A Report on
Summer Placement
in
Columbia Asia Hospital Pune

(April 1 to May 31st, 2015)

A Report

By

Dr. Ketan Apte

MBA Hospital and Health Management

2014-2016

Institute of Health Management Research, Jaipur

INSTITUTE OF HEALTH
MANAGEMENT RESEARCH
(WHO Collaborating Centre for District Health System Based on Primary Health Care)

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that Dr. Ketan Apte has undergone his Summer Training in Columbia Asia Pune Hospital, Mumbai from 1st April 2015 to 31st May 2015. The candidate himself carried out all the studies related to his Summer Training. His approach to the study has been scientific and analytical.

The summer training is in partial fulfilment of the course requirement recommended for the award of Master of Business Administration-Hospital & Health Management.

I wish him success in all him future endeavours.

Col. (Dr.) Ashok Kaushik,
Dean (Academic and Student Affairs)
IIHMR University, Jaipur

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COLUMBIA ASIA

1st June, 2015

INTERNSHIP COMPLETION LETTER

This is to certify that **Dr. Ketan Apte** has completed his 2 months Internship in our hospital in **Operations Department** from **1st April 2015** to **31st May 2015**.

He has successfully completed his assignments assigned to him during the period.

He has completed 2 projects during his internship period on **"Utilization Study of Various Modalities in Radiology Department"** and **"Gap Analysis in Patient Flow Process in Operation Theatre".**

During his tenure of internship period we found him sincere and hard working.

We wish him all the best for his future endeavor.

Yours Sincerely,
For Columbia Asia Hospital - Pune

Columbia Asia Hospitals Pvt. Ltd. PUNE 411014

Dr. Sunil Rao
GM (Pune Unit)

ACKNOWLEDGMENT

I am immensely grateful to all those who have been involved in my project.
My project would not have been possible without the kind support and help of many individuals and organization.

I would like to extend my sincere thanks to my institute, Institute of Health Management and Research, Jaipur, from where I got this opportunity.

I owe a great debt to **(Col). Dr. Sunil Rao** (General Manager), **Dr. Jyoti Shah** (Chief Medical) and my guide and mentor at Columbia Asia Pune, **Mr. Jayesh Nair** (Operations manager) for showing their interest and sharing their valuable views in spite of their busy schedule. It has been our privilege to work under their dynamic supervision in the hospital

I'm grateful to my guide, **Mrs. Tanjul Saxena** Professor, IIHMR Jaipur and, other departmental heads for their cooperation, help and wholehearted encouragement. Their assistance enabled me, to overcome many obstacles during the work of my project study.

I'm thankful to all those who directly or indirectly encouraged me to complete this project.

Table of Content

3. Annexures –

Abbreviations –

OPD – Out Patient Department

IPD – Inpatient Department

CSSD – Central sterile supply department

TAT – Turnaround time

GSR – Goods Service Receipt

ADR – Adverse Drug Reaction

RL – Responsibility Level

NDPS – Narcotic drug and psychotropic substances

LASA – Look Alike Sound Alike

VED – Vital, Essential, Desirable

ROL – Reorder Levels

DTC – Drugs and therapeutics committee

PPE – Personal Protective Equipment

PPM – Planned Preventive Maintenance

CMS – Chief Medical Services

ICN – Infection Control Nurse

CNS – Chief Nursing Superintendent

OT – Operation Theatre

ICU – Intensive Care Unit

NICU – Neonatal Intensive Care Unit

ER – Emergency Room

LDR – Labour Delivery Room

CSSD – Central Sterile Supply Department

BHU – Body Holding Unit (Mortuary)

MOR – Management Operational Review

HVAC – Heating ventilating and air conditioning

AHU – Air handling Unit

HEPA Filter – High Efficiency Particulate Air FIlter

MGPS – Medical Gas Plant System

DG – Diesel Generator

UPS – Uninterrupted Power Supply

STP – Sewage Treatment Plant

ETP – Effluent Treatment Plant

WTP – Water Treatment Plant

AMC – Annual Maintenance Contract

CMC – Continuous Maintenance Contract

CAMC – Comprehensive Annual Maintenance Contract

RO plant – Reverse Osmosis Plant

1. Observational Learnings –

1.1 Introduction –

Columbia Asia's highly skilled doctors and nurses deliver care in modern hospitals located close to where people live and work. Columbia Asia hospitals are specifically designed for the needs of patients and built for maximum comfort and efficiency. Patients benefit from advanced medical diagnostics, treatment and the personal care that only comes in facilities where the focus is on each patient.

Columbia Asia provides excellent care at affordable prices. Our transparent rate structure for medical procedures allows patients to know in advance how much their care will cost. There are no hidden or extra charges.

In the future all hospitals will be like Columbia Asia facilities: clean, modern, with the latest technology and designed to deliver efficient care to patients near where they live and work.

Columbia Asia is present in four countries- Malaysia, Vietnam, Indonesia and India.

Columbia Asia India

Columbia Asia is an international healthcare group operating a chain of modern hospitals across Asia. Columbia Asia Hospitals Pvt. Ltd.is one of the first healthcare companies to enter India through 100% foreign direct investment (FDI) route. The Columbia Asia Group is owned by more than 150 private equity companies, fund management organizations and individual investors.

Columbia Asia hospitals are clean, efficient, affordable and accessible. The innovative design of the hospitals, from their manageable size to their advanced technology, is focused on creating positive experience for patients.

The first hospital in India commenced operations in 2005 in Hebbal - Bangalore. Currently Columbia Asia operates seven multispecialty hospitals, one referral hospital and a clinic. The group has presence in Bangalore, Mysore, Kolkata, Gurgaon, Ghaziabad, Patiala and Pune.

Mission:

"Columbia Asia is pledged to deliver effective and affordable medical services in a clean and caring environment"

Vision:

"To build the best managed healthcare company in Asia"

Our Motto:

Customer First

Our People

We hire the best talent from healthcare and other industries, invest in training the employees and have numerous rewards and recognitions for them.

Patient-Centred Care

We pride ourselves on our service standards, the people working with us and the clinical expertise extended to patients. Our mission is to provide effective and affordable care in a clean and caring environment.

We have a hospitality-based approach wherein our patients are treated as guests. Our processes are technology-driven, making it convenient for patients to use our services. All our medical programmes are underpinned by an uncompromising belief and practice of ethics, excellence and strict clinical governance.

Infrastructure and Services

Columbia Asia today serves more than one million patients every year. Our hospitals offer comprehensive clinical programmes that are supported by a list of ancillary services (ICU, NICU, physiotherapy, referral lab, teleradiology/telemedicine, pharmacy and imaging facilities).

A comprehensive electronic medical records system forms the core of the hospital information system (HIS) that supports clinical decision making. While four of our hospitals are already accredited by NABH, the rest are under process. We cater to healthcare needs of international patients from developed and developing countries.

Columbia Asia Hospital – Pune, is a 100 bedded multi specialty facility situated close to the IT Parks at Kharadi. The hospital has highly qualified medical personnel and technicians to ensure healthcare delivery of the highest quality.

The hospital's infrastructure along with internationally benchmarked standards of medical, nursing and operating protocols are the key components that will make it a preferred hospital in Pune. A proprietary hospital information system and electronic medical record management assures error free and convenient patient records management, thereby greatly minimizing patient waiting time.

Clinical Specialities at Columbia Asia Pune.

- Anaesthesiology
- Bariatric Surgery
- Critical Care Medicine
- Dermatology
- Emergency Medicine
- ENT
- Gastroenterology
- General Surgery
- Internal Medicine
- Cardiology
- Neonatology
- Nephrology and Renal Transplant
- Neurology
- Neurosurgery
- Obstetrics & Gynaecology
- Ophthalmology
- Oral & Maxillo-Facial Surgery
- Orthopaedics
- Paediatric Surgery
- Paediatrics
- Plastic & Reconstructive Surgery
- Psychiatry
- Rheumatology
- Surgical Oncology
- Urology
- Vascular Surgery

Services and facilities at Columbia Asia Pune.

- **24 Hour Services**

- Emergency room
- Laboratory
- Pharmacy
- Radiology
- Ambulance
- Cath-Lab

- **Speciality Clinics -**

- Cancer screening
- Cardiac screening
- Diabetes clinic
- Joint replacement clinic
- Pain clinic
- Weight loss clinic
- Travel medicine
- Shoulder clinic

- Cochlear implant and bone anchored hearing aid clinic
- Sports medicine and arthroscopy

- **Laboratory**

- Histopathology
- Clinical pathology
- Cytology
- Biochemistry
- Microbiology

- **Digital Imaging**

- Digitized radiography
- Ultrasound & colour doppler
- Echocardiography
- Digitized mammography
- 16 - Slice CT
- MRI
- Interventional radiology
- Picture archival communication system
- Teleradiology

- **Operating Theatre**

- Major & minor surgery
- Central sterile services department

- **Ambulatory and day care**

- Daycare surgery
- Endoscopy
- Dialysis

- **Cafeteria**

- Inpatient dining
- Outpatient dining

- **Nursing Units**

- Isolation care
- Labor and delivery suite
- Neonatal intensive care
- Nursery
- Intensive care

- **Patient Accommodation**

- Rooms (Deluxe rooms, three bedded, two bedded and single bed rooms)
- Intensive Care Unit
- High dependency unit

Health Check Packages -

Basic Health Package

Complete Blood Count	**Blood Sugar Fasting**
Lipid Profile	**Urine Routine**
X-Ray Chest	**ECG**
Physician Consultation	**Pap Smear - Female**

Male: Rs. 1300
Female: Rs. 1700

Comprehensive Health Screening Package

Haemogram	**X-Ray Chest**
Blood Group & RH Factor	**ECG**
Blood Sugar Fasting	**TSH**
Blood Sugar PP	**Liver Function Test**
Lipid profile	**Serum Creatinine**
Urine Routine	**USG Abdomen & Pelvis**
Stool Routine	**Treadmill Test**
Serum Calcium	**Pap Smear- Female**
Physician Consultation	**Gynaecologist Consultation- Female**
Breakfast	

Male: Rs. 3750
Female: Rs. 4250

Executive Health Screening Package

Haemogram	**ECG**
Blood Group & RH Factor	**Thyroid Function Test**
Blood Sugar Fasting	**Liver Function Test**
Blood Sugar PP	**Serum Creatinine**
HBA1C	**USG Abdomen & Pelvis**
Lipid profile	**Treadmill Test**
Urine Routine	**Serum Calcium**
Stool Routine	**Urea**
X-Ray Chest	**Total PSA- Male**
Ophthal Consultation	**Mammogram (Bilateral 4 Views)- Female**
Nutrition Therapeutic Counselling	**Pap Smear- Female**
Breakfast	**Gynaecologist Consultation- Female**

