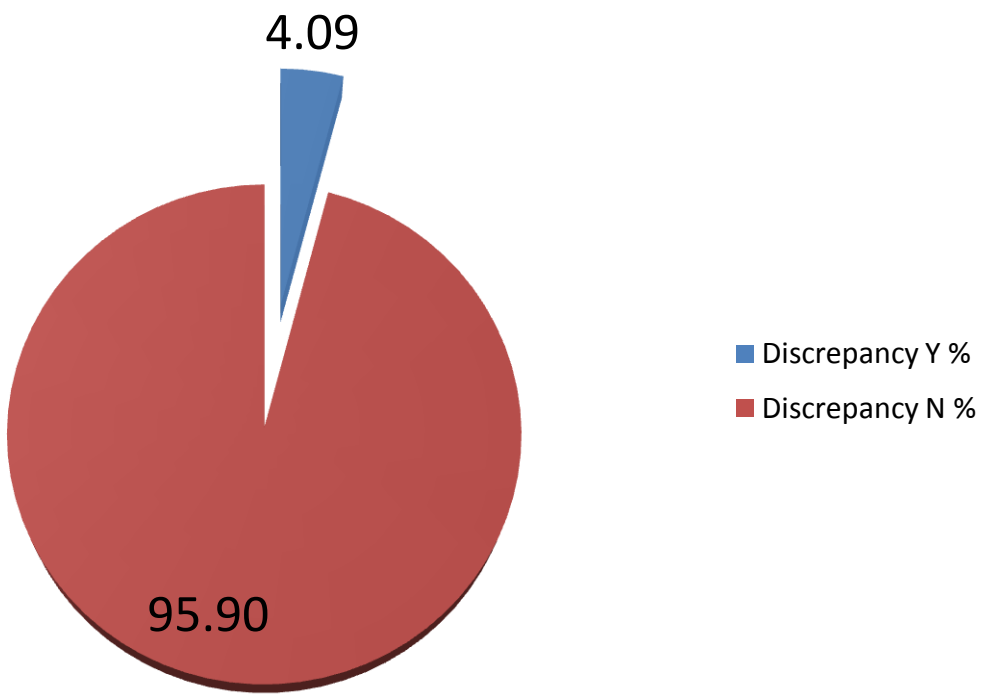
8. Intra Operative & Post Operative forms were not filled



Graph 8: Graphical Representation of discrepancy 8

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
6	116	122

9. Monitoring Form of surgery was not filled.

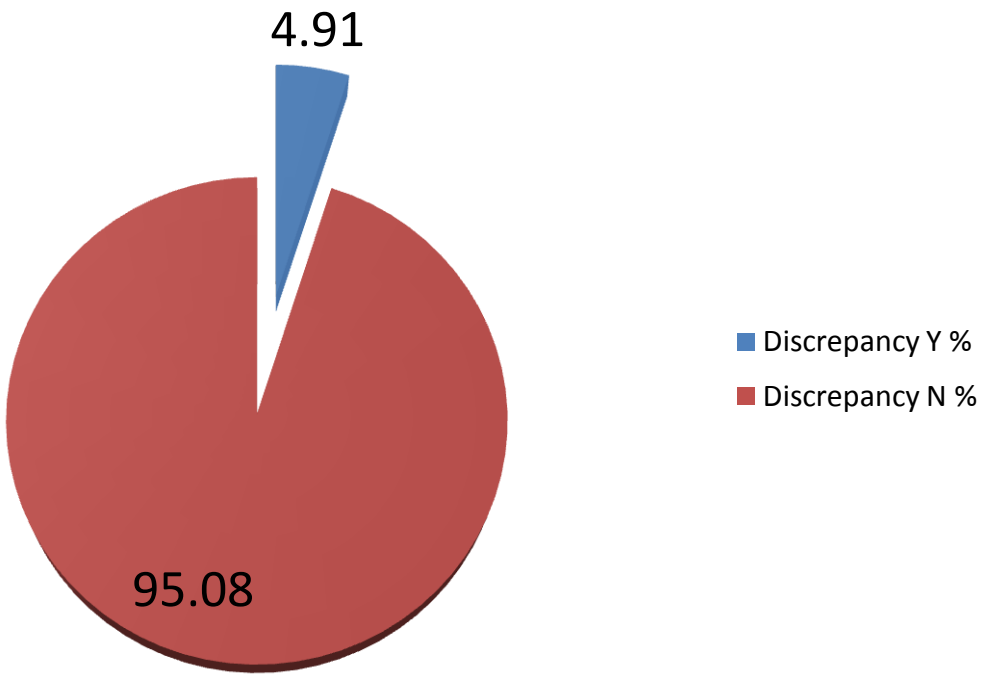


Graph 9: Graphical Representation of discrepancy 9

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
5	117	122

10. OT notes were not written / OT notes form was not filled.

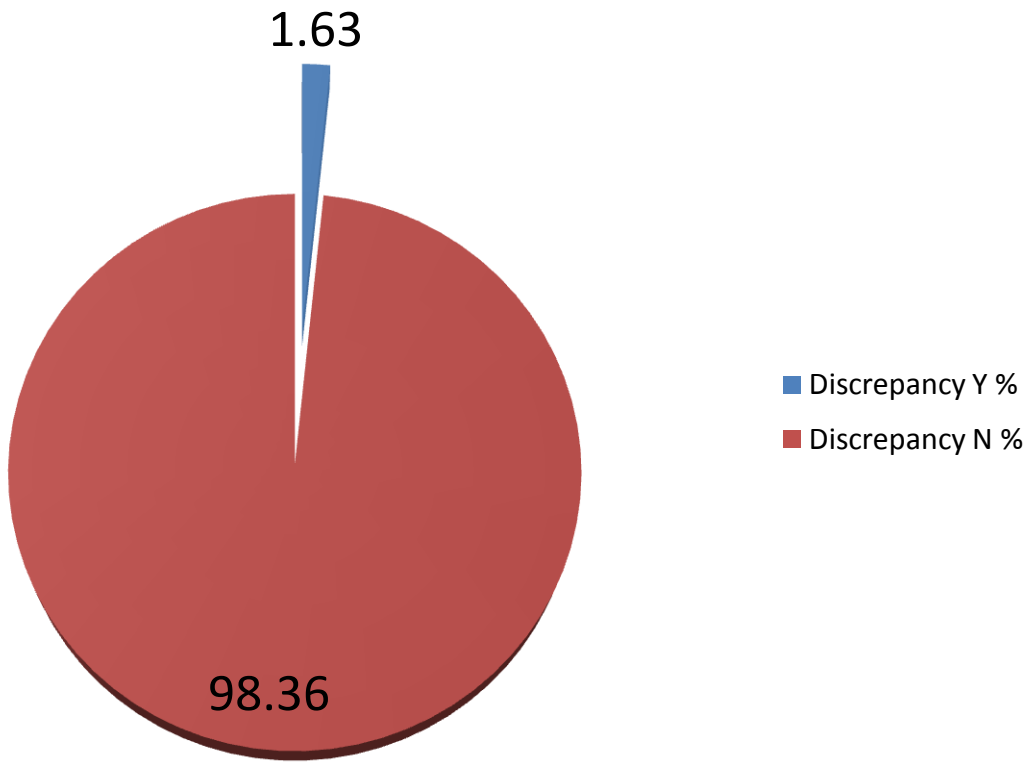
Remark: In some cases surgeon has written OT notes on Doctors progress sheet only. OT notes should be written in OT notes form instead of writing OT notes in progress sheet.



Graph 10: Graphical Representation of discrepancy 10

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
6	116	122

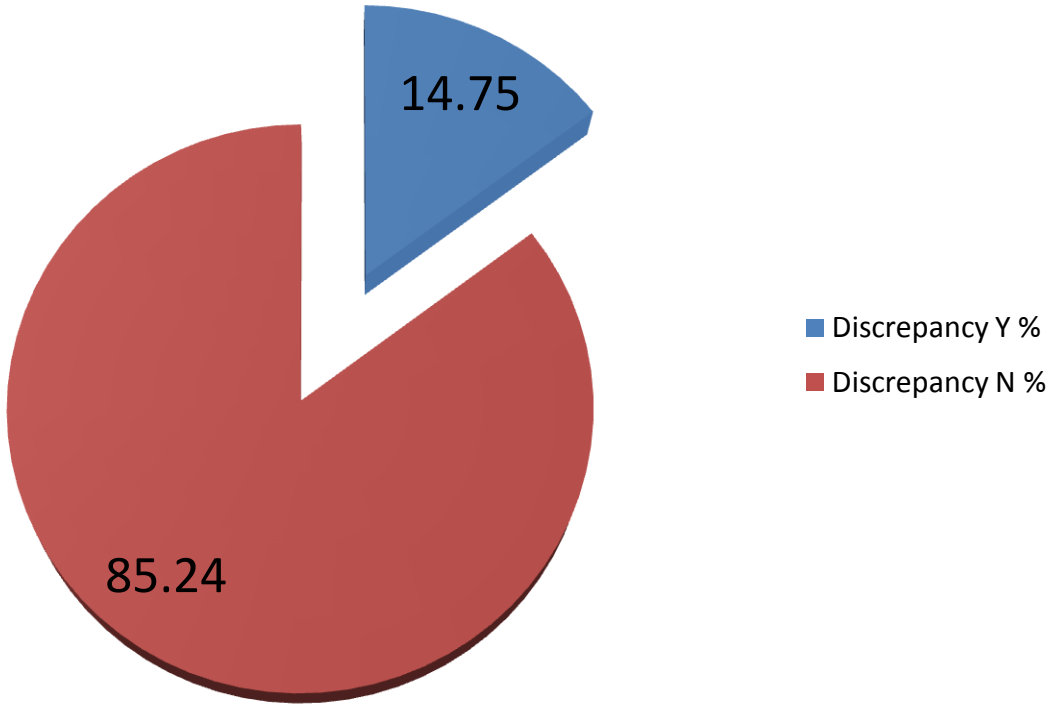
11.Physiotherapy IPD progress sheet was not filled.



Graph 11: Graphical Representation of discrepancy 11

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
2	120	122

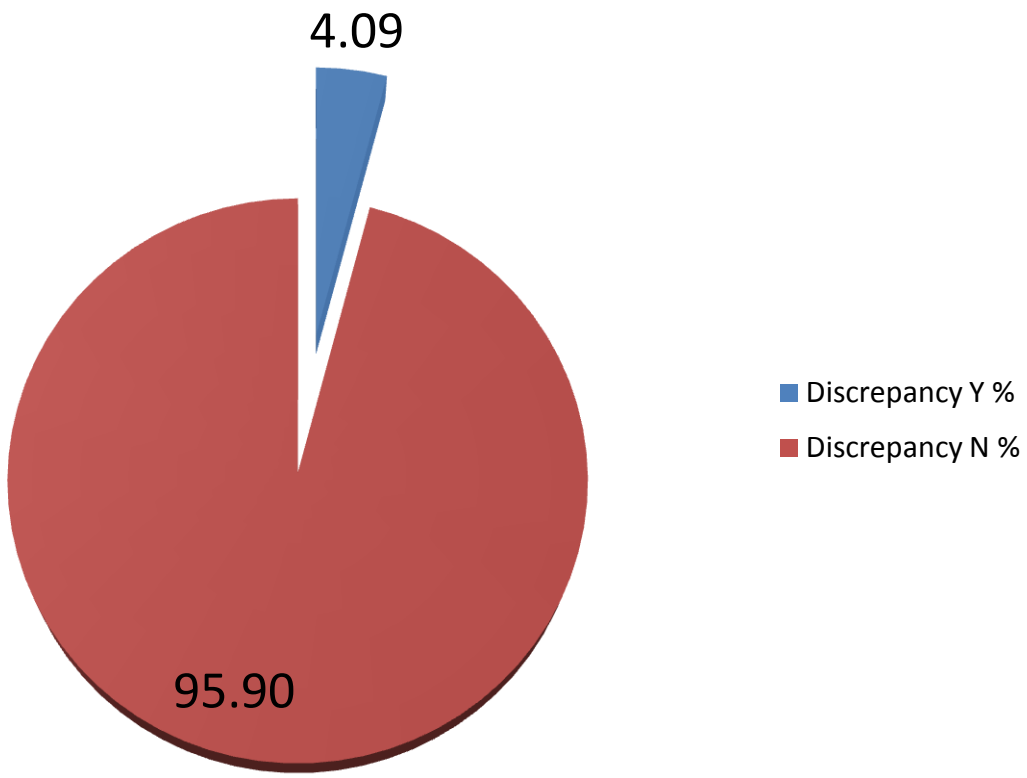
12.Form No.6d (Plan of care) was not filled completely.



Graph 12: Graphical Representation of discrepancy 12

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
18	104	122

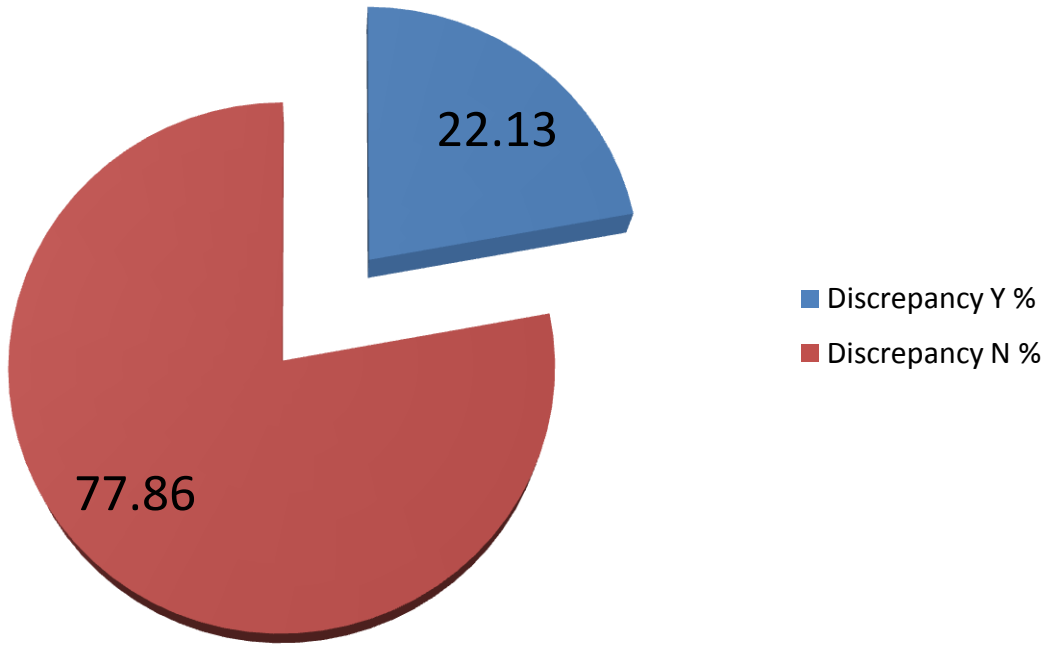
13.Pain Assessment was not done in Nursing admission assessment form.