Male: Rs. 5500
Female: Rs. 6500

Deluxe Wellness Package

Haemogram	**Total PSA- male**
Blood Group & RH Factor	**Mammogram (Bilateral 4 Views)- Female**
Blood Sugar Fasting	**PAP Smear- Female**
Blood Sugar PP	**Blood Urea Nitrogen**
HBA1C	**Pulmonary Function Test**
Lipid profile	**2D Echo**
Urine Routine	**Hbsag (ELISA)**
Stool Routine	**Physician Consultation (2)**
X-Ray Chest	**Ophthal Consultation**

ECG	**Nutrition Therapeutic Counselling**
Thyroid Function Test	**ENT Consultation**
Liver Function Test	**Gynaecologist Consultation- Female**
Serum Creatinine	**Breakfast**
USG Abdomen & Pelvis	**Serum Calcium**
Treadmill Test	**Uric Acid**

Male: Rs. 7500
Female: Rs. 9000

Cardiac Health Packages

i. Healthy Heart screening package Rs. 999

Glucose Fasting	**ECG**
Glucose Post Prandial	**TMT**
Lipid Profile	**Cardiologist Consultation**
Healthy Heart Diet Counselling	

ii. Comprehensive cardiac screening package Rs. 3500

Complete Blood Count	**ECG**
Glucose Fasting	**Tread Mill Test**
Glucose Post Prandial	**2D Echo**
Lipid Profile	**HbA1C**
Serum Creatinine	**Consultation with Cardiologist**
Nutrition Therapeutic Counselling	**Breakfast**

1.2 Mode of data collection -

Data was collected by method of observation and by shadowing some of the process as they occurred in the hospital.

I was allotted from 830 am to 530 pm every day during the course of the internship to do the same.

I was posted in various departments for one week each. I was asked to do projects in operation theatre and radiology department.

1.3 Department wise observations –

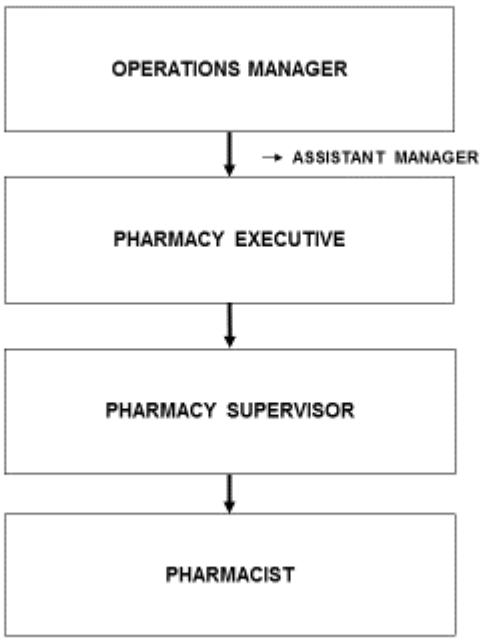
Drug store (Pharmacy) -

The hospital has two stores, one for surgical disposables and other retail is pharmacy which also supplies all the inpatients.

Objectives of the department –

I. Ensure timely delivery of Medicines, consumables, supplies for effective patient care.
II. Follow standard protocols for error free dispensing, storage and education of patients while adhering to brand service standard of pharmacy

Organogram -



Department Processes –

I. OPD dispensing
II. IPD dispensing
III. Narcotic storage, accounting, and dispensing to wings (other departments)
IV. Breakage, loss, theft or expiry of narcotics
V. Medicine/consumables refund
VI. Department stock transfer
VII. Procurement of drugs and consumables in formulary
VIII. Processing indent for items in formulary
IX. Stock management – receiving stock, returning stock to vendor, stock check
X. Purchase 'out of formulary drugs'
XI. Preparing GSR
XII. Drug recall
XIII. Management of expiry and near expiry drugs and consumables
XIV. Storage and dispensing of cut strip medicines

Quality Indicators –

I. Percentage of stock-outs including emergency drugs
II. Local purchase of drugs (out of formulary drugs)
III. Usage of 'Others' code
IV. High risk medication – ADR

Observations –

I. Strict formulary followed – only 2 brands allowed per molecule , formulary controlled centrally
II. Only online prescriptions are allowed , no retail prescriptions are entertained
III. Cash collected by an employee of finance department
IV. Possess NDPS licence
V. Department/wing wise indent schedule
VI. Inventory level in the store – 21 days (Ideal)
VII. Follow NABH protocols – LASA drugs,
VIII. Expiry and near expiry drugs , High value drugs stored separately
IX. NDPS drugs in double lock and key
X. All drugs stored alphabetically
XI. ROls not followed
XII. ABC, VED analysis implemented in the store
XIII. Tablets, ointments, syrups etc separate

XIV. DTC committee for introduction of new formulations

XV. Inventory count done weekly

Support Services –

Support services shall consist of facility maintenance, bio-medical, housekeeping linen and laundry, security, food services and landscaping.

Objectives –

I. Support Services shall ensure that all fixed assets are tagged, that their movements are monitored and that proper records are maintained.

II. Support Services shall maintain and update architectural plans and engineering blueprints and specifications.

III. The hospital shall ensure that movement of items in and out of the premises is done after obtaining due authorization and with relevant supporting documentation

IV. The Security Department is responsible for the overall Safety & Security of the Hospital infrastructure, the external customers and the internal customers.

V. The primary function of Housekeeping is to ensure the overall cleanliness, upkeep and maintenance of all areas of the Hospital.

VI. The Housekeeping Department will use a combination of efficient procedures, appropriate tools and methods with trained manpower thereby ensuring a hygienic atmosphere in the hospital.

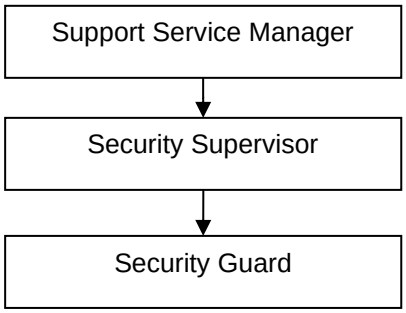
VII. The food services shall be managed in-house and will be referred to as Café Columbia.

VIII. The food services shall ensure that the food served is presentable, palatable and safe for consumption.

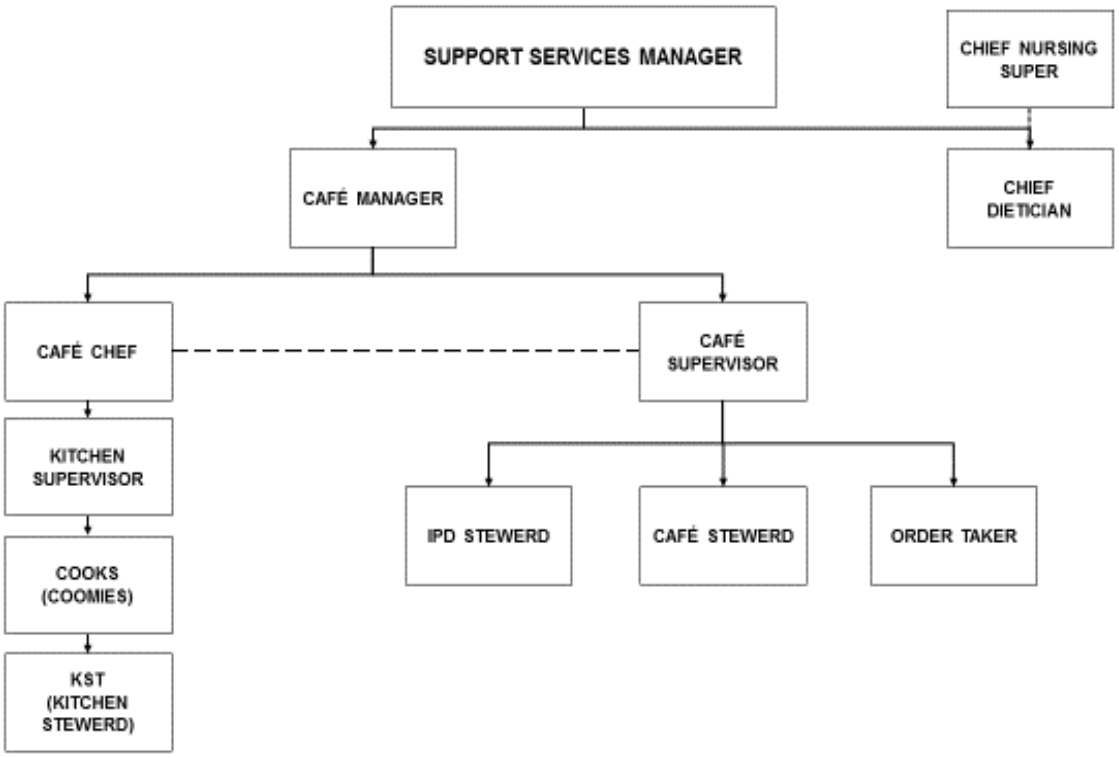
IX. All precautions will be followed while collecting biomedical waste.

X. Biomedical waste disposal will be done as per the guidelines.

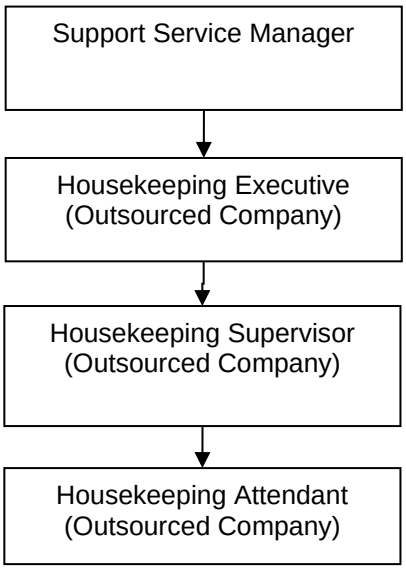
Organogram (Housekeeping) –



Organogram (Foods and Beverages) -



Organogram (Housekeeping) -



Housekeeping, Linen and Laundry, waste Management–

Quality Indicator -

I. Adherence to special cleaning schedules
- Vinyl Polishing
- High Dusting
- Curtain washing
- Deep Cleaning

II. PPM according to schedule
III. Patient safety
IV. Theft and loss
V. Correct Diet (Food and Beverages)
VI. Correct time (Food and Beverages)
VII. Correct Temperature (Food and Beverages)
VIII. Training actualisation
IX. Adherence to visitors policy

Services -

I. Getting ready (check cleaning equipment , PPE, check daily schedule)
II. Floor cleaning
III. Bathroom cleaning
IV. Deep cleaning
V. Polishing
VI. Buffing
VII. Linen Collection and redistribution
VIII. Trash collection and disposal
IX. Linen Inventory
X. Patient feedback
XI. Room preparation
XII. Biomedical waste collection and disposal