Graph 13: Graphical Representation of discrepancy 13

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
5	117	122

14.Allergies were not mentioned on Physician order sheet.



Graph 14: Graphical Representation of discrepancy 14

Discrepancy Found in no. of files	Discrepancy not found in no. of files	Out of total audited files
27	95	122

Recommendations

- Instructions should be given to RMO's to write clinical notes properly, clearly, system wise and in specific format.
- Working diagnosis or differential diagnosis should be clearly written in doctor progress notes or history sheets.
- Referral source must be entered in doctor progress notes or history sheets. , e.g. GP, A+E
- Surgery name should be written in capital letters & in full form on surgery related sheets.
- Surgery related all documents or sheets should be filled up in all surgical cases and in any kind of surgery.
- Presently there is only one column in doctor progress sheet i. e. clinical findings. Whenever consultant or RMO takes round, sometimes he/she just mentions clinical finding, he doesn't mention about treatment. Therefore it becomes difficult to understand which medicine has to be stopped, which medicine has to be started, which medicines of previous order should be continued after that round. There should be two columns in doctors progress sheets, clinical findings and treatment and treatment should be clearly written with dose, route and interval.

Limitations of Study

- The concurrent medical record evaluation form was provided by ABMH which was only already prepared tool provided to do auditing in wards. Researcher had no scope to add or remove some criteria from the checklist.
- In-patient Department medical records files were audited in limited number daily at different wards. Because of time limitations of a day, it was not possible for researcher to audit all IPD files of patients admitted on that day. Therefore files were selected randomly for auditing.

References

[1] http://www.stfm.org/RCtoolkit/Tools_Audit.cfm

[2] http://medicalrecordsaudit.net/page/2/

[3] http://medicalrecordsaudit.net/page/2/

[4] http://medicalrecordsaudit.net/page/2/

[5] http://medicalrecordsaudit.net/page/2/

[6] http://medicalrecordsaudit.net/page/2/

[7] http://medicalrecordsaudit.net/page/2/

[8] http://medicalrecordsaudit.net/page/3/

Project on

‘Time and Motion Study in Operation Theatre’

Time and Motion Study : History

- Frederick W. Taylor and his followers developed and refined the Time Study.
- Frank B. Gilbreth and his wife Lillian developed and refined the Motion Study.
- Historically the two studies are discussed individually; today they generally are discussed as one.

Background

Time study is a method created to determine the ‘correct time’ it takes to complete a certain task. Motion study is a method to establish ‘the one best way to perform a task’. Motion study is for cost reduction, and time study is for cost control. Motion study is design, while time study is measurement.

Time and motion study in OT is used to develop the best work method and develop motion consciousness on the part of all employees. Motion and time study in OT can reduce and control costs, improve working conditions and environment, and motivate employees.

Time study in OT is used to determine average time required for pre-operative, operative and post-operative duration and to establish standard time; and also to calculate OT utilization.

Motion study is used to understand process flow in OT like scheduling of operations, actual implementation of schedule, types of operations, reasons behind delays and cancellations of operations and other SOP’s. It is a technique used for improving work methods and upgrading of work systems in OT.

Aim

To assess time taken and work methods followed for various activities in OT and to develop best work methods in order to provide efficient and quality of care.

Objectives

- To determine average pre-operative, operative and post-operative duration.
- To calculate OT's utilization.
- To assess scheduling of operations.
- To find out reasons behind delay in operations and cancellation of operations.
- To determine department wise utilization of OT's.
- To check out whether SOP's of OT's are followed or not like filling up consent form, marking of side/site, filling up pre-operative checklist and doing time out.
- To uncover problems and create solutions.

Study Area and Type

- **Study Area:** Operation Theatre Complex, ABMH, Pune.
- **Study Type:** Non-intervention prospective and Descriptive case study.

Study Population and Size

- **Study Population:** Operations performed in OT complex (OT No. 1 to 6) from 7 AM to 7PM over period of 8 working days from date 26/04/2013 to 06/05/2013 includes both planned, unplanned operations.
- **Sampling Method:** Simple random sampling.
- **Sample Size:** 109 operations.
- **Percentage of sample size of total no. of operations performed:**

Total No. of operations from 26/04/2013 to 6/5/2013	Sample size	Percentage of sample size of total no. of operations performed
122	109	89.34%

Data Collection Tool and Technique

- **Data Collection Tool:** MS Excel sheet was prepared to note down observations.
- **Data Collection Technique:**
  - Observations in OT complex.
  - Informal interviews with staff.

Review of Literature

A time and motion study (or time-motion study) is a business efficiency technique combining the Time Study work of Frederick Winslow Taylor with the Motion Study work of Frank and Lillian Gilbreth (the same couple as is best known through the biographical 1950 film and book *Cheaper by the Dozen*). It is a major part of scientific management (Taylorism). After its first introduction, time study developed in the direction of establishing standard times, while motion study evolved into a technique for improving work methods. The two techniques became integrated and refined into a widely accepted method applicable to the improvement and upgrading of work systems. This integrated approach to work system improvement is known as methods engineering and it is applied today to industrial as well as service organizations, including banks, schools and hospitals. [1]

Other study:

METHODS

Two prospective studies, conducted in two phases were used to address the study objectives.

Phase I (Operation Theatre Utilization Study):

A time and motion study of 1247 operations was carried out in Phase I. The actual time patients spent in various activities while in the Operating Theatres were measured. In all, 10 stages were identified starting from the time the patient was called from the wards to the time the patient left the OT/RR.

Phase II (Operation Waiting Times Study):

Phase II explored the allocation of elective OT sessions to departments and the waiting time for surgery by specialties. The incidence of and reasons for case cancellation were also recorded. An expert panel was convened to classify operations by urgency and determine acceptable waiting times. An estimation of the theatre time needs of the various departments was made by adjusting the utilized operating theatre time by the ratio of the actual acceptable waiting times for each of their urgency categories. [2]

Outcome measures:

The study outcome measures were theatre utilization, waiting times for surgery, urgency of operations, departmental urgency case-mix, and theatre time needs assessment. [3]

A time-motion study established the baseline times for various stages of operating theatre activity. Standard benchmark time deviations were also derived. Operating theatre time utilization overall, and by individual departments was also calculated. The overall theatre time utilization was 58.56% for elective operations (Table 1) and 33.64% for emergency operations. [4]

Analysis and Results

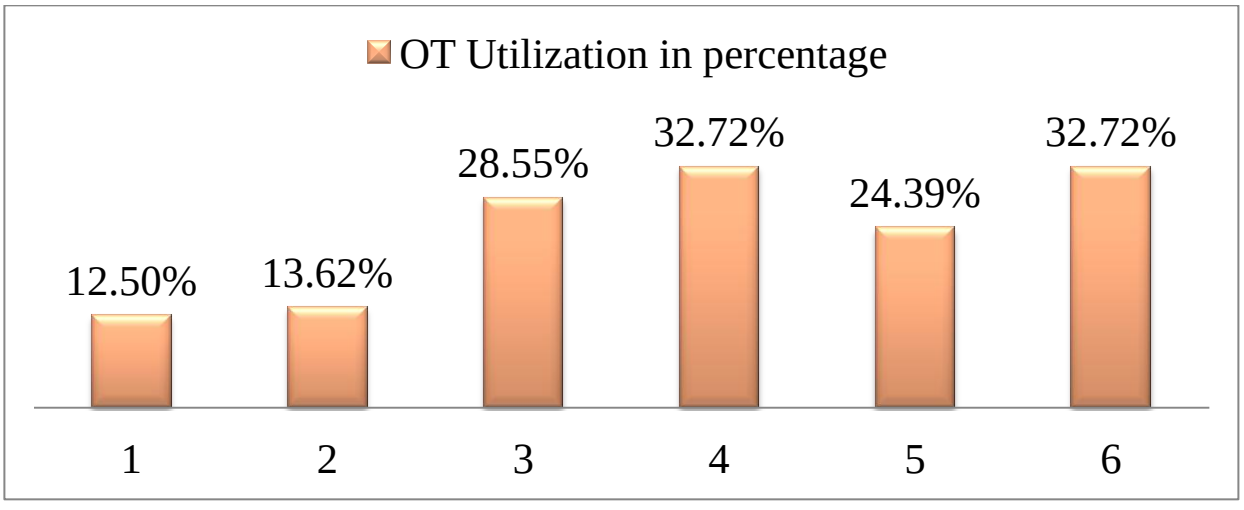
- Time study established average time required for pre-operative, operative and post-operative activities as follows:

Average preoperative Duration	Average Operative Duration	Average Postoperative Duration	Average Total Duration
24 min	1 hour 35 min	55 min	2 hour 55 min

- Time study was used to calculate OT utilization as follow:

OT No.	No. of Operations	Total hours utilized	Total hours available = 12 hrs / day * 8 days	OT Utilization in percentage
1	3	12 hours	96 hours	12.50%
2	18	13 hours 5min	96 hours	13.62%
3	14	27 hours 25 min	96 hours	28.55%
4	11	31 hours 25 min	96 hours	32.72%
5	21	23 hours 25 min	96 hours	24.39%
6	21	31 hours 25 min	96 hours	32.72%
Total	88	138 hours 45 min	576 hours	24.08%*

*Total OT suite utilization % (OT no. 1 to 6)



Graph 15: Graphical Representation of percentage of OT Utilization

Scheduling of OT:

Scheduling of operations is done manually as shown below:

Surgeon calls from OPD or IPD and books OT on telephone

⇩

Desk Monitor does necessary entry of OT booking in 'OT booking register'

⇩

RMO or Registrar fill up 'OT booking form' and sent it to OT with housekeeping staff

⇩

DM signs on OT booking form as received and OT booked

⇩

DM keeps white and red carbon copied forms with her and stores in 'OT booking form' file

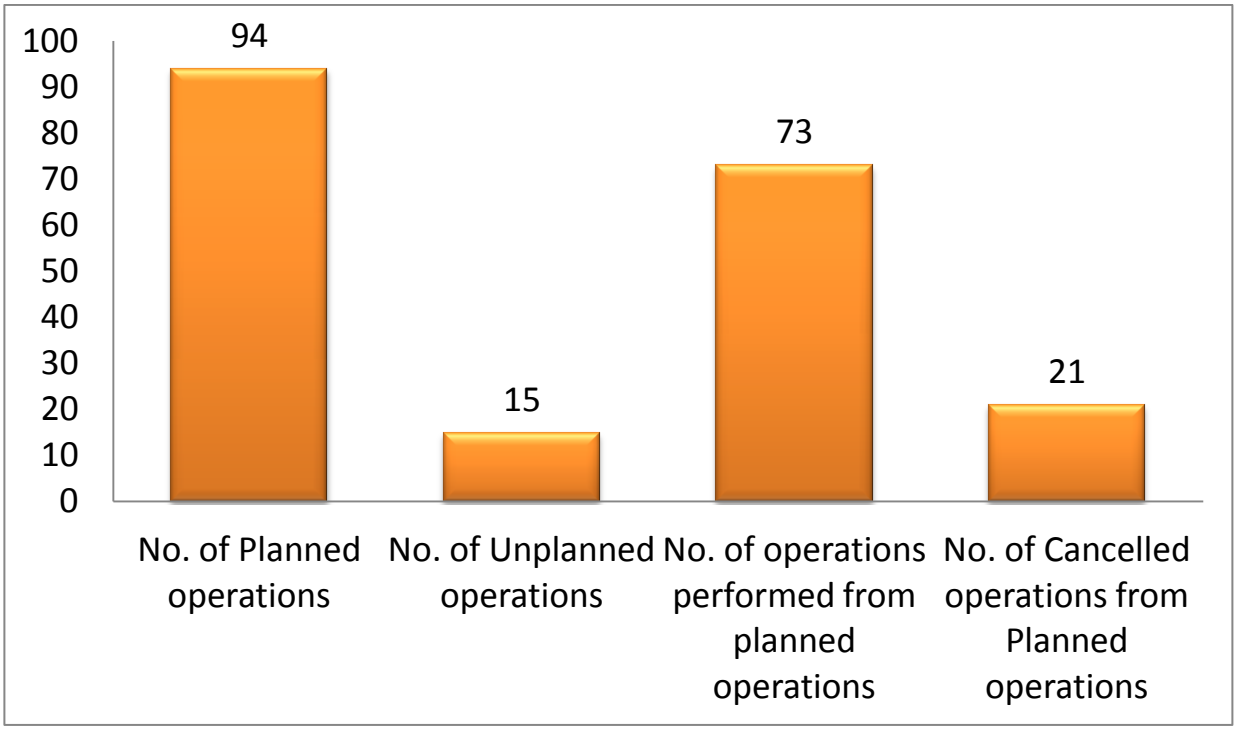
⇩

OT booking form book is returned to respective department

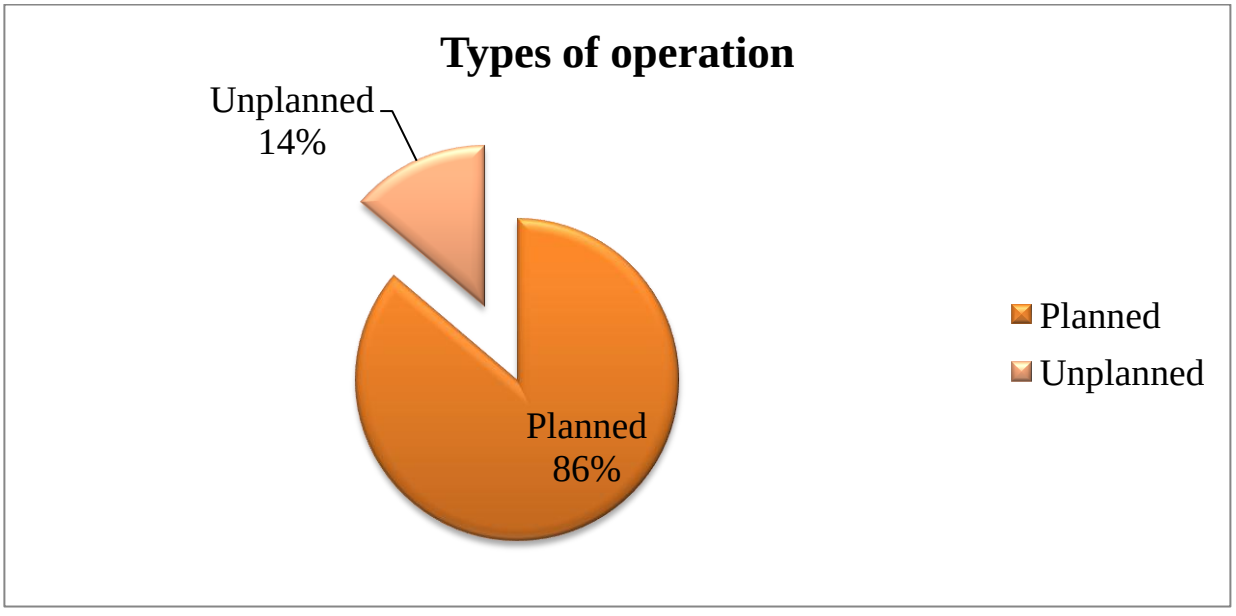
- This manual OT booking process causes wastage of time, paper and manpower. This process should be replaced by online OT booking in software.