Observations –

Linen and Laundry -

I. Nursing enters all the linen transferred to Linen Exchange Sheet
II. When the dirty linen is handed over to the Vendor its entered in Laundry Exchange Sheet (Three copies – Linen department, Security and Vendor)
III. Five stocks are maintained –
- Laundry Stock
- Patient Stock
- Linen Stock
- Store Stock

IV. Linen Life Cycle – (min) 200/cycles and (max) 300/cycles

Food and Beverages -

I. The hospital serves 8 meals a day to the patients, with consultation with the Dietician (Included in room charges)
- Sunrise Meal
- Breakfast
- Mid-Morning Tea
- Lunch

- Evening Tea
- Sunset Meal
- Dinner
- Night cap

II. Shop act Licence and FDA licence
III. Patient feedback is taken once a day
IV. 15 Days inventory is maintained
V. MOR once a month

Housekeeping –

I. Deep Cleaning (top to bottom) in critical areas like OT, ICU, NICU twice a month , other areas once a month
II. Room deep Cleaning is done on Sundays
III. Checklist is provided in each room , to be filled daily
IV. Different chemicals for different areas of the hospital, Basilocite for OT and BHU , R1 for washroom , R2 Floor cleaning
V. Maximum cleaning is done before 10:30 am (before the rush hours)
VI. Maximum 20 minutes/room

Biomedical Waste Management –

I. Always Kept in controlled temperature (23-25 c)
II. Biohazard sign is a statutory compliance
III. While collecting biomedical waste PPE (Heavy duty gloves, Gum boots and Mask) compulsory

Pest Control –

I. Done twice daily in Public areas
II. Different chemicals are used as it reduces the chances of developing immunity

Biomedical Engineering -

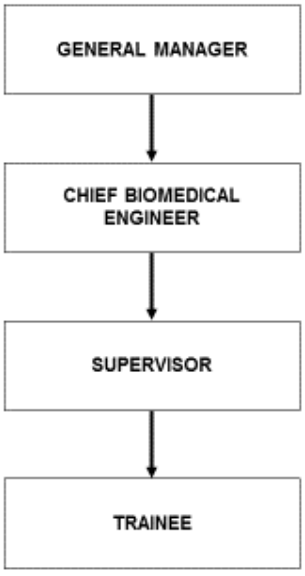
Objectives-

To install, commission and maintain all medical equipment in an efficient and cost effective manner

Quality Indicators –

I. Down time of equipment
II. Response time for Breakdown calls
III. Repeat breakdown call within 24 hours

Organogram -



Services –

I. Procurement of equipment
II. Equipment Installation
III. Preventive maintenance: Ensure timely maintenance of equipment
IV. Calibration: Execute calibration procedures
V. Repairs of defective equipment
VI. Condemnation of equipment
VII. Asset Management
VIII. Training: Biomedical engineering department is involved in the training of nursing, medical and paramedical staff in the use of medical equipment and computer aided programmes on equipment

Observations –

I. Most maintenance is done with the in-house team of engineers, AMC and CMC for critical equipment
II. Focus is more on proactive maintenance
III. Emphasis is more on training the end user. (Reduces operational difficulties and breakdowns).
IV. Training team consist of Biomedical engineer, Nursing and clinical educator

Facility -

Objectives –

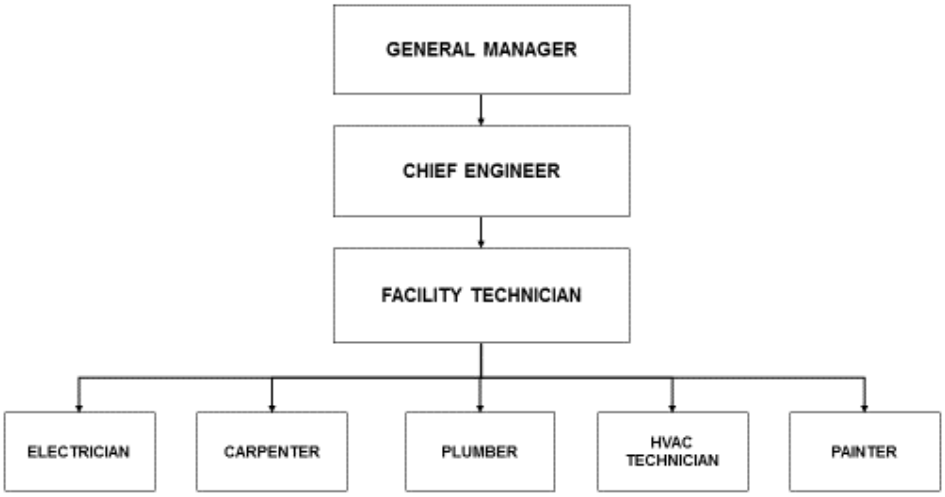
The facilities department will ensure smooth functioning of hospital operations by providing adequate support to end users for all requirements pertaining to Utilities and building safety

Quality Indicator –

I. Down time of Equipment

II. Preventive maintenance Planned vs Actual

Organogram –



Services –

I. Plan and executes the maintenance of all water systems required for the hospital right from source to final disposal.
II. Uninterrupted power supply to the entire hospital through either DG, UPS, or grid
III. Maintenance of electric boards and other equipment
IV. Supply of indoor air quality as per medical standards through HVAC
V. Maintenance of HVAC
VI. Uninterrupted Supply of medical gases (oxygen, carbon dioxide and nitrous oxide) to different department of hospital
VII. Maintenance of MGPS
VIII. Installation and maintenance of fire safety systems
IX. PPM – Equipment, Rooms

Observations –

I. Most equipment maintenance in-house , AMC, CMC only for critical equipment
II. STP and ETP installed and the recycled water used for gardening and flushing

III. In WTP water hardness maintained at 0 to 50 ppm
IV. Central AC maintains a temperature of around 20 to 24 degrees,
V. They have four Chillers installed (max two chillers are run at a time)
VI. OT and ICU has separate AHUs
VII. OT and isolation room are the only two areas where fresh air is supplied 24x7
VIII. OT has a separate DX unit which can further cool the air and reduce the temperature in the OT below 20 degrees
IX. In OT 25 to 30 air changes required over the OT table and 90 changes in the room
X. Positive pressure is maintained in OT,CSSD while negative pressure is maintained in isolation rooms
XI. RO water plant supplies water to OT, Dialysis and CSSD

Objectives –

The laboratory is committed to providing diagnostic services to all out-patients and in-patients of the hospital as well as to any other patients who may wish to utilize its services. The laboratory strives to maintain the best possible quality of results for all samples received. It takes utmost care to make sure that quality care is imparted to all patients without any kind of bias. All possible measures are taken to ensure that the results are clinically useful and reliable.

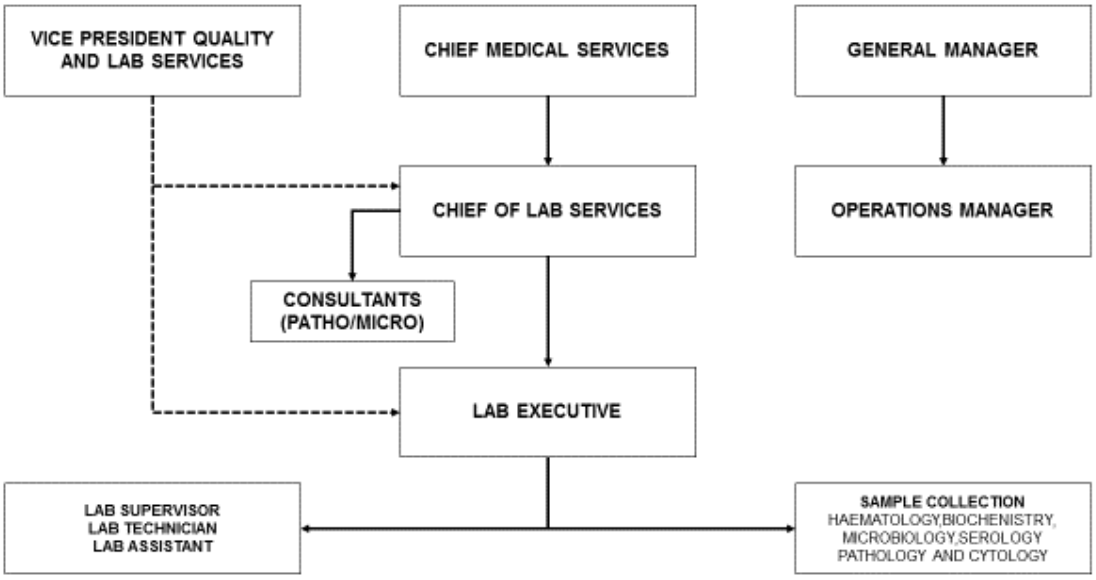
The laboratory endeavors towards continual improvement by imbibing quality values at every level. All the staff members are required to familiarize them with the content of the quality manual and comply with the policies and procedures laid down in the manual and associated documents at all times.

The laboratory of state of the art instruments. The laboratory staff undergoes continuous training in order to perform their tasks effectively, thereby increasing the overall efficiency of the laboratory.

Quality Indicators –

I. Turnaround time for reports
II. Repeat investigations
III. Reporting errors

Organogram –



Procedures –

I. Pre analytical phase consists of the steps from sample collection to processing prior to analysis and includes identification, specimen acceptance and specimen rejection.

II. Analytical phase consists of the actual testing of the specimen by instruments and/ or manually.

III. Post-analytical phase consists of result entry, verification, validation, report printing and dispatching

(All the process flowcharts are in Annexure 1)

Observations –

I. The lab uses all automated machines

II. The laboratory uses Laboratory Information System (LIS)

III. All the machines are linked to the LIS with double interfacing

IV. The machines are bought on the basis of reagent contract (no capital investment)

V. The contracts are done centrally ie at their Bangalore Office (Indian Management Office)

VI. Certain tests are outsourced to other laboratories

VII. The reports of all the outsourced tests are printed on their respective letterheads and not on Columbia Asia letterhead

Blood storage centre –

Essential blood components are stored.

Quality Indicators –

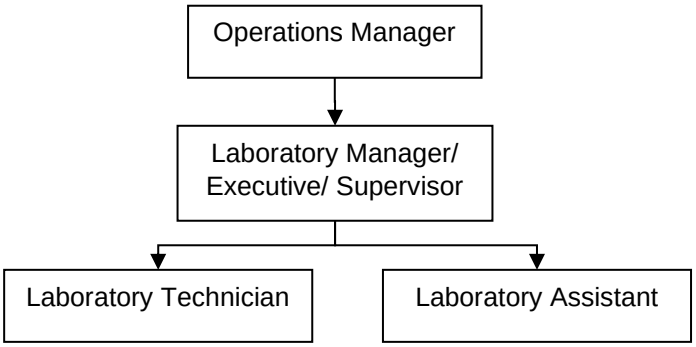
I. % of wastage of blood and blood products

II. Blood components usage

III. Turnaround time for issue of blood and blood components

IV. % of transfusion reaction

Organogram –



Services –

I. Sourcing of blood components

II. Storage and transportation of blood components

III. Issue of blood components

Radiology

Objective –

The department is committed to the high profile, high quality, precise and timely diagnosis and interventional procedures in a safe and caring environment.

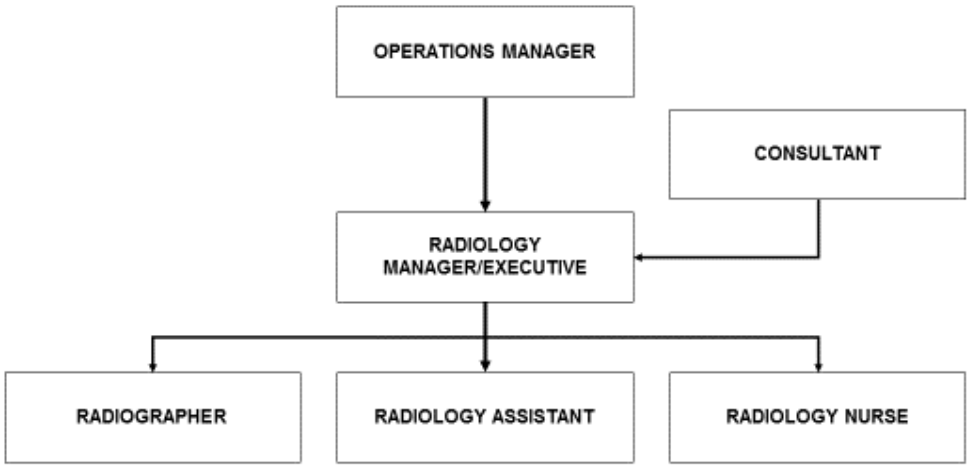
Our mission is to provide cutting edge radiology services to our valuable customers.

We will also provide tele-radiology facilities that conform to the international standards of care to our referring consultants and hospitals.

Quality Indicators –

I. Turnaround time for radiology reports
II. Waiting time for ultrasound scans
III. Quality grading of films
IV. Frequency of addendum to reports

Organogram –



Equipment –

- Siemens SOMOTOM EMOTION 16 slice CT scanner
- Siemens Magnum essenza MRI scanner
- Digital X RAY machine
- Mammography Machine
- High Defination USG machine
- Portable USG machine
- Fluroscope/ C arm

Physiotherapy –

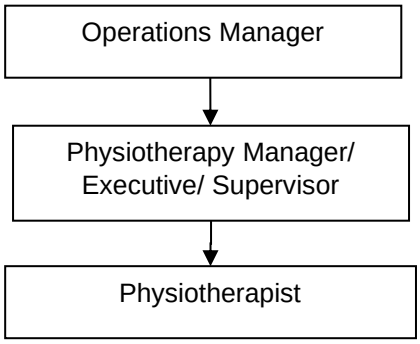
Objective -

To provide effective rehabilitation for a variety of musculoskeletal, neurological, respiratory conditions and other medical problems related to physiotherapy for patients in Columbia Asia Hospital. The Physiotherapists within Columbia Asia Hospital are committed to providing a service that is responsive to the needs of patients, innovative and based on current evidence and research.

Quality Indicators –

I. Waiting time for procedures in physiotherapy
II. Drop in pain score post treatment in acute cases

Organogram –



Services –

I. Interferential Therapy (IFT)
II. Ultrasound Therapy (UST)
III. Short wave Diathermy (SWD)
IV. Traction (cervical and lumbar)
V. Wax Therapy (WXT)
VI. Moist Therapy (MOT)
VII. Combi therapy
VIII. Laser Therapy (LAS
IX. Continuous Passive Motion
X. Shoulder Pulley and wheel
XI. Wall ladder
XII. Parallel bar and mirror
XIII. Quadriceps table
XIV. Gym ball
XV. Multi Gym
XVI. Exercise therapy

Customer Care –

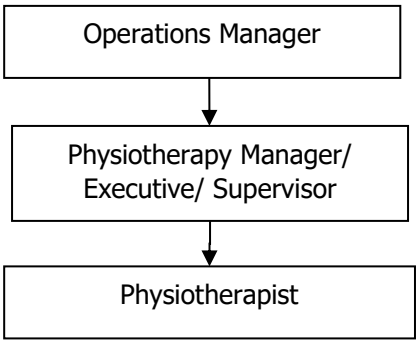
Objectives –

- To Provide Information to Internal and External Customers
- To guide patients
- To answer and guide internal and external telephone calls

Quality Indicators –

I. Waiting time in OPD

Organogram –



Procedures –

I. **Enquiry Desk -** Enquiry is manned by a customer care assistant 24hrs/day, and is supervised by the customer care supervisor. Handles all doubts, enquiries and questions concerning the services Columbia Asia provides.

II. **Console** - Handles internal calls (call transfers and enquiry), and external calls (call transfers, enquiry, scheduling appointments, rescheduling, and dissemination of information concerning health checks and other hospital services).

III. **OPD** - Processing of appointment schedules and consultations with respective consultants

IV. **Preventive Health Check-ups -** Offer different Health Screen Packages for men and women of different ages tailored to their requirements. Includes Health Screens for Corporates.

V. **Inpatient Services** - Customer service assistant will guide and accompany the patient/patient attender through all formalities of the admission process.

Medical Records Department (MRD) –

Objective –

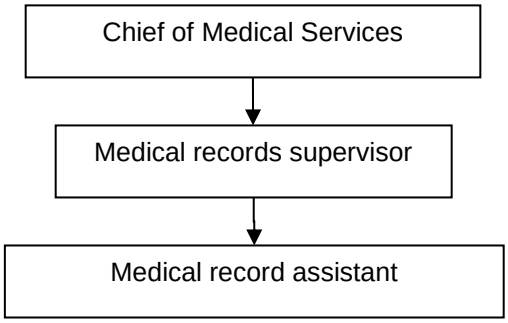
The Medical Records Department is responsible for maintaining medical records in a standardized and professional manner in order to protect patient confidentiality while allowing adequate access to providers in order to promote quality patient care.

Coding and release of information are some of the other major duties performed in the Medical Records Department.

Quality Indicators –

I. Errors in capturing demographic details of patients
II. Medical records deficiency rectification
III. Completion of ICD coding

Organogram -



Services –

I. Compiling of daily hospital census and reporting to authorized personnel
II. Updating statistics of all OP and IP census to monthly statistics
III. Collecting discharge files from all the wings
IV. Systematic maintenance of medical records
V. Coding as per ICD norms

Operation theatre

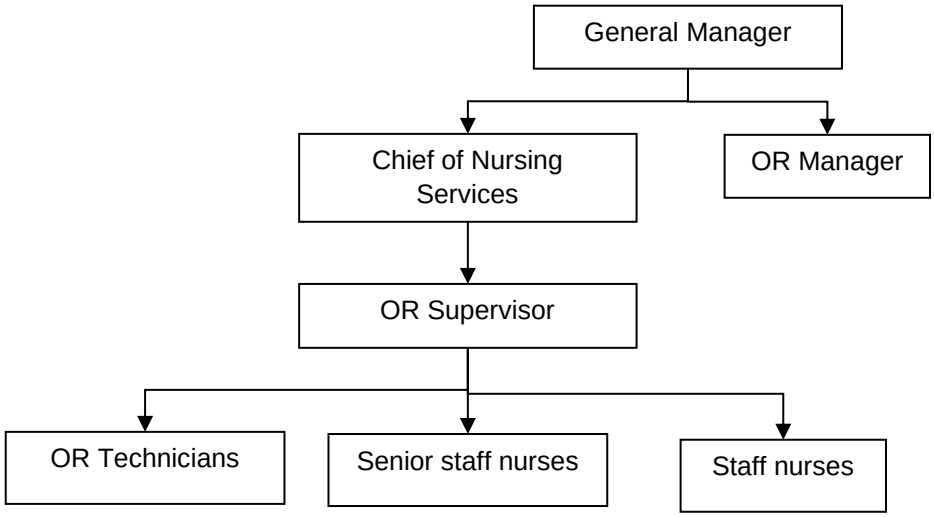
Objective –

The objective of Operating Room is to provide highest level surgical care to patients undergoing surgical treatment

Quality Indicators –

I. Modification of anaesthesia plan
II. Unplanned ventilation during anaesthesia
III. Adverse anaesthesia events
IV. Anaesthesia related mortality
V. Surgical site infection
VI. Re-exploration
VII. Accidental removal of tubes and catheter
VIII. Incidence of hematoma at the puncture site
IX. % of rescheduling of procedure

Organogram -



Procedures –

I. Pre-operative care
II. Pre- anaesthesia check up
III. Surgical procedures
IV. Post- operative care

1.4 Conclusion –

A well organised and well maintained hospital, with all the amenities a multi-speciality hospital should possess. Located strategically, near IT parks and townships. Customer centric approach ensures patient satisfaction. Good consultant empanelment has ensured steady increase in patient flow.

1.5 Limitations –

i. Not affordable to the middle class society
ii. No general ward
iii. No tie up with government insurance schemes like CGHS, ESIC etc
iv. No cardiac OT hence no cardiac surgeries performed
v. Low OTC pharmacy sale as they don't accept prescriptions from other hospitals or consultants

2. Project Report

2.1 Project 1

2.1.1 Introduction –

Hospitals have undergone a quantum change in concept and care provisioning from ancient days to present era. Modern medical technology has contributed immensely in improving the quality of healthcare and the state of health profile of nations.

The introduction of state of the art technology has resulted in metamorphic changes in diagnostic and therapeutic modalities in patient care activities. This has led to the enhancement of quality of life and decreased mortality and morbidity rates.

Medical equipment contribute to almost 40 to 50% costs of a tertiary care setup. The medical equipment though cutting edge at the time pf procurement poses a threat of inevitable obsolescence within 6 to 7 years of installation. The problem is compounded by the factor that most of such equipment are imported from reputed companies (Siemens, GE etc.). This leads to putting higher treatment costs and further to lesser competitive edge and low utilisation rates resulting in undesired operating margins.

A forecast for 1999 for this type of investigations in world healthcare market done by Market Intelligence Research Co., a firm based in Mountain View, USA, 1999, said this would be around USD 5 billion. In comparison to this USD 3.5 billion was spent by non-federal General hospitals alone in the US, on imaging equipment and supplies in 2000.