- Motion study in OT established following findings:

A) Types of operations

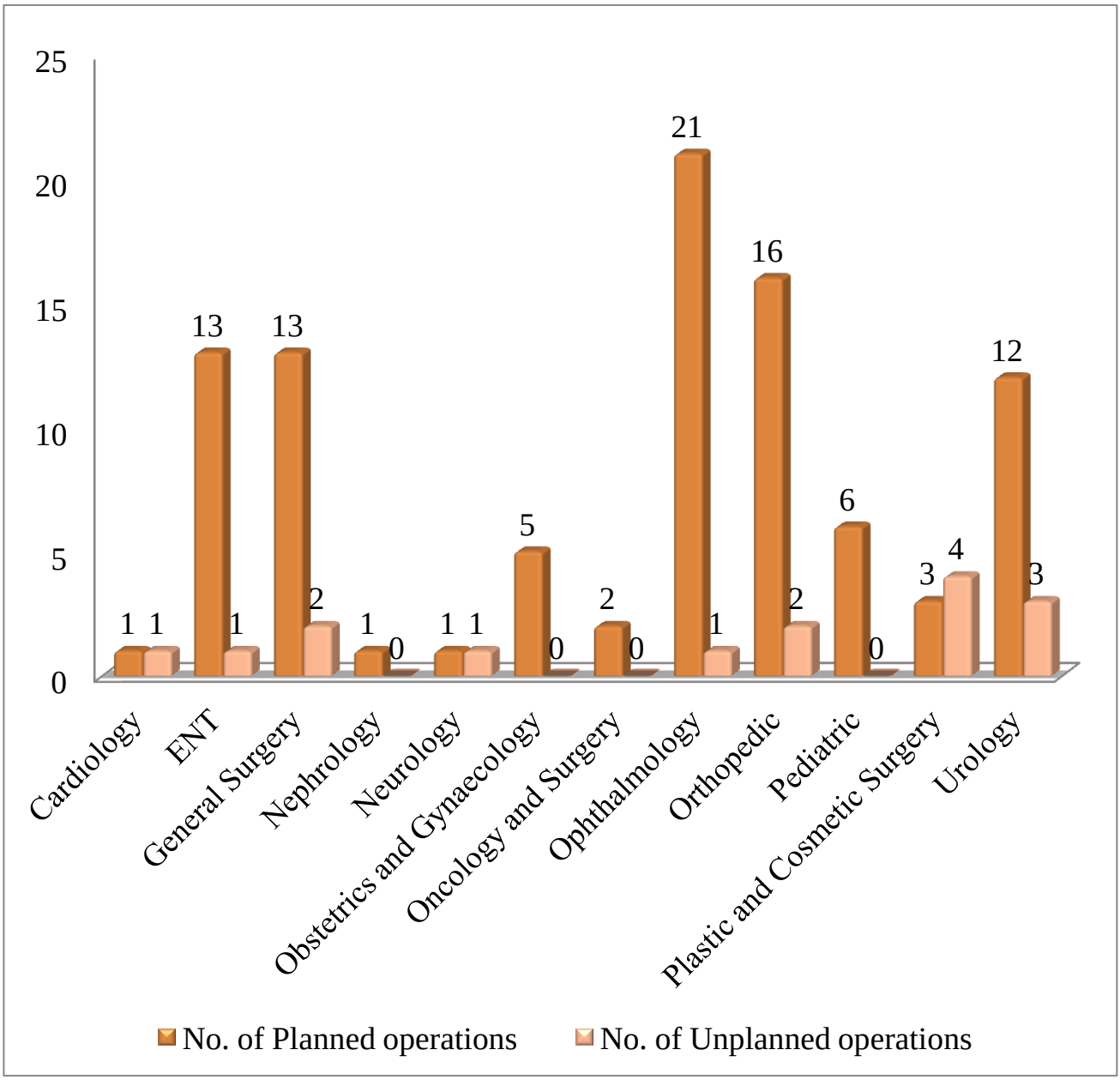


Graph 16: Graphical Representation of types of operation



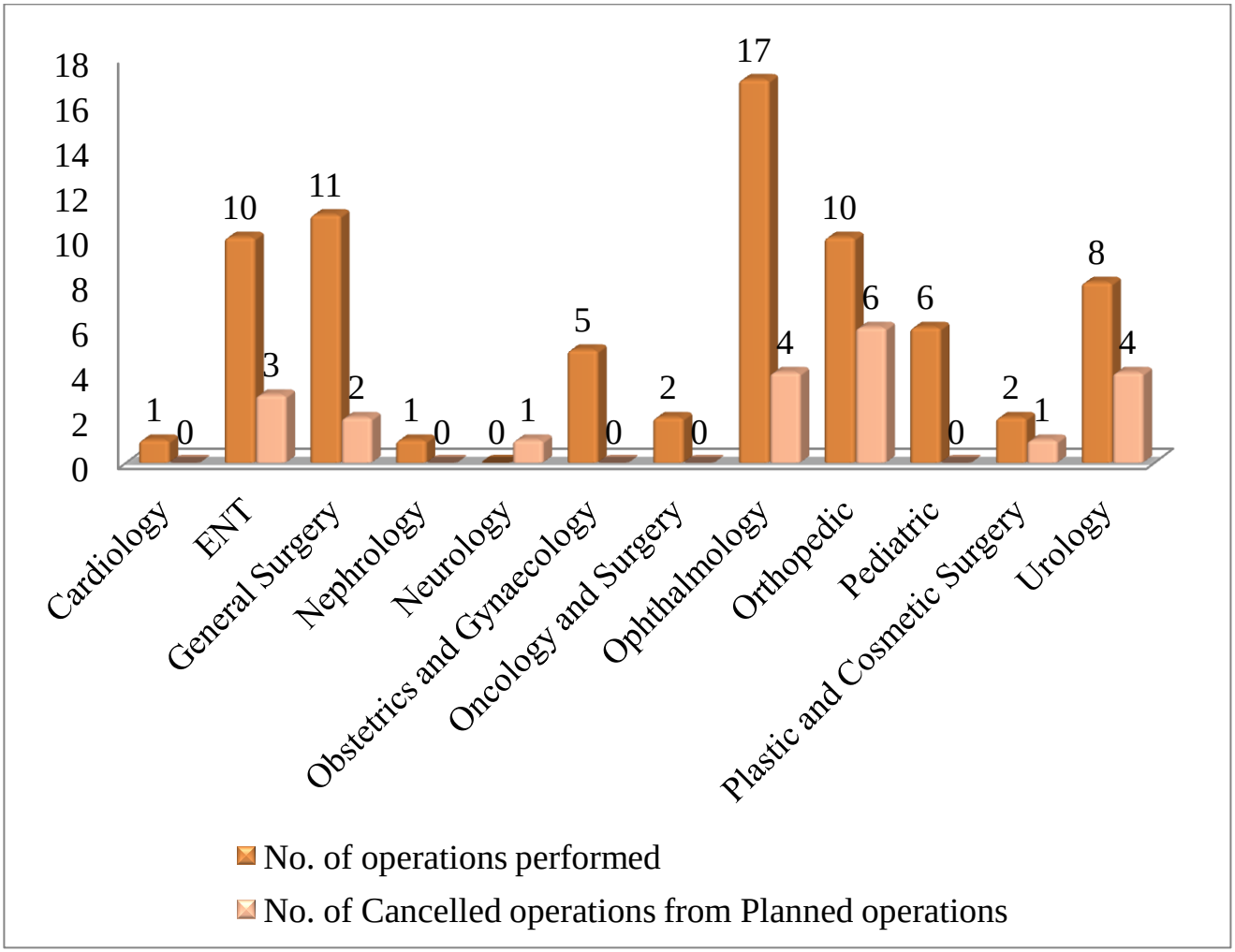
Graph 17: Graphical Representation of percentage of types of operation

B) Department wise number of planned and unplanned operations:



Graph 18: Graphical Representation of department wise number of planned and unplanned operations

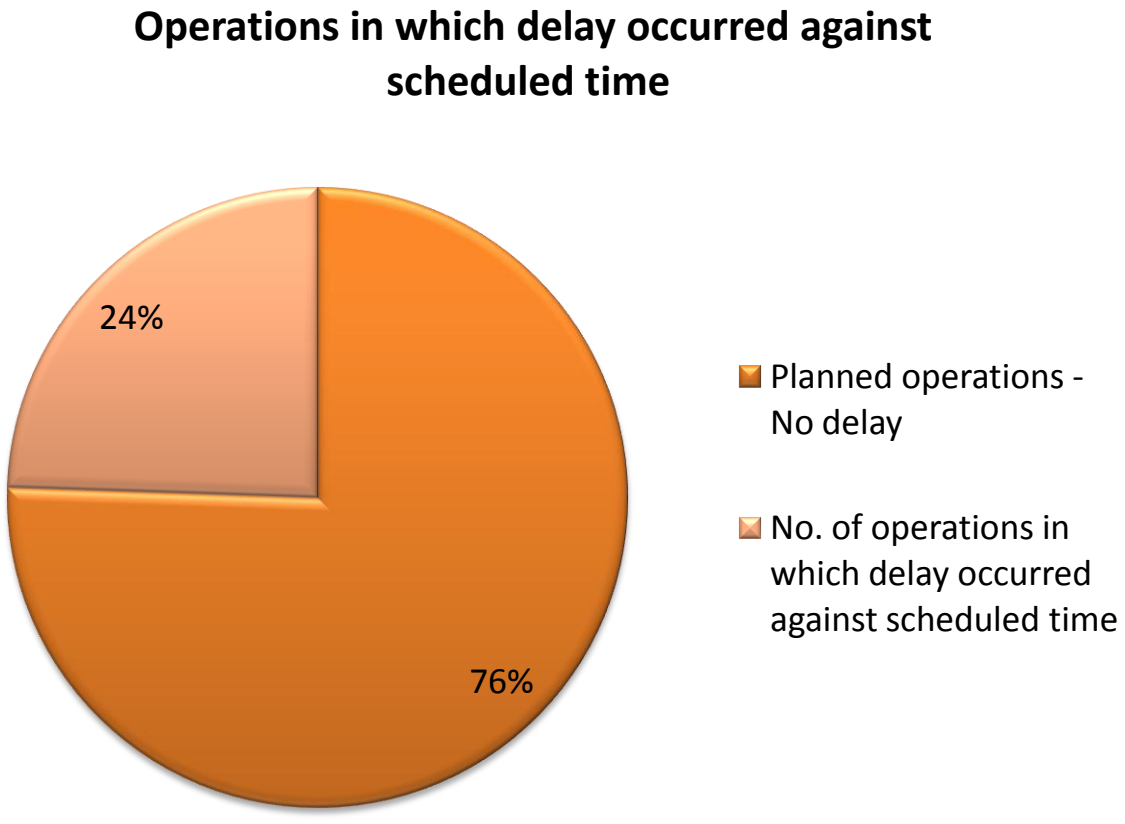
C) Department wise number of operations performed and cancelled:



Graph 19: Graphical Representation of department wise number operations performed and cancelled

D) Operations in which delay occurred against scheduled time:

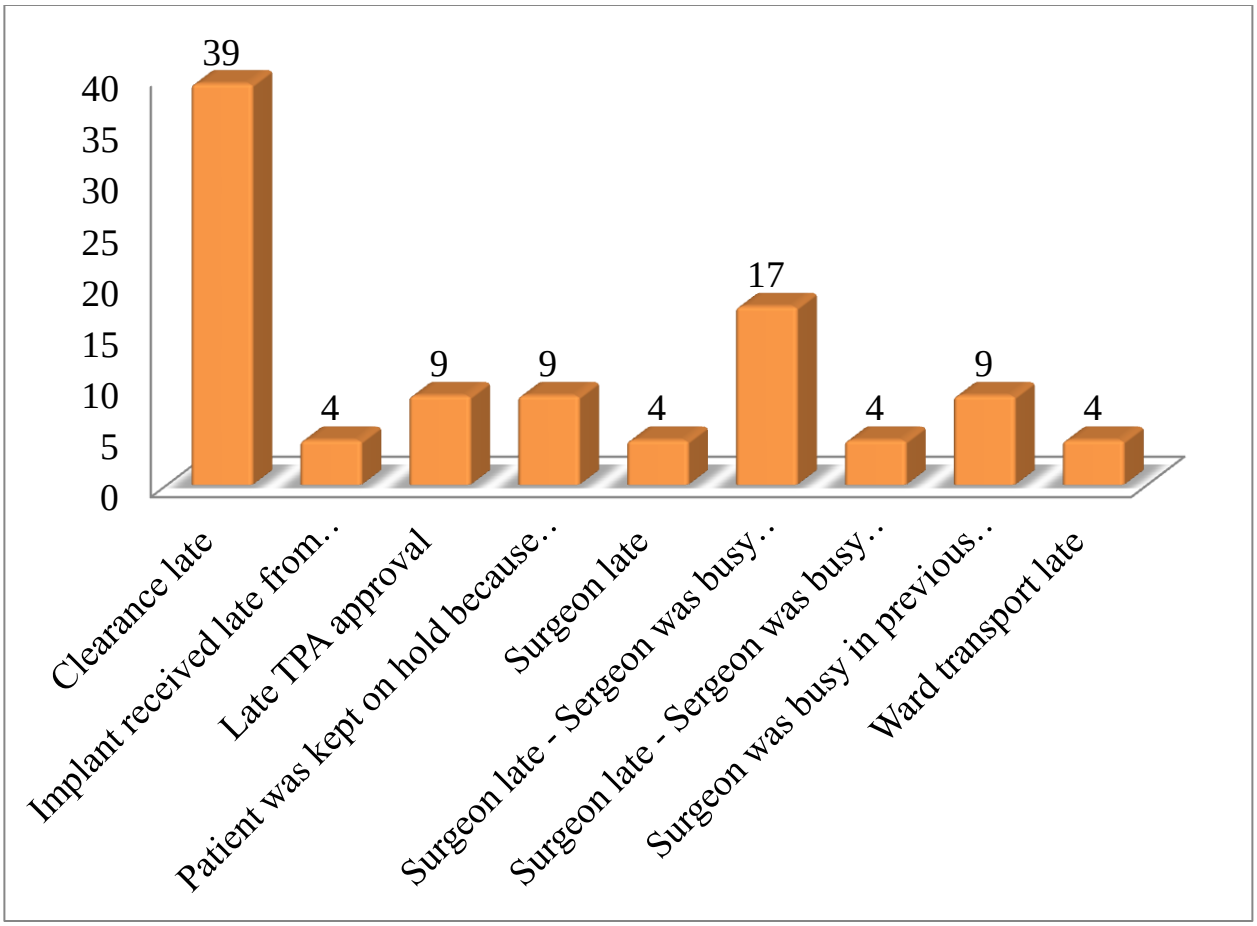
	Planned operations - No delay	No. of operations in which delay occurred against scheduled time	Total
Number	71	23	94
Percentage	76	24	100