In today's health care environment, the equipment purchase must be cost justified as India is a developing country with constrained resources and hi-tech hospitals. Establishment and maintenance of Radiology equipment in a hospital is expensive and every effort must be made for optimum utilisation of this equipment in appropriate manner.
The availability and utilisation of various healthcare equipment at all levels in the health system for effective and efficient service delivery was also emphasized in the Alma- Ata declaration at the international conference on primary healthcare 1978, which was later included into the strategy of health for all by 2000.

The study was conducted in the Radiology Department of Columbia Asia Hospital, Pune.
The Utilisation study was conducted for four modalities

- CT scan
- MRI scan

- Utrasonography (USG)
- X- Ray Machine

X – Ray Machine –

An X-ray generator is a device used to generate X-rays. It is commonly used by radiographers to acquire an x-ray image of the inside of an object (as in medicine or non-destructive testing) but they are also used in sterilization or fluorescence.

The heart of an X-ray generator is the X-ray tube. Like any vacuum tube, the X-ray tube contains a cathode, which directs a stream of electrons into a vacuum, and an anode, which collects the electrons and is made of copper to evacuate the heat generated by the collision. When the electrons collide with the target, about 1% of the resulting energy is emitted as X-rays, with the remaining 99% released as heat. Due to the high energy of the electrons that reach relativistic speeds the target is usually made of tungsten even if other material can be used particularly in XRF applications.

A cooling system is necessary to cool the anode; many X-ray generators use water or oil recirculating systems.

Computed Tomography (CT) Scan -

A computerised tomography (CT) scan uses X-rays and a computer to create detailed images of the inside of the body.

CT scans are also sometimes known as CAT scans, or computed tomography scans.

During a CT scan, you'll usually lie on your back on a flat bed. The CT scanner consists of an X-ray tube that rotates around your body. You'll usually be moved continuously through this rotating beam.

The X-rays will be received by a detector on the opposite side of your body and an image of the scan will be produced by a computer.

Unlike an MRI scan, where you're placed inside a tunnel, you shouldn't feel claustrophobic.

The images produced by a CT scan are called tomograms and are more detailed than standard X-rays. A CT scan can produce images of structures inside the body, including the internal organs, blood vessels, bones and tumours.

The scan is painless and will usually take between five and 10 minutes depending on the part of your body being scanned.

CT scans can be used to diagnose and monitor a variety of different health conditions, including brain tumours, certain bone conditions, and injuries to internal organs such as the kidneys, liver or spleen. They're also now being used to look at the heart.
They're also often used to look inside the body before another procedure takes place, such as radiotherapy treatment or a biopsy (where a small sample of tissue is taken so that it can be examined under a microscope).

Magnetic Resonance Imaging (MRI) Scan –

Magnetic resonance imaging (MRI), nuclear magnetic resonance imaging (NMRI), or magnetic resonance tomography (MRT) is a medical imaging technique used in radiology to investigate the anatomy and physiology of the body in both health and disease. MRI scanners use magnetic fields and radio waves to form images of the body. The technique is widely used in hospitals for medical diagnosis, staging of disease and for follow-up without exposure to ionizing radiation**.**

To perform a study, the patient is positioned within an MRI scanner which forms a strong magnetic field around the area to be imaged. In most medical applications, protons (hydrogen atoms) in tissues containing water molecules are used to create a signal that is processed to form an image of the body. First, energy from an oscillating magnetic field is temporarily applied to the patient at the appropriate resonance frequency.
The excited hydrogen atoms emit a radio frequency signal which is measured by a receiving coil. The radio signal can be made to encode position information by varying the main magnetic field using gradient coils. As these coils are rapidly switched on and off they create the characteristic repetitive noise of an MRI scan. The contrast between different tissues is determined by the rate at which excited atoms return to the equilibrium state. Exogenous contrast agents may be given intravenously, orally or intra-articular.

MRI requires a magnetic field that is both strong and uniform. The field strength of the magnet is measured in teslas – and while the majority of systems operate at 1.5T, commercial systems are available between 0.2T–7T. Most clinical magnets are superconducting which requires liquid helium. The lower field strengths can be achieved with permanent magnets, which are often used in "open" MRI scanners for claustrophobic patients.

Ultrasonography (USG) –

Diagnostic sonography (ultrasonography) is an ultrasound-based diagnostic imaging technique used for visualizing internal body structures including tendons, muscles, joints, vessels and internal organs for possible pathology or lesions. The practice of examining pregnant women using ultrasound is called obstetric sonography, and is widely used.

In physics, 'ultrasound' refers to sound waves with a frequency too high for humans to hear. Ultrasound images (sonograms) are made by sending a pulse of ultrasound into tissue using an ultrasound transducer (probe). The sound reflects (echoes) from parts of the tissue; these echoes are recorded and displayed as an image to the operator.

Many different types of images can be formed using ultrasound. The most well-known type is a B-mode image, which displays the acoustic impedance of a two-dimensional cross-section of tissue. Other types of image can display blood flow, motion of tissue over time, the location of blood, the presence of specific molecules, the stiffness of tissue, or the anatomy of a three-dimensional region.

Compared to other prominent methods of medical imaging, ultrasonography has several advantages. It provides images in real-time (rather than after an acquisition or processing delay), it is portable and can be brought to a sick patient's bedside, it is substantially lower in cost, and it does not use harmful ionizing radiation. Drawbacks of ultrasonography include various limits on its field of view including difficulty imaging structures behind bone and air, and its relative dependence on a skilled operator.

2.1.2 Problem Statement –

A quantitative analysis to study the Utilisation of different modalities in The Radiology and Diagnostic Department of Columbia Asia Hospital, Pune.

2.1.3 Review of Literature -

Availability and Utilization of Major Equipment at District Hospital Gurgaon, Haryana Vol. 13, No. 2 (2001-07 - 2001-12)

O.P. Lathwal*, Alok Banerjee**

Summary -

This prospective study was carried out at the district hospital Gurgaon in Haryana, in nine different departments and ten service areas, in order to find out the utilization of various major equipment in the respective areas. The actual utilization of the available equipment was found to be only 39.3%, the rest were either non-functional (35.5%) or not in use (25.2%) and kept as reserve. Majority of the non-functional/ break down equipment were just lying for condemnation (28.2%), only 7.3% kept for repair, out of the available total equipment of 369. The reason for less availability, non-functioning and underutilization of equipment was found to be improper and poor system of maintenance and repair, and tendency to keep some of them in reserve for their future use, in case of breakdown of the existing ones.

Utilisation Study of CT Scan in a Multi-Speciality Hospital

Dr. P. Naveen Kumar M.D. Assistant Professor, Department of Hospital Administration, Kasturba Medical College & Hospital, Manipal,

Summary -

The cost of imaging modalities is humungous in multi-specialty care hospitals. The administrators have to drive the management of plethora of investigative modalities with utmost care. As these are capital intensive, utilisation studies of such equipment after installation is very essential and drawn lot of significance since beginning. The introduction of CT has been one of the most significant advances among the imaging techniques. The first users were physicians within Research hospitals, then, community hospitals started using them and private practitioners, meanwhile, typically did not purchase the expensive systems. To study the utilisation of CT scan, the approach undertaken was a prospective study to find the number of scans done over a 6-month period, the average scans done in a day were calculated. The average time taken per scan was found. These calculations give us the time the machine is being run over in a 8-hour shift. The 8-hour shift was considered as maximum time the machine is operable. The utilisation co-efficient index was the tool used to deduce the utilisation percentage of the CT scan. The machine in the study was utilised with 50% of its full potential.

An assessment of Diagnostic Equipment in a Tertiary Healthcare Setup: A key to Economic Patient Management. 2014

Chaudhary P, Kaul P,

Summary -

Equipment utilisation management is the evaluation of the medical equipment necessity, appropriateness and efficiency of the use in the healthcare services or procedures. The Investment on an equipment is said to be a good one if it shows a utilisation coefficient of 50% or above.

The study was a descriptive observational in nature and was conducted in the diagnostics department PGIMER Chandigarh. The results indicated that the utilisation coefficient of various diagnostic equipment in PGIMER were in order of 58.1, 62.1 and 60.4% for high, medium and low cost equipment respectively.

On an average, the utilization coefficient of medical equipment under study was fond to be 60.2% (above 50%). This figure reflects that the budget spent on average medical diagnostic equipment in the department is very much justifiable.

2.1.4 Rationale of Project –

In an era of cost-intensive medical care, every equipment being installed in healthcare institutions need to be fully and properly utilized.

It should be the earnest endeavour of the management and users to optimize the equipment to obtain maximum returns for the capital invested

An optimum utilisation of equipment will result in as follows:

- Optimum patient handling and rapid turnover
- Minimum possible cost of healthcare
- Quality patient care and satisfaction

2.1.5 Research objective –

- To find out the utilisation coefficient of MRI ,CT, USG and X RAY
- To compare the flow of cases from IPD,OPD and OTC

2.1.6 Research Methodology –

- **Study Design –**
  Retrospective, cross – sectional study

- **Sample size –**
  Census

- **Inclusion Criteria –**

Data was collected from 1st January 2015 to 30th April 2015, 26th January 2015 was excluded as it is a public holiday. Total 119 days.

- All CT scans and MRI scans done from 9 am to 10 pm.
- All USGs and X RAYs done from 9 am to 6 pm.
- All patients from IPD (In patient department) , OPD (Outpatient Department), OTC (over the counter) patients.

- **Exclusion Criteria –**

- All procedures and scans performed on 26th January 2015 as it is a public holiday, the department only accepts emergency patients, no routine procedures or scans are performed.

- All USGs and X RAYs performed post 6 pm, as only emergency patients are taken post 6 pm.

- All CT and MRI scans done post 10 pm as the CT machine and MRI console is shut down post 10 pm, only emergency scans are performed.

2.1.7 Tools and Techniques –

- The workload of each modality was calculated by studying the number of procedures, scans performed each day for a period of 4 months
- The average time per scan , procedure was calculated
- the total scans, procedures done per day and the total operational time of the equipment was calculated
- The utilisation index for each modality was calculated
- The total number of visits were analysed to find out IPD to OPD ratio

- **Utilisation Index** (Bureau of Indian Standards 1996) **–**

  Utilisation essentially means the use of the equipment to full potential. Utilisation index or Coefficient is one of the important parameters to monitor the functional status of the equipment, the parameter to assess the productivity of a service or equipment

$$\textbf{Utilisation Index} = \frac{N}{M} \times 100$$

Where

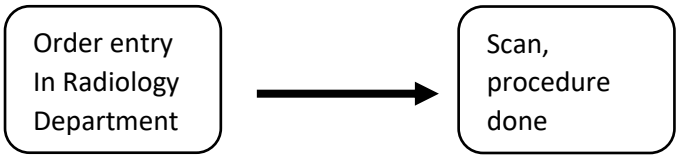
N = Average number of hours the equipment is used per day.