Graph 20: Graphical Representation of operations in which delay occurred against scheduled time

E) Reasons for delay in operations:

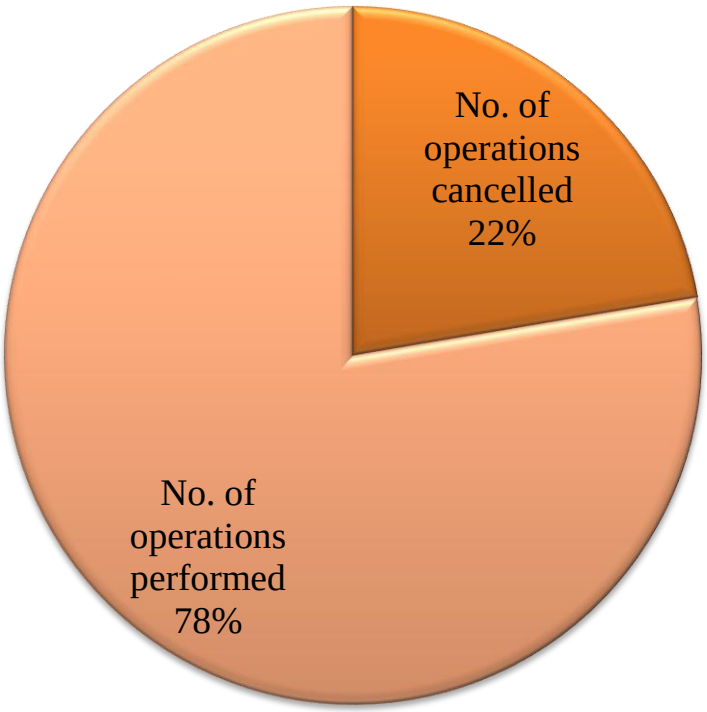
Reason for delay	No. of operations in which delay occurred from scheduled time	Percentage
Clearance late	9	39
Implant received late from provider and ward transport late	1	4
Late TPA approval	2	9
Patient was kept on hold because surgeon was busy in emergency operation	2	9
Surgeon late	1	4
Surgeon late - Surgeon was busy in OPD	4	17
Surgeon late - Surgeon was busy in OPD and BT, CT reports were awaited	1	4
Surgeon was busy in previous surgery	2	9
Ward transport late	1	4
Total	23	100



Graph 21: Graphical Representation of reasons for delay in operations

F) Number of operations cancelled of planned operations:

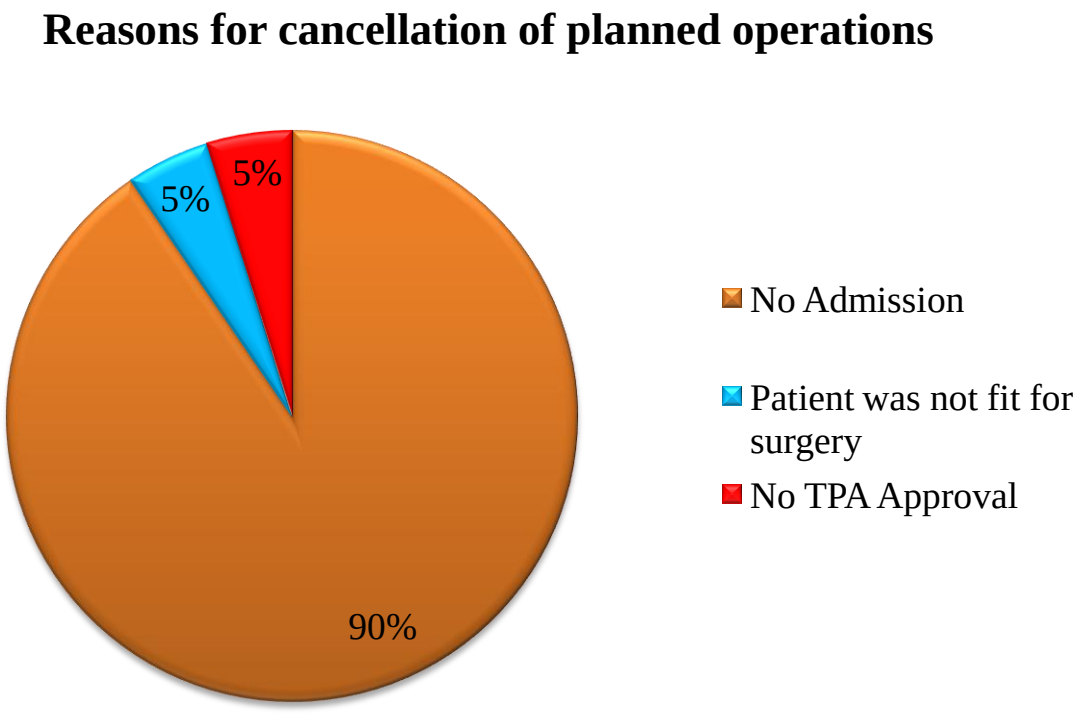
No. of operations cancelled	21	22
No. of operations performed	73	78
Total no. of planned operations	94	100



Graph 22: Graphical Representation of number of operations cancelled of planned operations

G) Reasons for cancellation of operations:

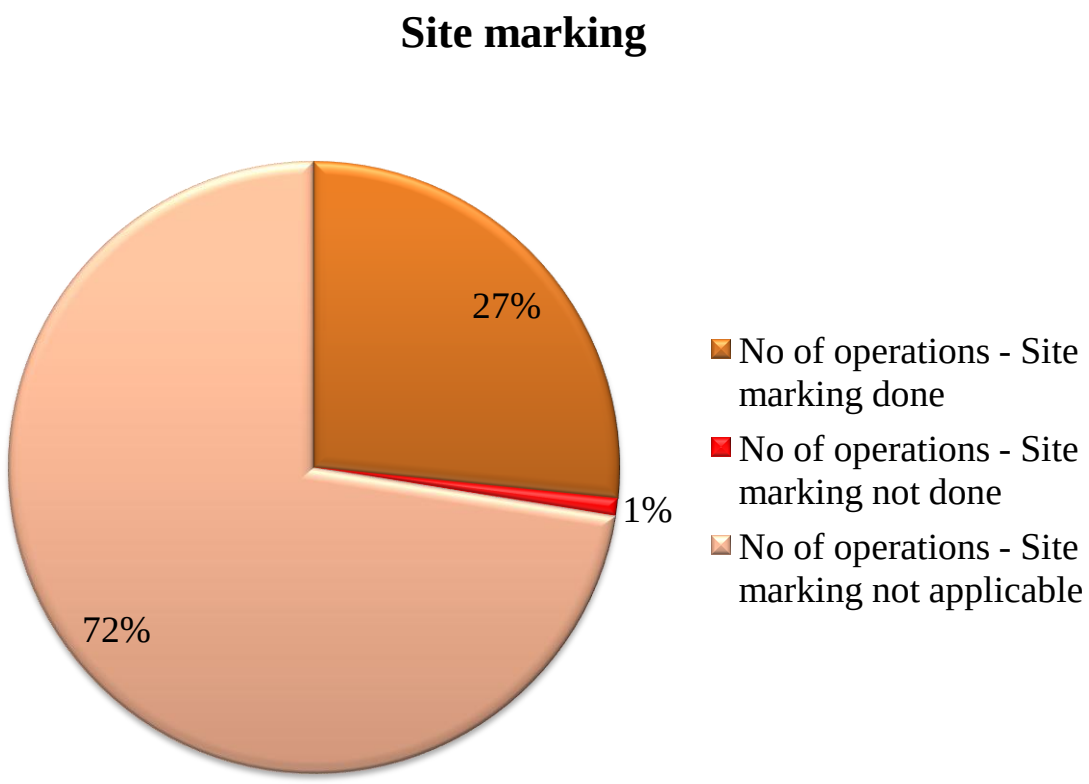
Reason for cancellation of planned operation	No. of operations	Percentage of Operations
No Admission	19	90
Patient was not fit for surgery	1	5
No TPA Approval	1	5
Total	21	100



Graph 23: Graphical Representation of reasons for cancellation of operations

H) Site marking:

No of operations - Site marking done	29	27
No of operations - Site marking not done	1	1
No of operations - Site marking not applicable	79	72
Total	109	100



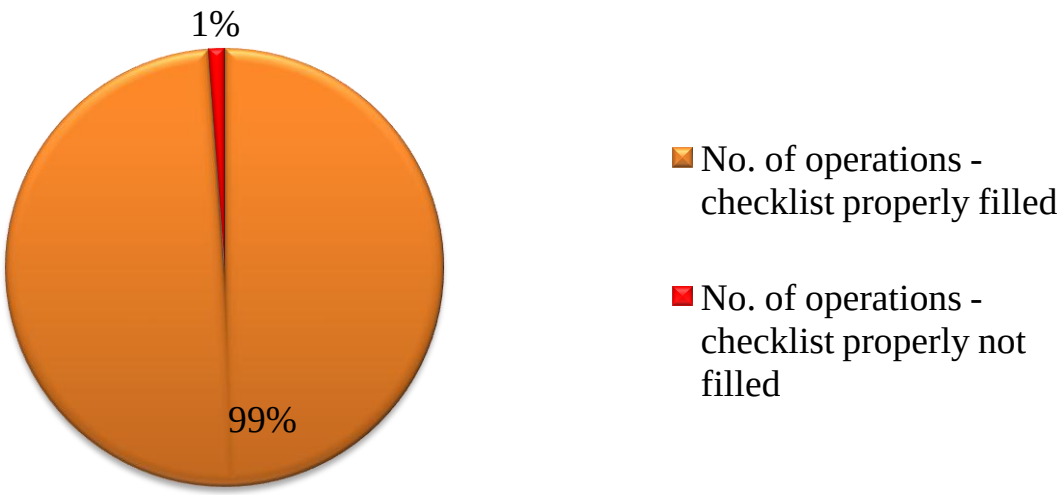
Graph 24: Graphical Representation of Site marking

I) Consent form for operation:

Consent form was filled and signed properly in all observed cases.

J) Pre-operative checklist:

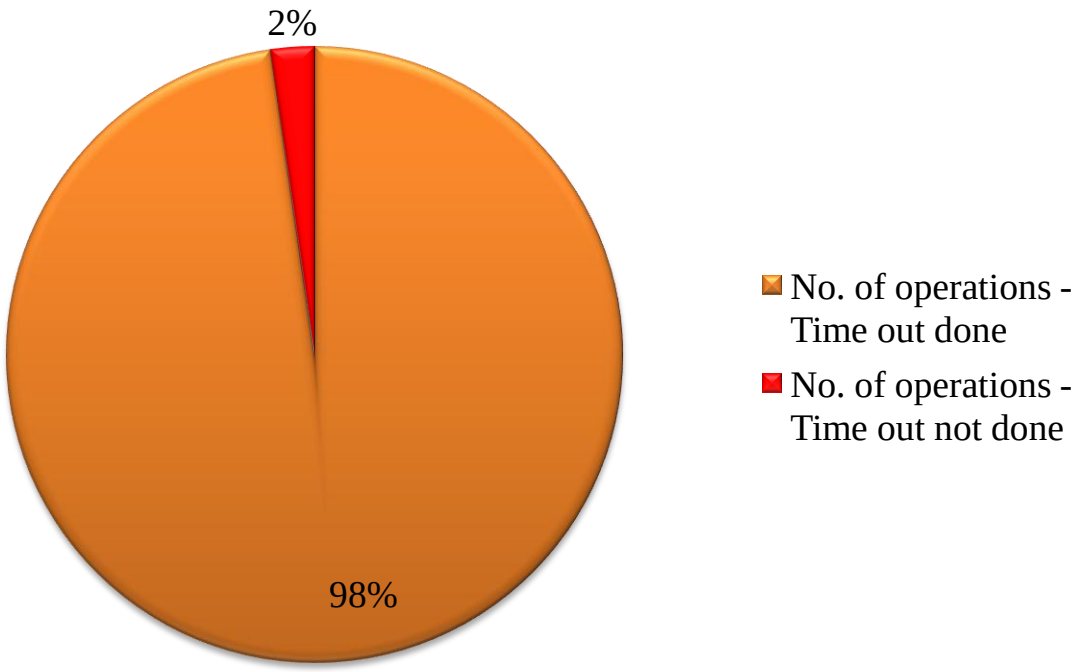
No. of operations - checklist properly filled	87	99
No. of operations - checklist properly not filled	1	1
Total	88	100
No. of cancelled operations	21	
Total	109	



Graph 25: Graphical Representation of number of operation in which Pre-operative checklist filled

K) Time-out:

No. of operations - Time out done	86	98
No. of operations - Time out not done	2	2
Total	88	100
No. of cancelled operations	21	
Total	109	



Graph 26: Graphical Representation of number of operation in which time-out done

Conclusions

- According to findings of study, the overall OT utilization rate is 24.08% which indicates OT utilization is less.
- Scheduling of operations is done manually and it's functioning is going on without any error because of less number of operations.
- It is found that delay in operations is occurring in 24% of operations and the most common reason is late clearance of operation charges.
- Around 22% operations of scheduled operations are cancelled and the main reason of cancellations is uninformed no admission for operation.
- SOP's of OT's are followed satisfactorily like filling up consent form, marking of side/site, filling up pre-operative checklist and doing time out .

Recommendations

- In any hospital, the OT is said to be the primary source of revenue generation with around 50-60 per cent of revenue earned just by this area. Therefore OT utilization in ABMH can be increased by increasing number of lucrative cases through marketing.
- Elective surgeries should be scheduled as a cluster on fixed days rather than spreading them over many days.
- The IT system like online software should be used for OT scheduling in order to reduce wastage of time, paper and manpower. Training for use of software should be given to RMO's, registrars and surgeons. There should be OT manager to look after smooth functioning of online OT scheduling.
- The major issues like delays in operations due to late arrival of patient to OT, delay in conduct of operation, transfer of the patients and last minute cancellations of operations should be promptly solved. These issues should be supervised and solved by OT manager.
- Theatre managers should monitor the actual use of operating room and co-ordinate with the surgeons, anesthetist and other theatre personnel.
- 'Multi tasking' of the staff in the OT should not be done. Senior nurse who looks after recovery of patient and monitoring in post-operative area and pre-operative area has to perform the duties of desk monitor which includes scheduling of OT's, attending telephone calls, coordinating with all staff to manage activities in OT, scheduling duties of nursing and OT technician staff and to look after all issues arising in OT. This leads to substandard and lowered quality of postoperative care and monitoring. These activities can be assigned to OT manager in order to reduce workload of desk monitor. Dedicated staff performing specific duties not only improves efficiency, but also increases job satisfaction.

- Operations should be performed back to back in specific OT's and should be shut down after completion of scheduled cases. The OT's which will not be in use should be shut down. This results in decreased stress on the infrastructure such as electrical power, air conditioning and laminar flow system. Not following this method results in unnecessary running of this essential equipment, which increases the running costs.

- Cancellation of surgery by patients without adequate notice is the main problem of intra-operative management. Non-attendance by patients for elective surgery leads to wasted theatre time and wasted resources. Confirmations should be done on telephone whether patient is going to attend operative or not. Patient should be encouraged to get admitted earlier well advanced before surgery for preoperative preparation and this should be managed by OT manager.

- If time is wasted between operations like due to late clearance of operation charges, the day's schedule is slowed down and later operations are delayed. The surgeons' time is wasted and they tend to come late, anticipating delays. The patients become more nervous waiting for their operations and more uncomfortable during the prolonged period without fluids. These all issues should be looked after by OT manager.

Limitations of Study

- Researcher had been allotted with Operation Theatre complex situated on first floor which contains 6 operation theaters. Time and Motion study was done only in Operation Theatre complex situated on first floor. It could not be done in operation theatres of gynecology & obstetrics, In-vitro fertilization and Accident & emergency operation theaters because they are situated on ground floor.

References

[1] http://en.wikipedia.org/wiki/Time_and_motion_study

[2] http://fhbgrants.netsoft.net/report/512018dr.pdf

[3] http://fhbgrants.netsoft.net/report/512018dr.pdf

[4] http://fhbgrants.netsoft.net/report/512018dr.pdf

Project on

‘ Operation Theatre Equipments Utilization Study’

Background

Equipment plays major role in hospital and health care services as an aid to health professionals, providing efficient diagnostic and therapeutic tools to make the identification of the disease problem and their cures accurately and appropriately.

The operation theatre of a hospital is a complex workshop and the most important facility of the hospital. It is said to be the primary source of revenue generation with around 50-60 per cent of revenue earned just by this area. The equipments present here ranges from simple items to sophisticated ones. It requires maximum utilisation and appropriate management of these medical equipments to ensure optimum cost-benefit.

Effective management and efficient maintenance of the equipments in operation theatre has deep economical impact on the hospital and is vital for smooth functioning of the operation theatre.

The need for taking up this project is to the find out the capacity utilization of the equipment in operation theatres in Aditya Birla Memorial Hospital, Pune.

Aim

To evaluate the utilization of critical equipments in OT at ABMH and provide suggestion to increase their use and thus increase revenue from equipments

Objectives

- To find the capacity utilization rate of critical equipments in the operation theatre complex.
- To provide recommendations.

Equipments taken for study

C-arm Arcadis old	Heart Lung Machine 1
C-arm Mobil New	Heart Lung Machine 2
Harmonic Scalpel	Intra Aortic Balloon Pump
Ligasure	Activated Clotting Time
Video Trolley 1	Stryker Saw Cardiac
Video Trolley 2	Octopus
Video Trolley 3	Head Light Luxtek 1 and 2
Surgical Microscope ENT	Swiss Lithoclast Master
Surgical Microscope Neurology	Temperature Control Monitor 1
Surgical Microscope Ophthalmology	Temperature Control Monitor 2
Laser Urology	TCM Warm Touch
Drill Machine-ENT	TCM Bair Hugger
Drill Machine-Neuro-Codman	Phaco machine
Drill Machine-Neuro-Manman	Vitrectomy machine
Drill Machine-Ortho Manman	Shaver Ortho
Drill Machine-Ortho AO	Intelligent Tourniquet
Drill Machine-Ortho Stryker	Pulse Lavage (Irrigation machine)

Liposuction Trolley	Micro debrider

Study Area and Type

- **Study Area:** Operation Theatre Complex, ABMH, Pune.
- **Study Type:** Non-intervention prospective study and Descriptive case study

Study Population and Size

- **Study Population:** Operations performed in OT complex (OT No. 1 to 6) from 7 AM to 7PM over period of 13 working days from date 11/05/2013 to 25/05/2013 includes both planned, unplanned and emergency operations.
- **Sampling Method:** Non-probability Simple random sampling
- **Sample Size:** 131 operations
- **Percentage of sample size of total no. of operations performed:**

Total No. of operations from 11/05/2013 to 25/05/2013	Sample size	Percentage of sample size of total no. of operations performed
162	131	80.86%

Data Collection Tool and Technique

- **Data Collection Tool:** MS Excel sheet was prepared to note down observations.
- **Data Collection Technique:**

  - Primary data
  - Observations
  - Informal interviews with staff
  - Secondary data: Operation theatre registers

Review of Literature

Equipment utilization is the percentage of time the equipment is performing its intended function during a specified time period. Utilization essentially means the use of the equipment to its full potential. Utilization index or use coefficient is one of the important parameters to monitor the functional status of the equipment. It is the parameter to assess the productivity of a service or equipment. [1]

Hospital equipment can be broadly classified into:

• Biomedical equipment

• Laboratory equipment

• Ward equipment

• Service support equipment

• Utilities and hospital furniture

All these account for a major part of any hospital project cost, which could go up to almost 60 percent. Of this, biomedical equipment could account for nearly 50 percent of the cost. Keeping this in view, it is essential to ensure maximum utilization of the equipment with minimum downtime. With the adaptation of proper maintenance techniques and management systems one can utilize resources optimally and reduce the breakdown and related maintenance workload. It should be an earnest endeavor of the management and users to optimize the equipment utilization to obtain maximum return on capital invested. In an era of cost-intensive medical care, every equipment being installed in healthcare institutions need to be fully and properly utilized.

In production, an increase of utilization will require more preventative maintenance and more wear and tear on the machine. Sometimes it is more economical to buy

new equipment, but increasing the utilization of the current equipment is usually the most practical.

An optimum utilization of equipment will result in:

- Optimal patient handling and rapid turnover
- Minimum possible cost
- Quality patient care and satisfaction [2]

Use Co-efficient is applied to assess the utilization of equipment is optimally utilized or under utilized. Use Co-efficient of equipment may be measured by the following formula.

Use co-efficient % = (N/M)*100

where N is average no. of hours the equipment is used per day. where M is maximum number of hours the equipment can be used per day.

If the use co-efficient is less than 50%, it is considered to be underutilized and hence a bad investment. However, life saving equipment cannot be subjected to this kind of assessment. [3]

Equipment Utilization Rate Formula

OT equipment utilization can be calculated from below mentioned formula:

Equipment utilization rate =

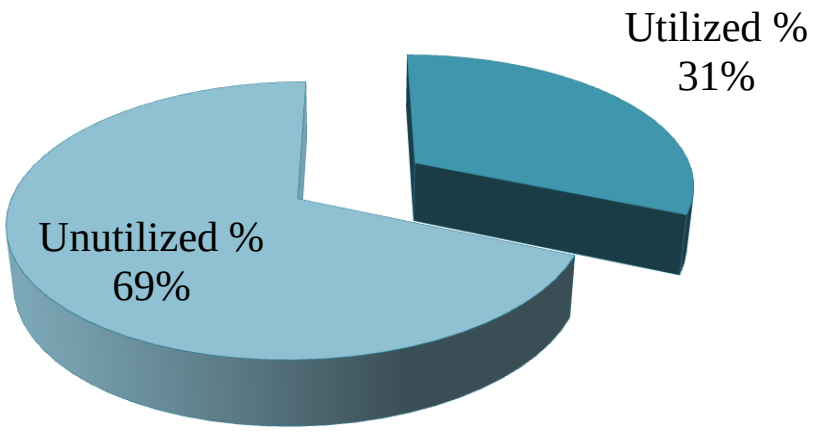
$$\frac{\textbf{Total no. of hours the equipment is used} \times 100}{\textbf{Total no. of hours the equipment can be used}}$$

Analysis and Interpretation

1. C-arm Siemens Arcadis (Old)Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
29	49	156	31	69

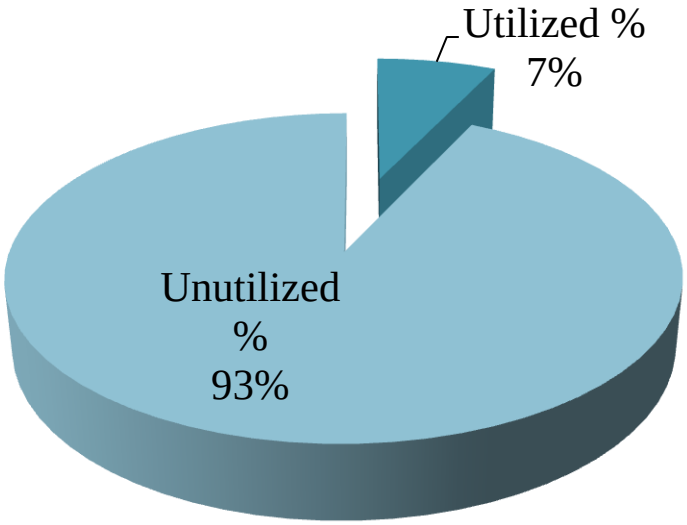


Graph 27: Graphical Representation of C-arm Siemens Arcadis (Old) Utilization Rate

2. C-arm Siemens Multimobil 5E (New) Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
6	11	156	7	93



Graph 28: Graphical Representation of C-arm Siemens Multimobil 5E (New) Utilization Rate

Comparison between C-arm Siemens Arcadis and C-arm Siemens Multimobil 5E:

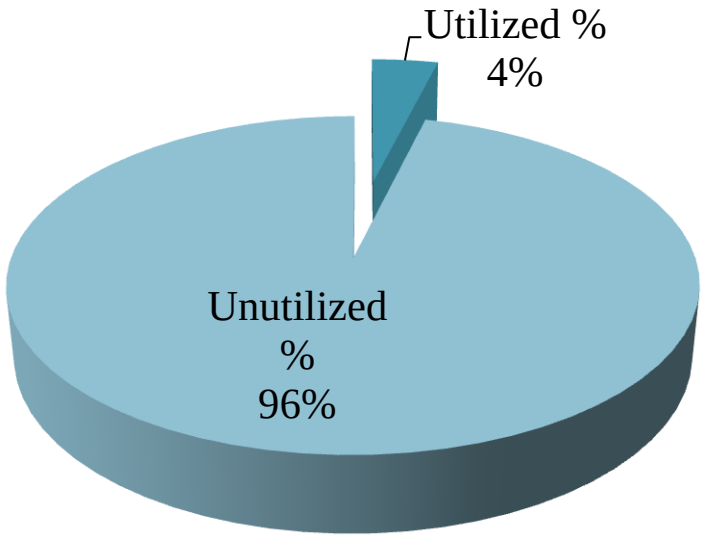
C-arm Siemens Arcadis (Old)Utilization	C-arm Siemens Multimobil 5E (New)
1. Clarity of images is good.	1. Clarity of images is not good.
2. Handling of c-arm is very easy and smooth for OT Technician at the time of operation.	2. Handling of c-arm is difficult for OT Technician at the time of operation.
3. Locking system of c-arm is very good.	3. Locking system of c-arm is malfunctioned. It does not get locked properly. There is risk of trauma to patient on operation table due to this malfunctioning.
4. It has both hand and foot switch to shoot radiation. It just requires single press for clear image.	4. It has only foot switch functioning to shoot radiation. Hand switch is not functioning because it is not compatible with system. OT Technician has to keep foot switch pressed until image becomes clear on monitor. This may cause additional exposure of patient to radiation.
5. It has facility of storage of all patient's data and images. If a patient demands films of the images taken during operation and the final images after completion of operation like implants of orthopedics or stent implanted, with the help of this record films can be provided to patients.	5. This C-arm has no facility of storage of patient's data and images. Therefore, if a patient demands films of the images taken during operation and the final images after completion of operation like implants of orthopedics or stent implanted. It is not possible to provide films. For this,

Therefore surgeons give preference to this C-arm Siemens Arcadis over C-arm Siemens Multimobil 5E.	patient has to undergo x-ray investigation again. Therefore surgeons don't prefer to use this c-arm
6. This c-arm is frequently used.	6. This c-arm is rarely used

3. Activated Clotting Time Utilization rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
1	6	156	4	96

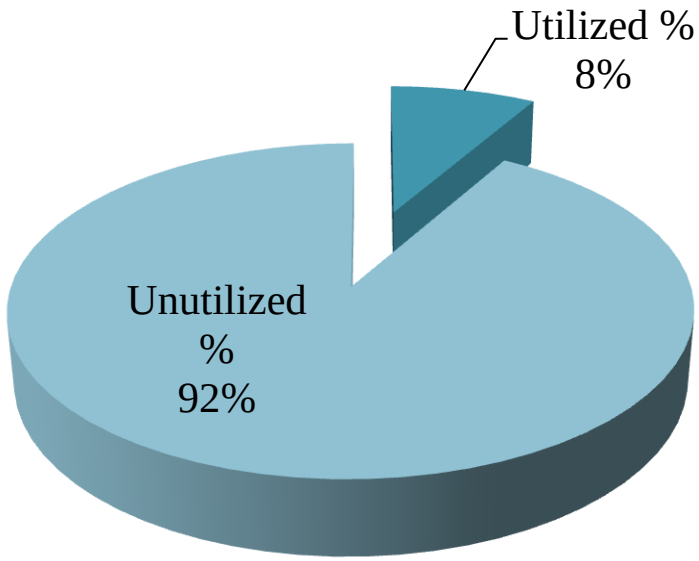


Graph 29: Graphical Representation of Activated Clotting Time Utilization rate

4.Drill Machine – ENT Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
4	13	156	8	92



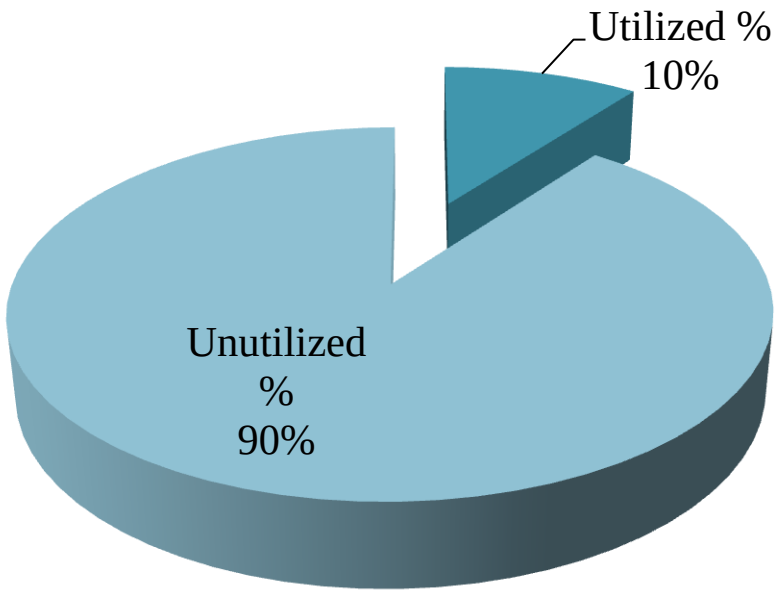
Graph 30: Graphical Representation of Drill Machine – ENT Utilization Rate