M = Maximum number of hours the equipment can be used per day.

2.1.8 Data Collection and Analysis –

The study was conducted in the radiology department of Columbia Asia Pune branch. The Process was mapped and time from patient registration to end of procedure, scan was calculated. The TAT times were taken from the HIS software.

TAT -



- **Analysis –**

The data was entered in excel. It was cleaned and the sorted to get data for individual modalities.

The utilisation index was calculated separately for ST,MRI, USG and X RAY using the above formula.

Where M was taken as 8 hours for USG, X RAY and 10 hours for ST, MRI.

- **Utilisation of equipment –**

Modality	Total scans	Avg time per scan	Avg scans per day	Avg hrs per day	Max hrs available per day	Utilisation Index
CT	**206**	**0.42**	**2**	**0.72**	**10**	**7.21%**
MRI	**203**	**0.75**	**2**	**1.50**	**10**	**12.79%**
USG	**1163**	**0.45**	**10**	**4.5**	**8**	**54.97%**
X RAY	**1738**	**0.33**	**15**	**4.95**	**8**	**60.85%**

(Table 1)

The utilisation Index if lower than 50% marks underutilisation of that machine.

CT scan and MRI are heavily underutilised at 7.21% and 12.79%. The USG and X RAY utilisation is 54.97% and 60.85% which is above the 50% mark.

Causes of Underutilisation of CT scan and MRI scan

- The hospital is two years old hence the overall patient load in the hospital is less
- Due to tough competition from other hospitals and diagnostic centres in the vicinity.
- The CT scan is 16 slice model but the pricing of the services is equal to a 64 slice CT scan
- Lack of established doctors in key departments like Neurosciences, critical care , general surgery and orthopaedics
- Due to limitations of the CT scan machine coronary angiographies cannot be performed which is a major drawback as most hospitals offer the service in their preventive health check ups
- Due to stringent hospital policies regarding referral charges
- Lack of marketing of radiological services and Health check packages

- **Patient flow –**
  The patient flow is categorized into three streams

- IPD (Inpatient Department) – patients admitted in the Hospital
- OPD (Outpatient Department) – patients availing OPD services
- OTC (Over the Counter) – Walk in patients and referred by other hospitals, nursing homes and private practitioners

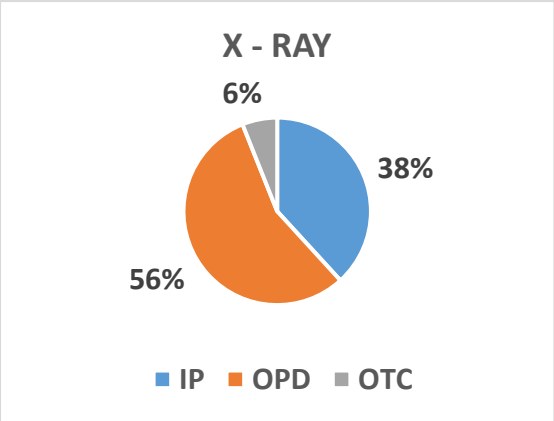


Chart 1

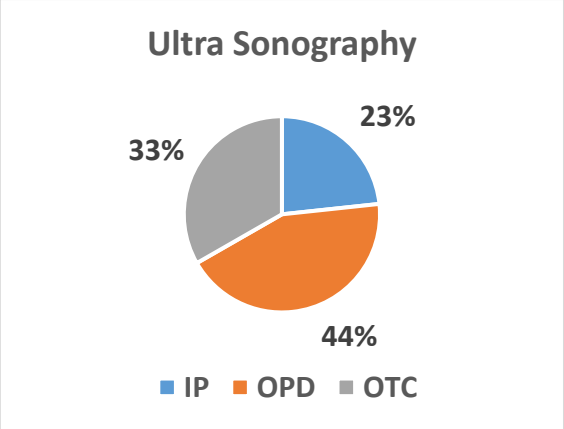


Chart 2

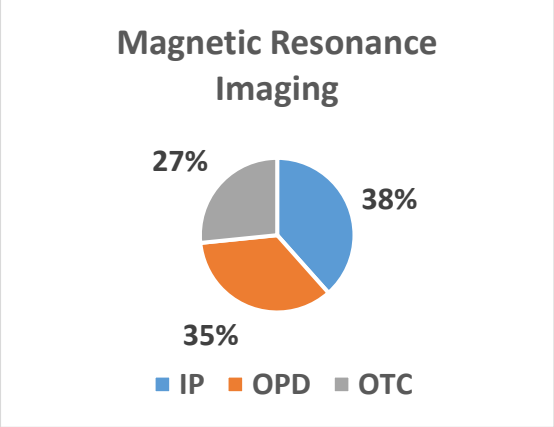


Chart 3

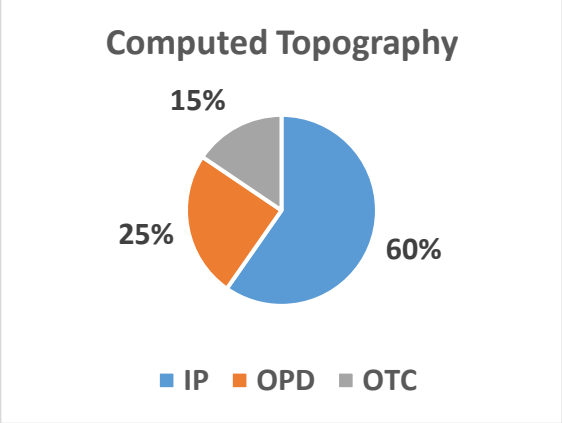


Chart 4

Charts 1 to 4 represent total number of IPD, OPD, OTC patients availing X RAY (1), USG (2), MRI (3) and CT (4) services

The IPD to OPD ratio –

- CT scan – 2 : 1
- MRI scan – 1 : 1
- X RAY – 1 :2
- USG – 1 : 1

The ratio doesn't vary much in case of USG and MRI scan. In case of CT scan the inpatient load is double that of the OPD, visa versa in case of X- RAY

Referred cases and walk-ins in percentage of total -

- CT scan – 15.53%
- MRI scan – 26.6%
- USG – 33.28%
- X- RAY – 6.04%

The referred cases and walk-ins are very low for X- RAY and CT scan

Causes of Low referrals and walk-ins

- Due to tough competition from other hospitals and diagnostic centres in the vicinity.
- The CT scan is 16 slice model but the pricing of the services is equal to a 64 slice CT scan
- Due to stringent hospital policies regarding referral charges
- The public perception of the hospital as expensive
- Lack of marketing of radiological services and Health check packages

2.1.9 Recommendations –

- Change in policy regarding referral charges to outside consultants which will increase the utilisation.
- Strengthening neurosciences, general surgery, critical care, orthopaedic departments by introducing popular consultants.
- Start specialised clinics like Spice clinic, joint clinic etc.
- Similar to stand alone diagnostic centre, tie ups with hospitals and nursing homes which don't have these facilities.
- Restructure the pricing of the services, introduce schemes and discounts.
- Tie ups with ambulance services to increase the load of emergency and trauma cases.
- Aggressive direct to customer marketing of various health check packages.
- Tie up with corporates.
- Tie up with townships and various societies, special discount packages.

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2.2 Project 2 –

2.2.1 Introduction -

Operation Theatre complex is an important profit making unit of clinical hospital operations. The OT Complex includes mainly three areas apart from other supporting areas-Operation rooms/ theatres, Pre-operative recovery area and post-operative recovery area. The concept of Zoning is followed in construction of OT Complex. The numbers of operation-rooms depend upon the size & type of hospital. Operation Rooms are located in central part of hospital building from ground floor to various floors of hospital. This special unit is capital intensive part of hospital as heavy investment is required to build it and to purchase the fixed and movable equipment. Heavy fixed and variable cost is incurred to run this unit. So, it makes utilization of this unit mandatory not only to increase revenues but also to curtail the cost and keep it within control.

In the future, hospitals are expected to treat more patients per year than now. To be able to accomplish this, they have to treat patients more efficiently, given the current growth in demand for hospital care and the resources made available to hospitals.

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Operation Theatre/room complex (Operating theatre. 2015, June 3)

An **operating theatre**, also known as an **operation theatre**, **operating room** (**OR**) or **operating suite**, is a facility within a hospital where surgical operations are carried out in a sterile environment. Historically, the term "operating theatre" referred to a non-sterile, amphitheatre in which students and other spectators could watch surgeons perform surgery.

Contemporary operating rooms are devoid of a theatre setting (though some in teaching hospitals may have small galleries), making the term "operating theatre" a misnomer for the modern facility. Operating rooms are spacious, easy to clean, and well-lit, typically with overhead surgical lights, and may have viewing screens and monitors. Operating rooms are generally windowless and feature controlled temperature and humidity. Special air handlers filter the air and maintain a slightly elevated pressure. Electricity support has backup systems in case of a black-out. Rooms are supplied with wall suction, oxygen, and possibly other, anaesthetic gases. Key equipment consists of the operating table and the anaesthesia cart. In addition, there are tables to set up instruments. There is storage space for common surgical supplies. There are containers for disposables. Outside the operating room is a dedicated scrubbing area that is used by surgeons, anaesthetists, Operating Department

Practitioners (OPDs), and nurses prior to surgery. An operating room has a map to enable the terminal cleaner to realign the operating table and equipment to the desired layout during cleaning.

Several operating rooms are part of the operating suite that forms a distinct section within a health-care facility. Besides the operating rooms and their wash rooms, it contains rooms for personnel to change, wash, and rest, preparation and recovery rooms(s), storage and cleaning facilities, offices, dedicated corridors, and possibly other supportive units. In larger facilities, the operating suite is climate- and air-controlled, and separated from other departments so that only authorized personnel have access.

Advances in technology now support **Hybrid Operating Rooms**, which integrate diagnostic imaging systems such as MRI and Cardiac Catheterization into the operating room to assist surgeons in specialized Neurological and Cardiac procedures.

Brief description of OT complex under study

The OT complex under study was located on the second floor of the hospital. Columbia Asia Hospital has three major OTs and is connected with Central Sterile Supply Department (CSSD). The OT Complex has four Zones - i) **Protective zone**- comprises of waiting room for patient and relatives, changing rooms for all medical and paramedical staff with toilets ii) **Clean Zone** – includes recovery Room (pre and post-op recovery), trolley bay, doctor's room, pantry iii) **Sterile zone** – includes operating room, equipment room, clean utility room, neonatal bassinet, drugs/instrument trolley areas. iv) **Disposal Zone** with dirty utility room (connected to CSSD).

2.2.2 Problem statement -

A gap analysis of the patient flow process of the operation theatre complex in Columbia Asia Hospital Pune.