5. Drill Machine – Codman – Neurology Utilization Rate:



Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
3	16	156	10	90

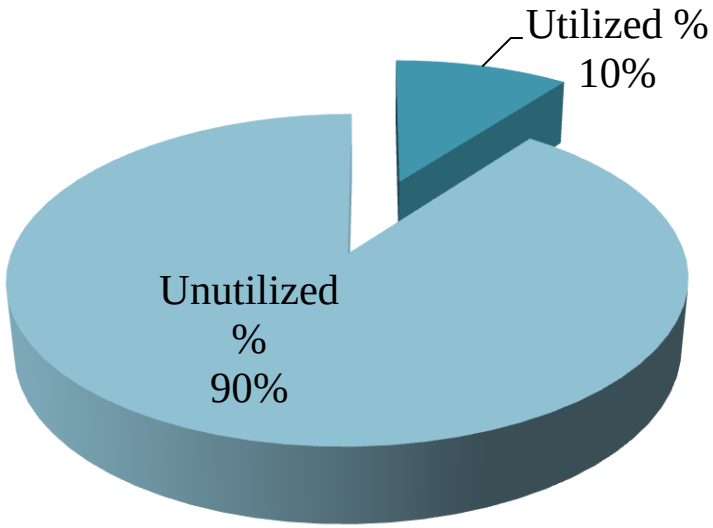


Graph 31: Graphical Representation of Drill Machine – Codman – Neurology Utilization Rate

6. Drill Machine – Manman – Neurology Utilization Rate :

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
3	16	156	10	90

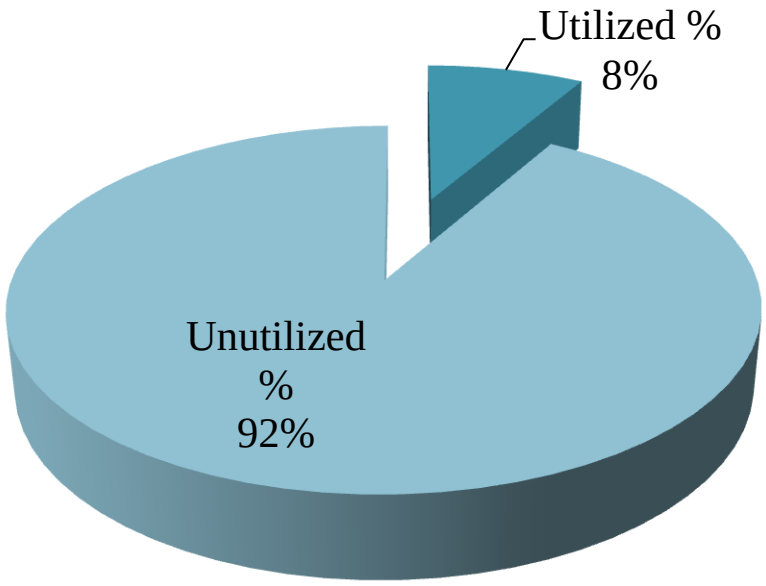


Graph 32: Graphical Representation of Drill Machine – Manman – Neurology Utilization Rate

7. Drill Machine - AO – Orthopedic Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
8	13	156	8	92

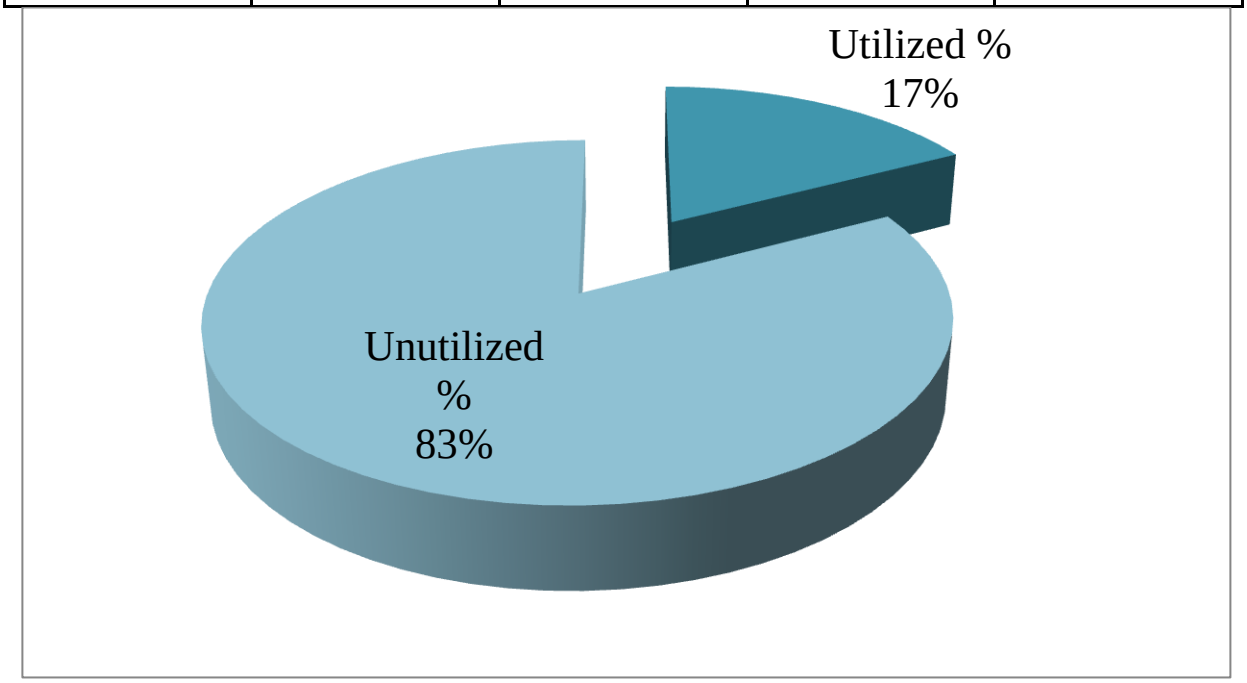


Graph 33: Graphical Representation of Drill Machine - AO – Orthopedic Utilization Rate

8. Drill Machine – Stryker – Orthopedic Utilization Rate:

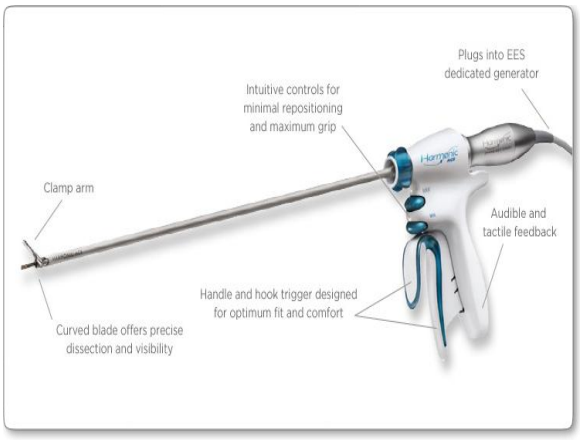
Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
8	27	156	17	83

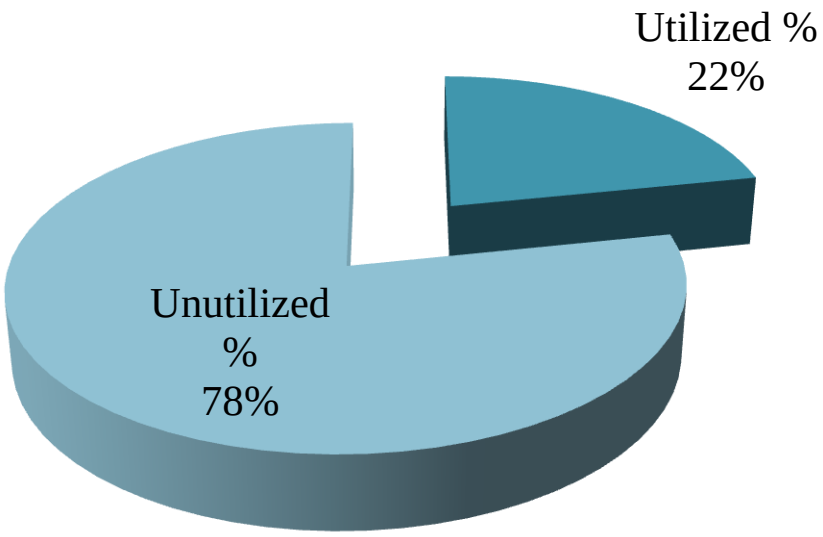


Graph 34: Graphical Representation of Drill Machine – Stryker – Orthopedic Utilization Rate