2.2.3 Review of Literature –

Understanding patient flow. **Department of Health Care Administration, Trinity University. HOLLY S. LEWIS, Feature Editor, Pennsylvania State University (2000).** Cotè, M. J.

There has been an increasing interest in patient logistics with a focus on patient flow among health care providers. There are many reasons for this development, one being that increasing the flow of patients through hospitals is one of "the major elements in improving efficiency in the delivery of health care services" (Côte, 2000:1). This interest thus originates from cost issues and is accentuated by the fact that health institutions are financed on a refund basis where their payments are closely linked to the patient throughput. Côte states that a part of the motivation behind the need to understand patient flow has been brought about by a change in health care operations. In the United States most of the users of health care services paid, until the mid 1980s , health care providers on a cost reimbursement or negotiated cost reimbursement basis.

The system left little incentive to concentrate on efficiency in delivering health care services, and the situation lead to a rapid increase in the cost of health care services. In the mid 1980s the federal government adopted a prospective payment system. Health care providers found themselves dealing with fixed payments for their services and they could no longer pass their cost on to the payers. These consequences created a real incentive for health care providers to concentrate upon efficiency in the delivery of health care services and began to pay attention to patient flow at their facilities, to understand and manage that flow better (Côte, 2000).

In order to relieve pressure on the health care service and to improve the interaction between the health care sectors, one needs to consider the entire patient flow leading up to and away from institutionalization. This calls for "whole system thinking". That would allow for coordination of the policies governing resource allocation across the various stages of the patient flow process and thus a strategy for the management of the patient flow across the various sectors of health care services. An understanding of the patient flow can also offer insight to health care providers so that they recognize themselves as parts of this larger system (Côté, 2000). Another important point in understanding patient flow is the LEON (Laveste Effektive Omsorgsnivå) principle of Lowest Effective Service Level (LESL). In the Norwegian health care this principle states that a patient must be treated within the right time and at the correct professional level. The principle includes that one should not use more

recourses on a health problem then what it takes to address any heath issue at hand effectively, in time and as justifiably close to the patient as possible. There are many reasons why health care providers may find it difficult to follow the LEON principle in the face of issues such as an increasing number of acute patients, unacceptably long waiting list for elective patients and ward overload that causes patients to be inappropriately located and subsequently relocated causing resources to be ineffectively spent and that delays appropriate treatment of patients in need.

Patient Flow in Hospitals: Understanding and Controlling It Better

Carolharaden, PhD and Androgerresar, M.D.

Summary –

Waits, delays, and cancellations are so common in Healthcare, patients and providers assume that waiting is an inevitable, but regrettable part of the care process. For years, hospitals responded to delays by adding resources, more beds and buildings or more staff to deal with an increasingly needy population. Furthermore, as long as payment for services covered the costs, more construction and more staff allowed for continued inefficiencies in the system. Today, few organizations can afford this solution. Moreover, recent work on assessing the reasons for delays suggests that adding resources is not the answer. In many cases, delays are not a resource problem they are a flow problem. The Institute for Healthcare Improvement has worked with more than 60 hospitals in the United States and the United Kingdom to evaluate what influences the smooth and timely flow of patients through hospital departments and to develop and implement methods for improving flow. Specific areas of focus include smoothing the flow of elective surgery, reducing waits for inpatient admission through emergency departments, achieving timely and efficient transfer of patients from the intensive care unit to medical/surgical units, and improving flow from the inpatient setting to long-term-care facilities.

A study of utilization time analysis in operation theatre in a tertiary care hospital of Goa, India

Dr. Ajay Kumar Jain*, Dr. Santosh Kumar Choube**, Dr. Hrishiraj Pawar***

Optimum utilization of the OT complex does not only reduce cost of operations but also increases revenues. Present case study aims at measurement of utilization of Operation Rooms, pre and post-operative Recovery areas of OT complex and identification of bottlenecks needed to be removed for the optimum utilization of operation theatre.

Methodology - This was a prospective and analytical study. The Primary data was collected on routine basis from OT and recovery area of tertiary care hospital of Goa. Sampling was Convenience sampling. The sample size was 111 surgical patients of OT complex during 2 months of study for both the OT-Utilization and Recovery area utilization study was carried out for a period of four weeks. There were totally five OTs of including one hybrid OT. Four OTs out of Five OTs were functional. For OT-Utilization and the Recovery area utilization, the data was collected directly that included: i) Time at which patient is brought inside the pre-op recovery area –the time of movement of patient from the ward to pre-op recovery ii) Time at which patient is taken out from pre-op to main OT iii) Scheduled(listed) time of surgery iv) Exact time of surgery –as noted by self v) For how long the surgery took place vi) When was the patient brought into the post-op recovery area vii) Time of movement of patient from post-op recovery to the ward.

Conclusion -

1. **Time of delay** - On an average every surgery was delayed by 1 hour and 08 minutes. Maximum delay ocurred during Orthopaedic surgeries like Open Reduction and Internal Fixation because approval for TPA patients was delayed due to TPA-procedures.

2. **Pre-operative delay** - On an average every patient was kept in pre op recovery ward by 58 minutes. Maximum delay occurred during surgeries due to pre-surgical check including.

3. **Surgery time** - In major surgeries like Neuro (spine) & orthopaedic (B/L TKR, THR) surgeries took maximum time for surgery.

4. **Post-operative delay -** post op stays in the recovery ward depends upon the kind of surgery the patient undergoes, if the surgery is major like brain surgery on that case patient may require post op stays long duration.

Patient flow at the central surgery unit of Haukeland Universitets Sykehus, A system Dynamic Approach

Charlotte Elise Rosendahl Linge

Summery -

The Central operation division at Haukeland Universitets sykehus is considered to be the

”heart” of the hospital. At the same time surgery units are often singled out as an organizational unit that can constitute a bottleneck in the hospital and it is important to identify bottleneck leading to a sub-optimal flow through the unit. The main objective was to investigate how the patient flow can be improved through a change in the structure underlying the problems at the Central operation division.
The highest production increase was achieved through allowing overtime and adding extra shifts at night. Applying single personnel resources and opening locks resulted in (apart from reducing number of days elective surgeries are performed) the lowest increase in production. An improved planning of the operation program almost halved cancelled surgeries. Adding more shifts also reduced cancellation though in a different matter then the previous mentioned policy. An operation program in itself does not improve the flow, it’s the resources ability to perform the program as planed that leads to an improvement. And a more reliable program eases the job for the personnel resources. The addition of shifts affects the cancellation by treating emergency patients faster and reducing interference with the elective flow. Another good effect of better planning is a cost reduction, but adding personnel is only cost effective if there is a good increase in production. An exogenous element which interacts with the system can inflict the system with added delays and through this raise the average séance time (delayed surgeon).Reducing the delayed improves the patient flow.

2.2.4 Rationale of project –

More and more hospitals are nowadays focused on making their internal processes as efficient as possible, so that time and money are optimally used. Furthermore, they have to improve quality of the services provided to keep them competing within the industry. One of the ways to accomplish this is by optimizing the patient flow planning aspect by understanding this process better.
Increased efficiency is expected to improve patient throughput. In an effort to achieve better efficiency identification and removal of bottlenecks in the system is essential.

2.2.5 Research objective –

- To study the patient flow process in the operation theatre complex.
- To find out gaps in the patient process flow in the operation theatre complex.

2.2.6 Research Methodology –

- **Study Design –**
  Descriptive, prospective study
- **Sample size –**
  Census
- **Inclusion Criteria –**
  All elective cases in the operation theatre complex from 8 am to 4 pm.
- **Exclusion Criteria –**
  All emergency cases.

2.2.7 Tools and techniques –

The Primary data was collected on routine basis from OT and recovery area of Columbia Asia Hospital Pune. Whole process of OT patient flow process was understood. Process mapping for the surgeries being performed was developed and track of activities taking place were monitored.

2.2.8 Data collection and analysis -

The process was divided into three phases (i) Pre-Operative (ii) Intra- operative and (iii) Post- operative. Each stage of the process was carefully observed right from the entry of the patient in the pre operation room to exit from post recovery room. Data was collected from 11th May 2015 to 23rd May 2015.

(The format used for data collection is given in annexure I)

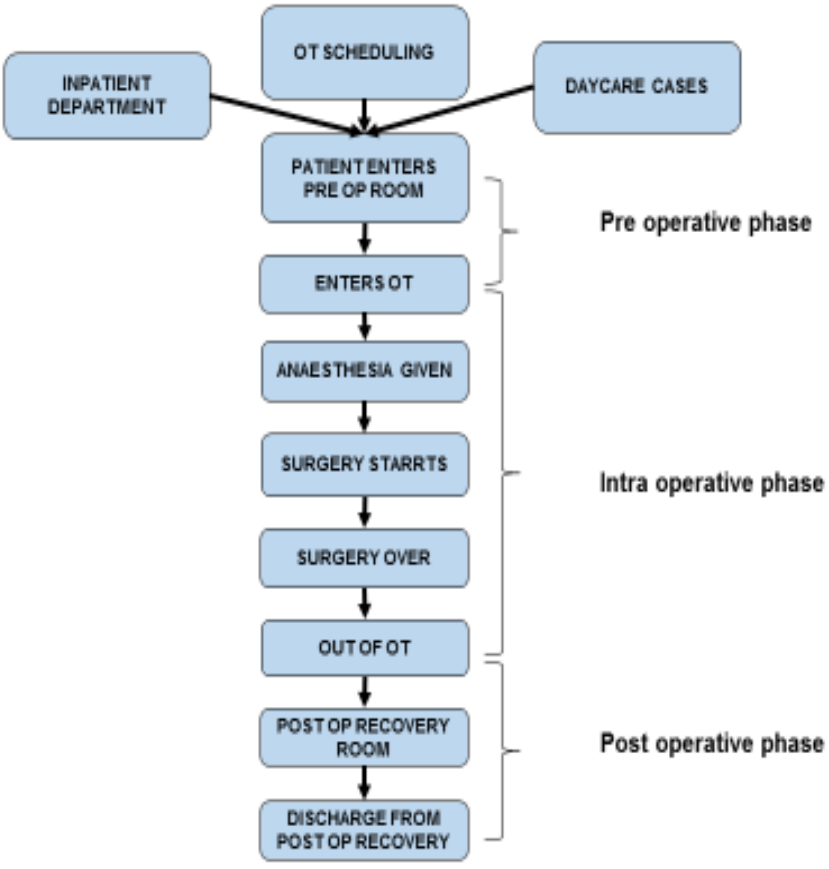

Chart 1.0 – Patient flowchart in the Operation Theatre Complex

The cases are scheduled one day in advance. The OT list is prepared at 5 pm and circulated in all concerned departments by 5:30 to 6 pm. Before sending the patient to the OT complex the nursing staff is supposed to follow the pre-operative instructions given by the operating surgeon and the physician. They have to fill in the checklist and take all the required consents.