9. Harmonic Scalpel Utilization Rate:



No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
13	34	156	22	78

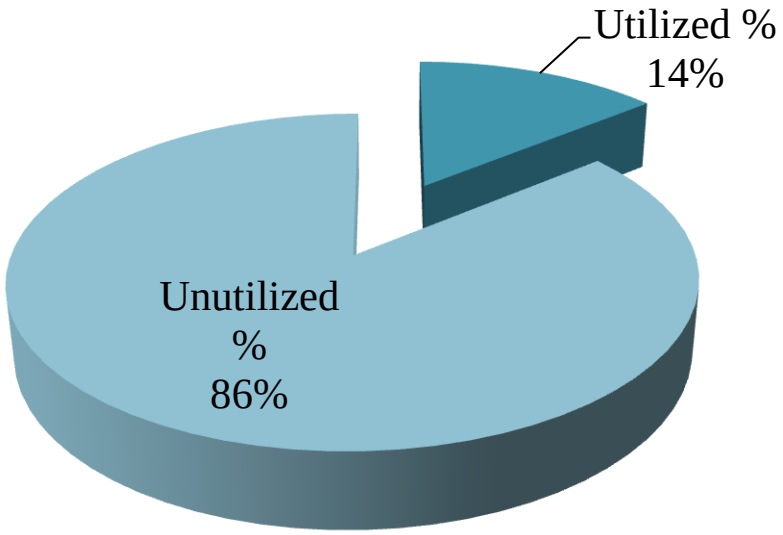


Graph 35: Graphical Representation of Harmonic Scalpel Utilization Rate

10. Head Light Luxtek 1 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
8	22	156	14	86

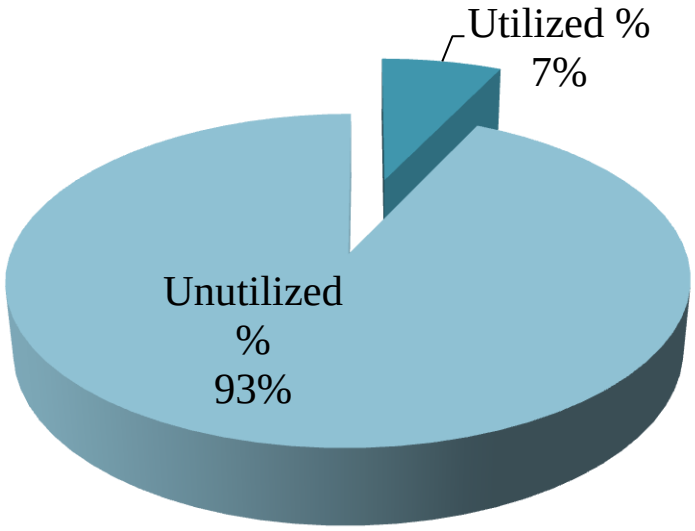


Graph 36: Graphical Representation of Head Light Luxtek 1 Utilization Rate

11. Head Light Luxtek 2 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
3	11	156	7	93

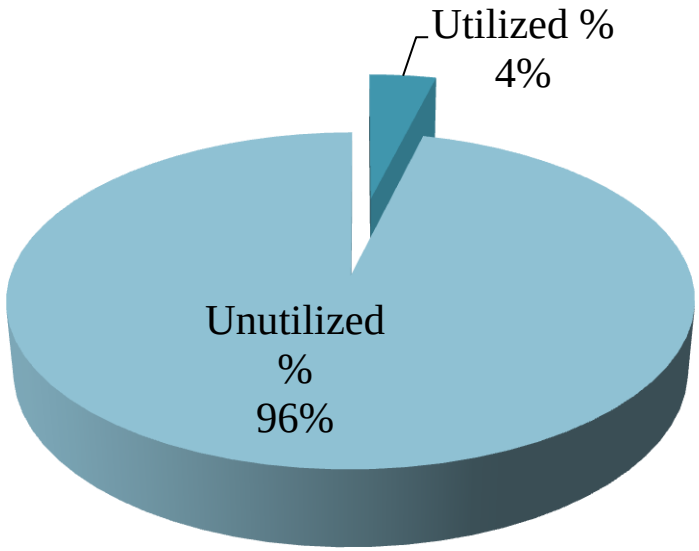


Graph 37: Graphical Representation of Head Light Luxtek 2 Utilization Rate

12. Heart Lung Machine 1 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
1	6	156	4	96

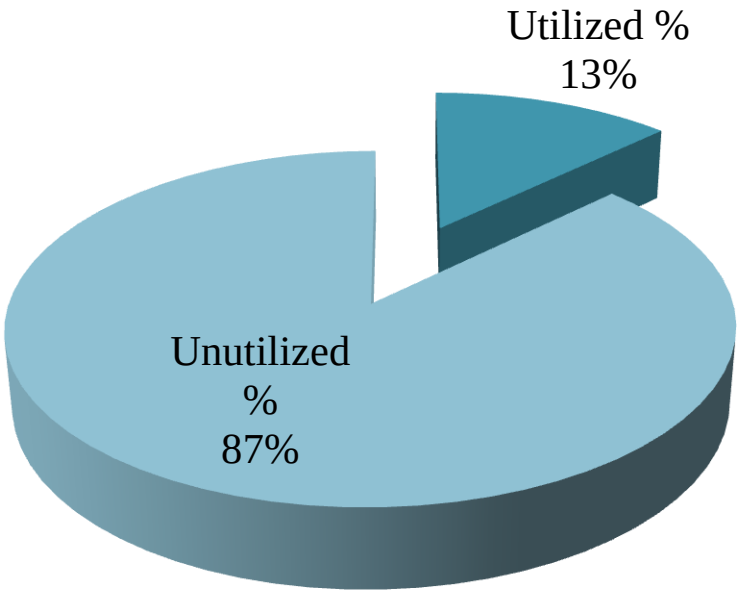


Graph 38: Graphical Representation of Heart Lung Machine 1 Utilization Rate

13. Intelligent Tourniquet Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
7	20	156	13	87

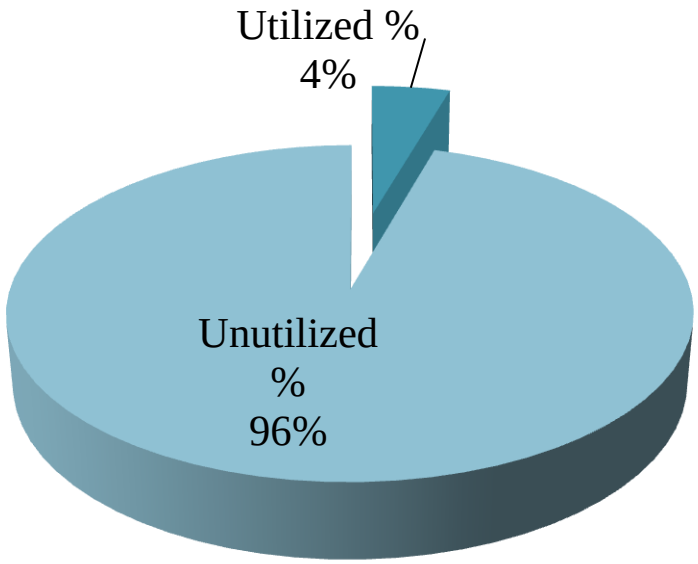


Graph 39: Graphical Representation of Intelligent Tourniquet Utilization rate

14. Laser Urology Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
5	7	156	4	96

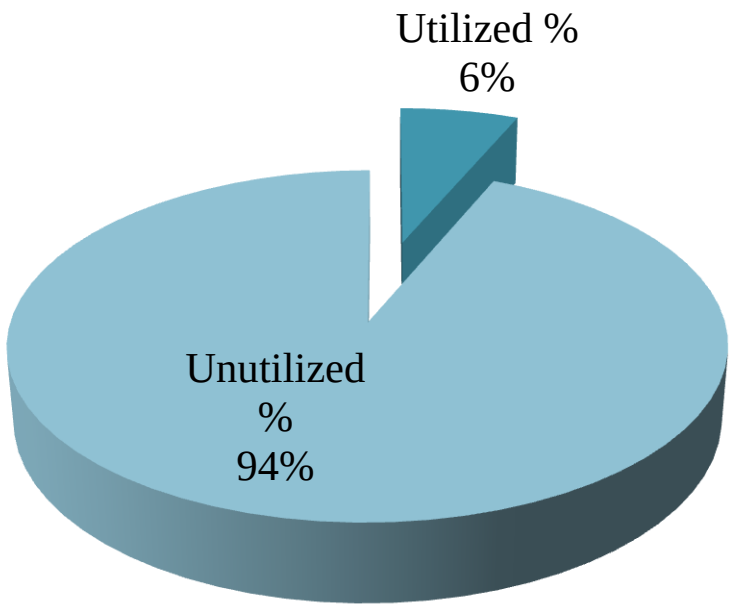


Graph 40: Graphical Representation of Laser Urology Utilization rate

15. Micro Debrider Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
6	10	156	6	94

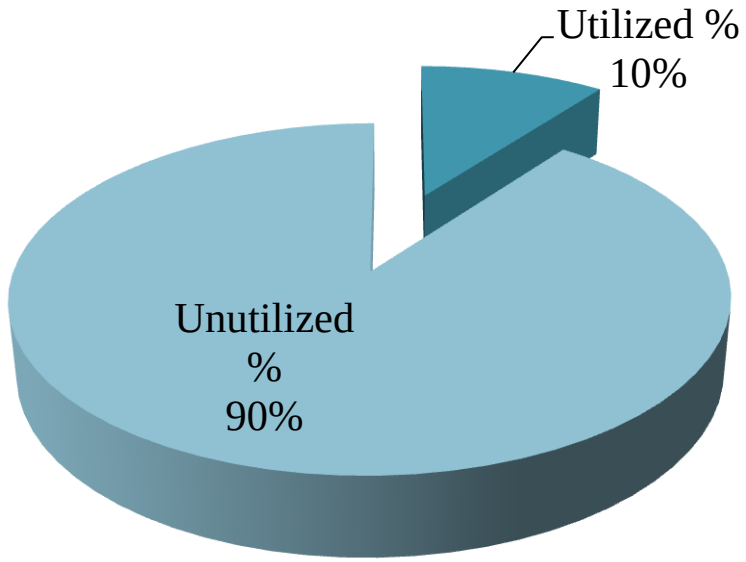


Graph 41: Graphical Representation of Micro Debrider Utilization Rate

16. Phaco machine Utilization Rate:

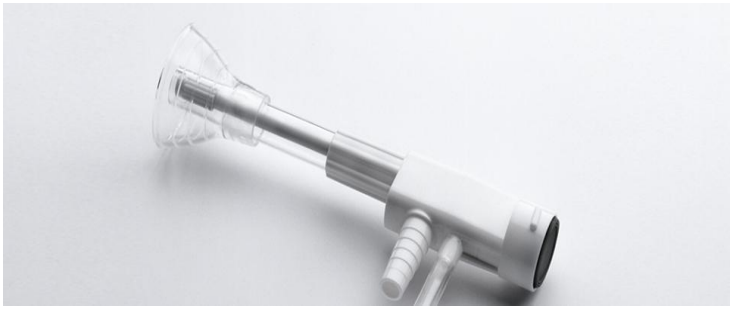
Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
27	16	156	10	90

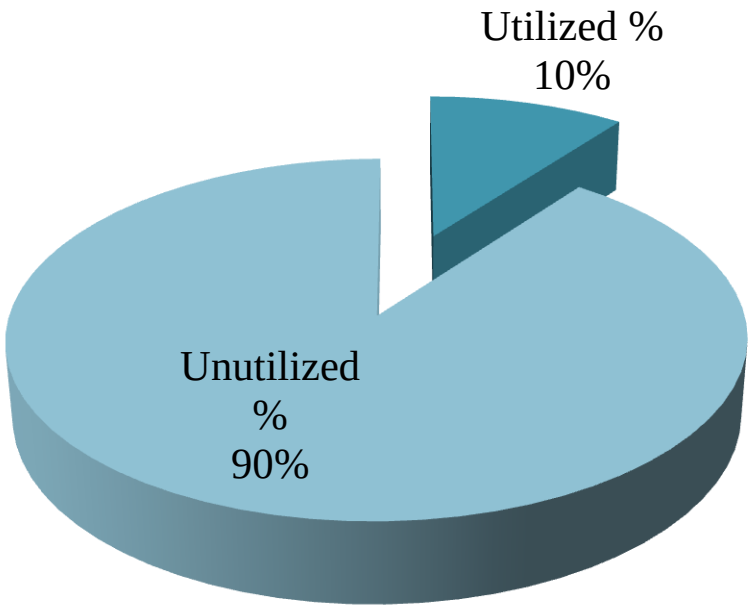


Graph 42: Graphical Representation of Phaco machine Utilization Rate

17. Pulse Lavage Utilization Rate:



No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
4	16	156	10	90

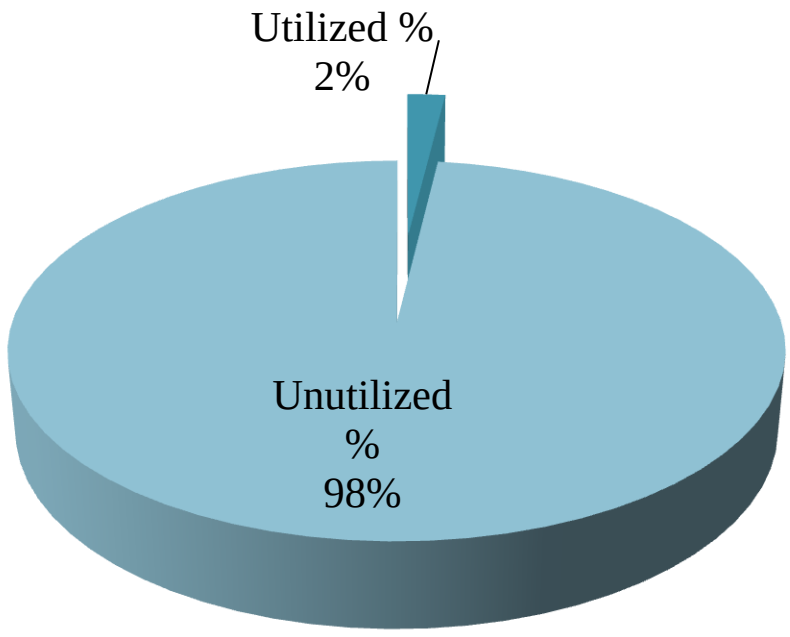


Graph 43: Graphical Representation of Pulse Lavage Utilization Rate

18. Shaver Ortho Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
1	3	156	2	98

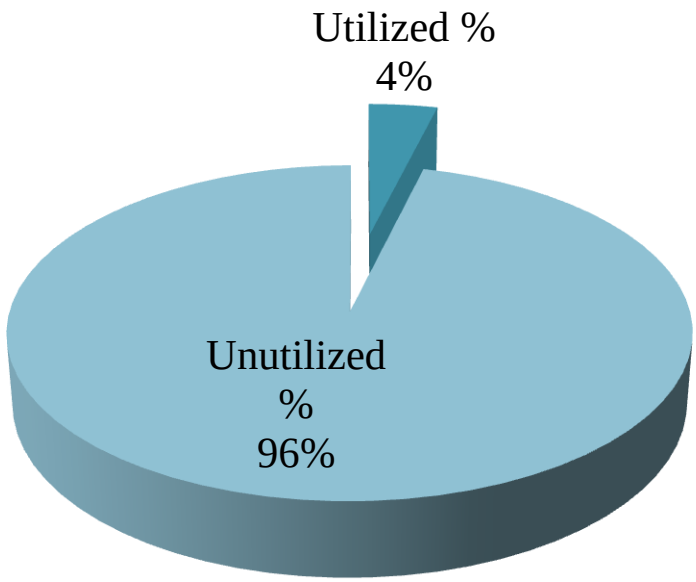


Graph 44: Graphical Representation of Shaver Ortho Utilization Rate

19. Stryker Saw Cardiac Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
1	6	156	4	96

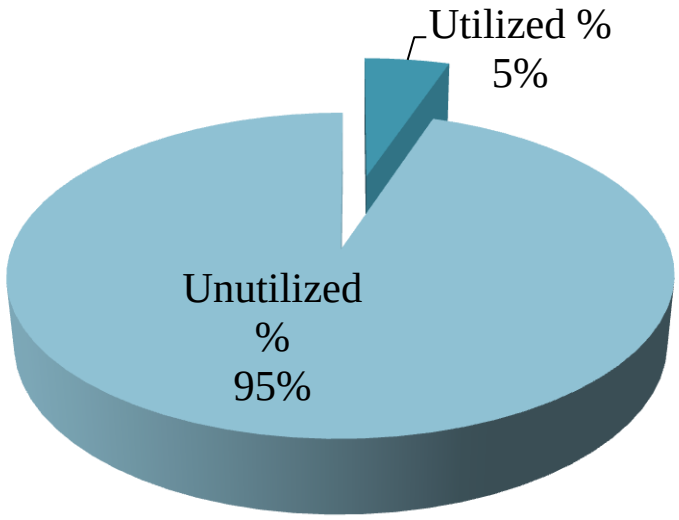


Graph 45: Graphical Representation of Stryker Saw Cardiac Utilization Rate

20. Surgical Microscope ENT Utilization Rate:

Findings:

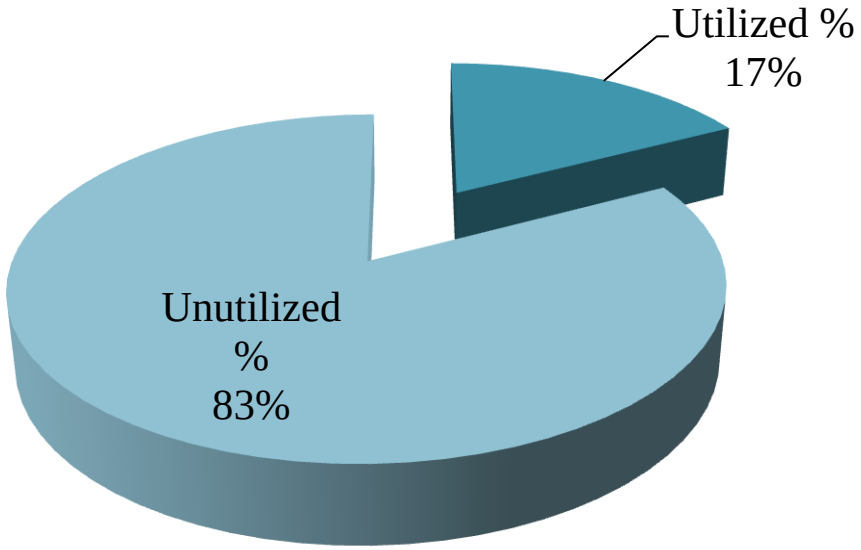
No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
4	8	156	5	95



Graph 46: Graphical Representation of Surgical Microscope ENT Utilization Rate

21. Surgical Microscope Neurology Utilization Rate:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
5	27	156	17	83

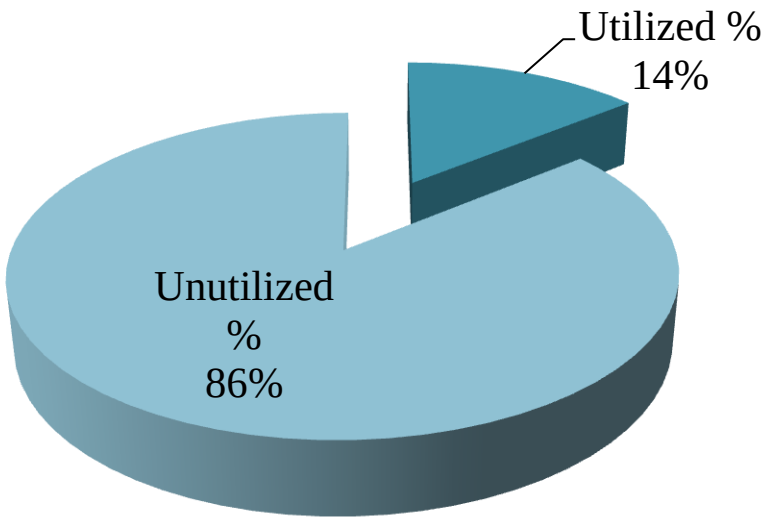


Graph 47: Graphical Representation of Surgical Microscope Neurology Utilization Rate

22. Surgical Microscope Ophthalmology Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
30	22	156	14	86

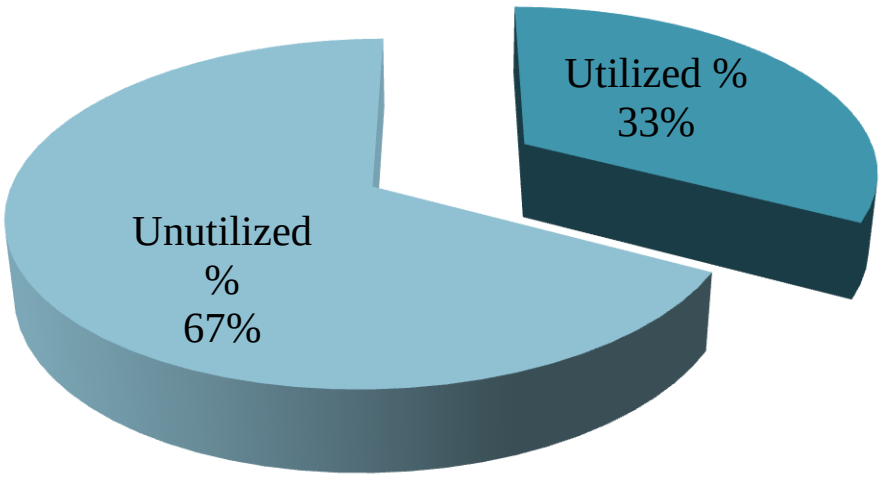


Graph 48: Graphical Representation of Surgical Microscope Ophthalmology Utilization Rate

23. TCM (Temperature Control Monitor) Bair Hugger Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
13	51	156	33	67

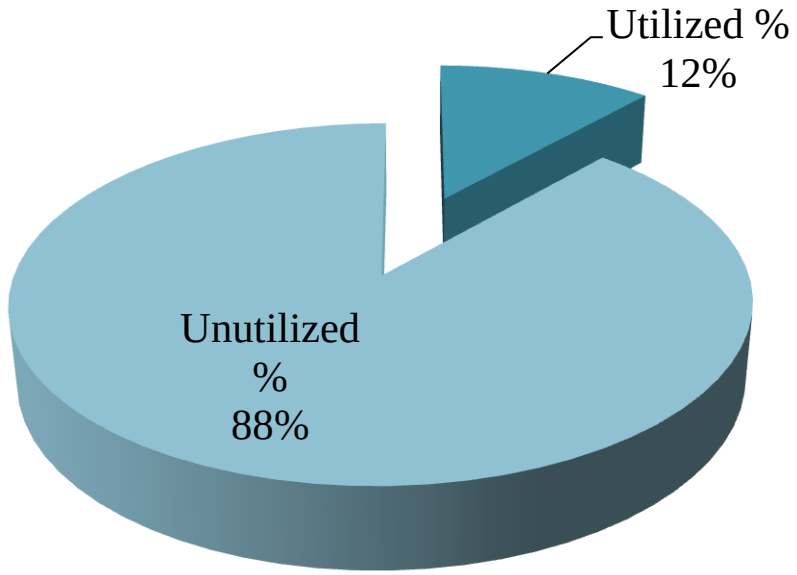


Graph 49: Graphical Representation of Bair Hugger Utilization Rate

24. TCM (Temperature Control Monitor) Warm Touch Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
6	18	156	12	88

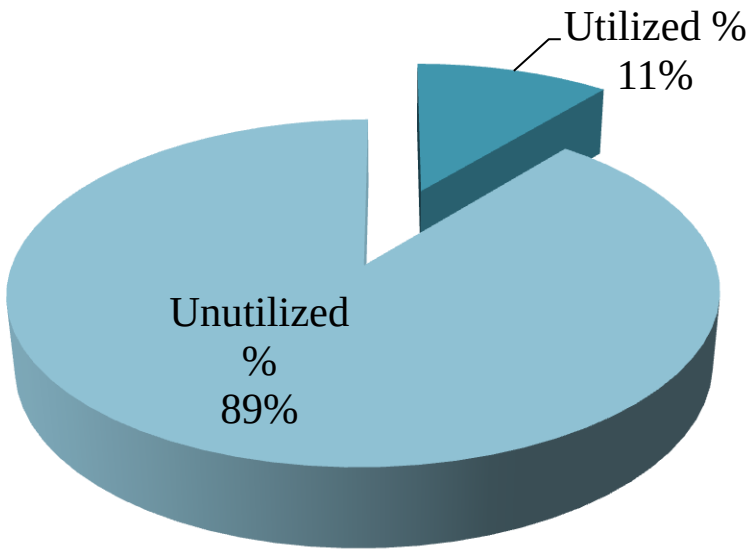


Graph 50: Graphical Representation of Warm Touch Utilization Rate

25. TCM (Temperature Control Monitor) 1 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
4	17	156	11	89

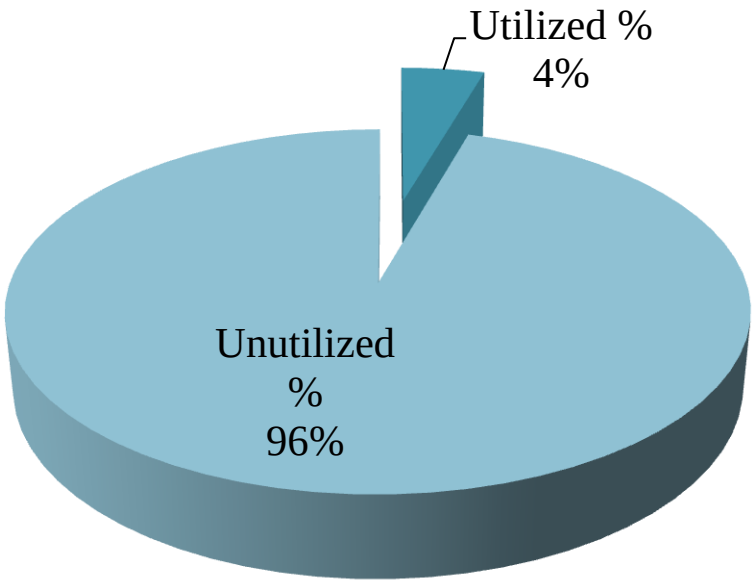


Graph 51: Graphical Representation of TCM (Temperature Control Monitor) 1 Utilization Rate

26. TCM (Temperature Control Monitor) 2 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
3	7	156	4	96

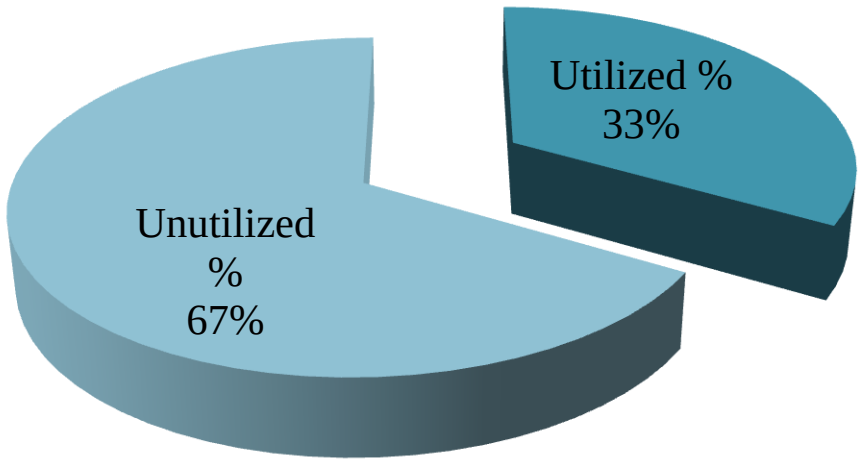


Graph 52: Graphical Representation of TCM (Temperature Control Monitor) 2 Utilization Rate

27. Video Trolley 1 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
38	52	156	33	67

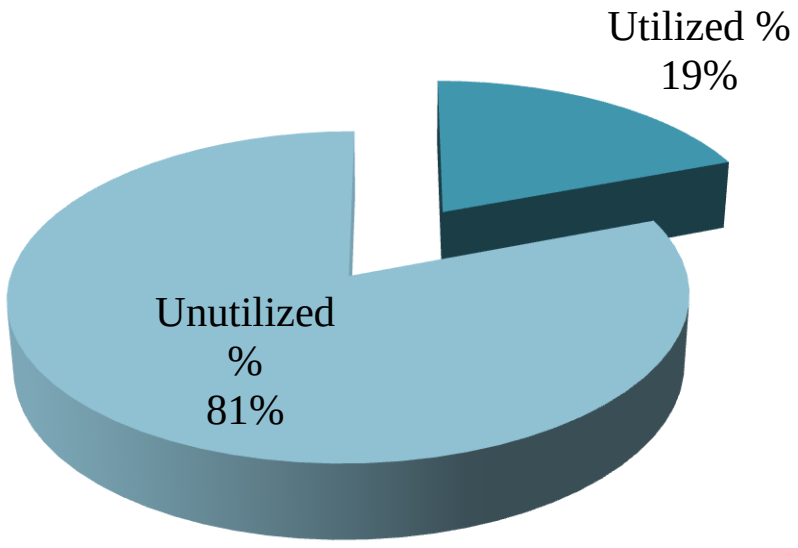


Graph 53: Graphical Representation of Video Trolley 1 Utilization Rate

28. Video Trolley 2 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
19	30	156	19	81

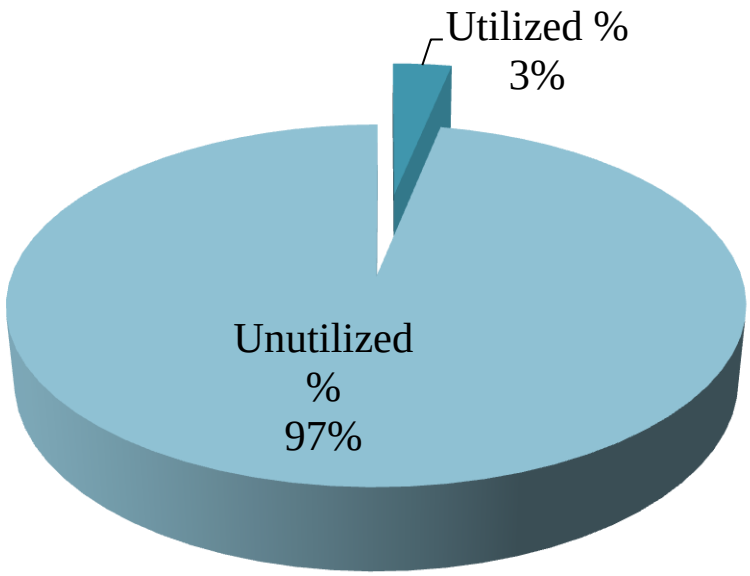


Graph 54: Graphical Representation of Video Trolley 2 Utilization Rate

29. Video Trolley 3 Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
4	5	156	3	97

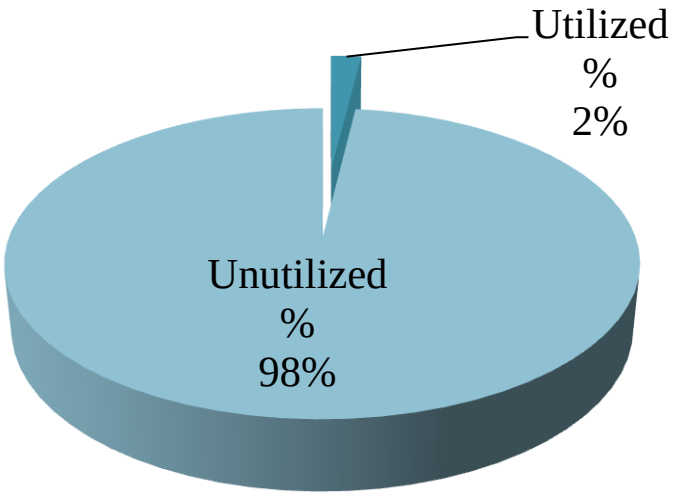


Graph 55: Graphical Representation of Video Trolley 3 Utilization Rate

30. Vitrectomy machine Utilization Rate:

Findings:

No of Cases	Total no. of hours utilized	Total No. of hours available	Utilized %	Unutilized %
1	3	156	2	98



Graph 56: Graphical Representation of Vitrectomy machine Utilization Rate

Conclusion

- As per study findings, utilization rates of 30 OT critical equipments are below 50%. This indicates that all equipments are underutilized.
- Equipments which have 0% utilization rate:

1. Ligasure
2. Drill Machine-Ortho Manman
3. Heart Lung Machine 2
4. Intra Aortic Balloon Pump
5. Octopus
6. Liposuction Trolley
7. Swiss Lithoclast Master

- Utilization rates of all OT equipment are mentioned on next page

Equipment	Utilization Rate		Utilization Rate
C-arm Arcadis old	31%	Heart Lung Machine 1	4%
C-arm Mobil New	7%	Heart Lung Machine 2	0%
Harmonic Scalpel	22%	Intra Aortic Balloon Pump	0%
Ligasure	0%	Activated Clotting Time	4%
Video Trolley 1	33%	Stryker Saw Cardiac	4%
Video Trolley 2	19%	Octopus	0%
Video Trolley 3	3%	Head Light Luxtek 1 and 2	14% & 7%
Surgical Microscope ENT	5%	Swiss Lithoclast Master	0%
Surgical Microscope Neurology	17%	Temperature Control Monitor 1	11%
Surgical Microscope Ophthalmology	14%	Temperature Control Monitor 2	4%
Laser Urology	4%	TCM Warm Touch	12%
Drill Machine-ENT	8%	TCM Bair Hugger	33%
Drill Machine-Neuro-Codman	10%	Phaco machine	10%
Drill Machine-Neuro-Manman	10%	Vitrectomy machine	2%
Drill Machine-Ortho Manman	0%	Shaver Ortho	2%

Drill Machine-Ortho AO	8%	Intelligent Tourniquet	13%
Drill Machine-Ortho Stryker	17%	Pulse Lavage (Irrigation machine)	10%
Liposuction Trolley	0%	Micro debrider	6%

Recommendations

- OT's all critical equipments are underutilized due less flow of surgical cases. Therefore, attempts should be done to increase flow of surgical cases.
- Marketing of surgical facilities available at ABMH should be done through media like newspaper, radio, etc.
- There should be strong referral system for surgical cases. To develop this referral system, Memorandum of Understanding (MOU) can be signed with General Practitioners, surgeons and small scale hospitals or they should be assigned as authorized reference centre of ABMH.
- Empanelment of ABMH with different Third Party Administrators (TPA's) and insurance companies can be done to increase surgical cases
- A committee should be formed which shall include senior employees like surgeon, anesthetic, nurse, OT technician, biomedical engineer, marketing personnel and OT manager. There should be meeting of these committee members at regular interval to assess functioning of OT and equipment utilization. OT manager should be responsible to conduct this meeting. OT manager should maintain data of OT equipment utilization.
- C-arm Siemens Multimobil 5E is malfunctioned and rarely used as previously mentioned and also it is technologically backward than C-arm Siemens Arcadis. Therefore it should be replaced with new C-arm Siemens Arcadis.

Limitations of Study

- Breakdown maintenance time of couple of equipments was negligible, therefore it is not considered in study while calculating equipment utilization percentage.

References

[1] http://digitallibrary.srmuniv.ac.in/dspace/bitstream/123456789/8361/1/P4778.pdf

[2] http://digitallibrary.srmuniv.ac.in/dspace/bitstream/123456789/8361/1/P4778.pdf

[3] http://digitallibrary.srmuniv.ac.in/dspace/bitstream/123456789/8361/1/P4778.pdf