(I) Pre-operative phase -

For elective cases the patient is to be brought to the OT complex at least half an hour before the scheduled procedure. In case of any change in the schedule, OT manager communicates the same to the nursing staff. While handing over the patient to OT the ward nurses have to insure that all the documents, investigation reports are attached, consent is taken. The checklist is handed over to the OT nurses. Once in the Pre-operating room the anaesthetist does a pre-anaesthetic evaluation. Patient is prepared for the procedure.
Once the previous procedure is over, OT is prepared for the next procedure.

(II) Intra-operative phase –

Patient is taken in the operation theatre. The patient is draped, painted and put in position for the surgery. Anaesthesia is given depending upon the procedure.
Surgeon carries out the procedure. Post procedure the patient is shifted out into Post-operative room.

(III) Post-operative phase –

Once the patient is stable, with doctor's consent the patient is shifted out of the post-operative recovery room to either ward, or Intensive care unit.
The duration of stay in the post-operative recovery varies with surgery.

- **Data analysis and interpretation –**

The data was entered in excel. Data was cleaned and sorted.
Gaps in each phase were studied separately.

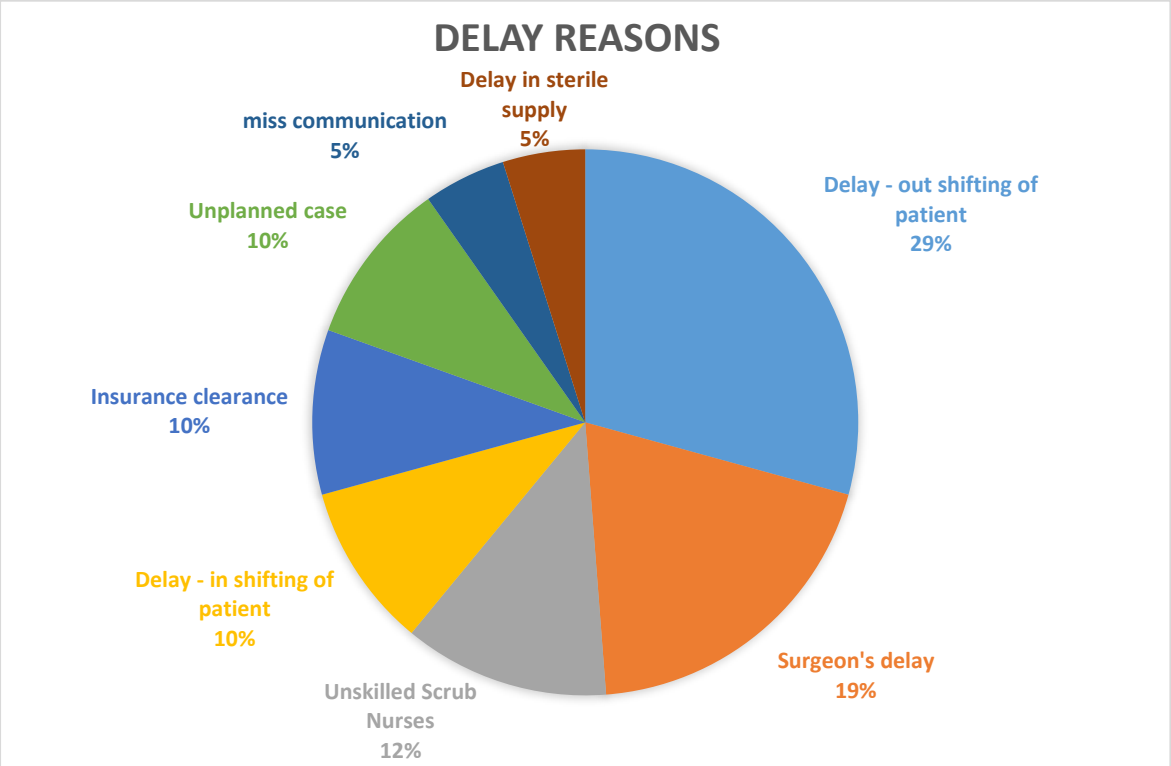

Chart 2.0 – Major Reasons for delay in patient flow process.

Reasons for Delay	Cases
Delay – Out shifting of patient	12
Surgeon's delay	8
Unskilled scrub nurse	5
Delay – in shifting of patient	4
Insurance clearance	4
Unplanned clearance	4
Miss communication	2
Delay In sterile supplies	2
No delay	9
Total cases	**50**

Table 1.0 – Reasons for delay and frequency of cases.

Out of total 50 cases 41 cases (82%) were delayed due to some reason.

Major reasons for delay were shifting of patients in and out of OT complex (43%), surgeon's delay (22%), unskilled scrub nurses (13%), insurance clearance (11%) and unplanned cases (11%).

(I) Pre-operative phase -

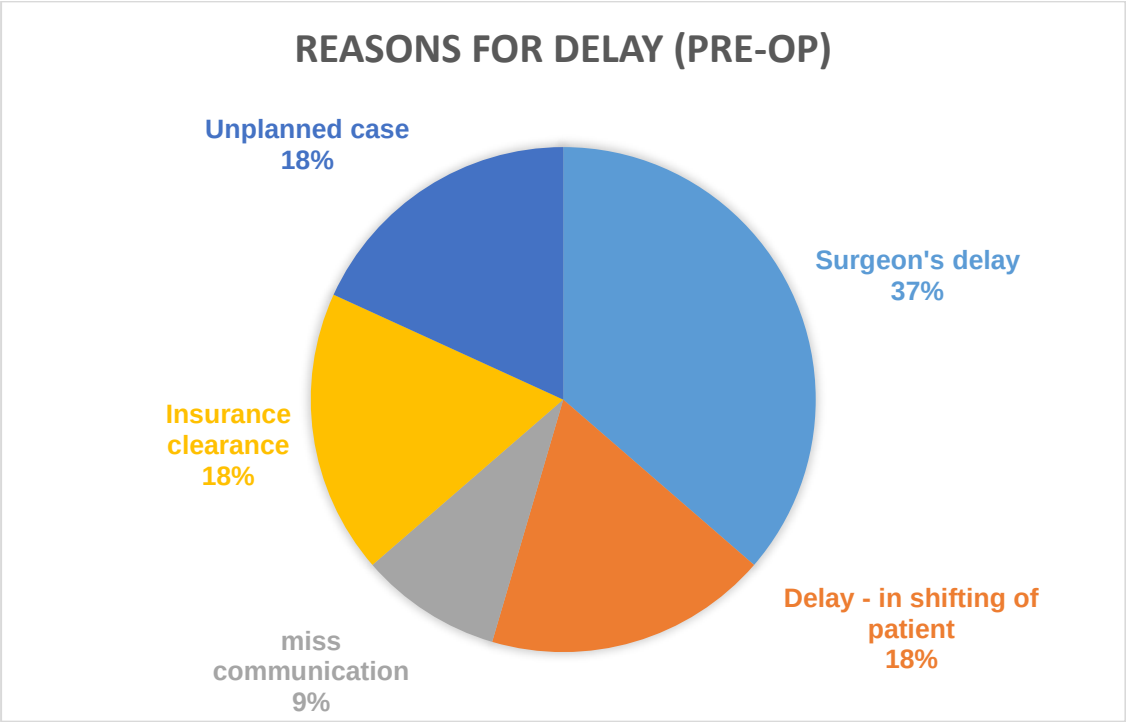

Chart 3.0 – Reasons for delay in pre-operative phase

In case of pre-operative phase maximum delay is caused by surgeon, shifting of patient to the OT complex, insurance clearances and unplanned cases.

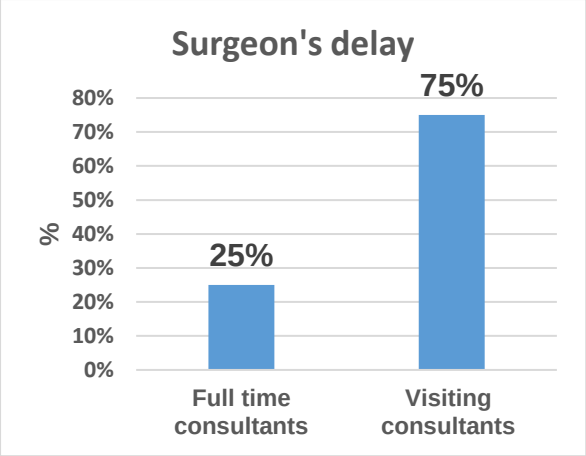

Chart 3.0 – Delay due to full-time vs visiting consultants

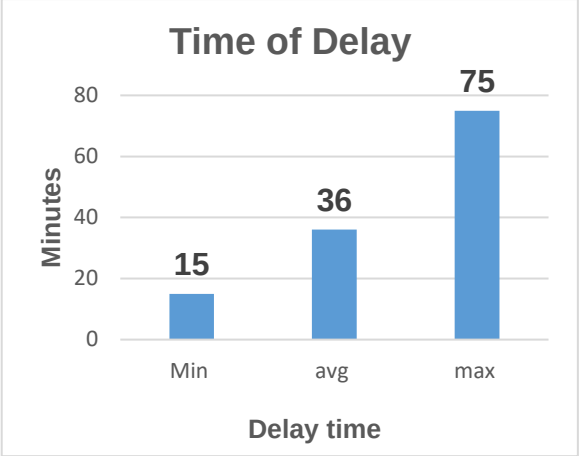

Chart 4.0 – Minimum, average and maximum time of delay

Pre-operative delay was observed in 44% of cases (22 out of 50 cases).
It was observed that most surgeon delays were caused due to visiting consultants (75%).
Average time of delay was around 36 minutes while maximum was 75 minutes.

Pre-operative delay was seen more in cases scheduled in the afternoon than morning.

- Many times operating surgeon doesn't report to the operating theatre on time due to various reasons. This problem was particularly common in visiting consultants as they operate and conduct OPD in other hospitals as well.

- As the hospital is still new it's not operating at full capacity. On an average 8 procedures are done on daily basis. To maximise the utilisation unplanned cases are accepted. This breaks the entire process chain as most of the times the surgeon informs half an hour to one hour prior leaving no time for the staff to prepare for the case.

- Most patients in Columbia Asia are insured patients. Many times it takes time to process the insurance which causes delay.

- It is the ward nurse's responsibility to bring the patient to the Pre-operative room half an before the procedure. Many times they are busy in ward work which leads to delay in transfer of patient.

- OT schedule is not fixed and surgeons can book cases whenever they want. The OT list is printed and circulated at 5 o'clock. The chances of miss communication increase for any case booked post 5 o'clock which leads to delay.

(II) Intra-operative Delay –

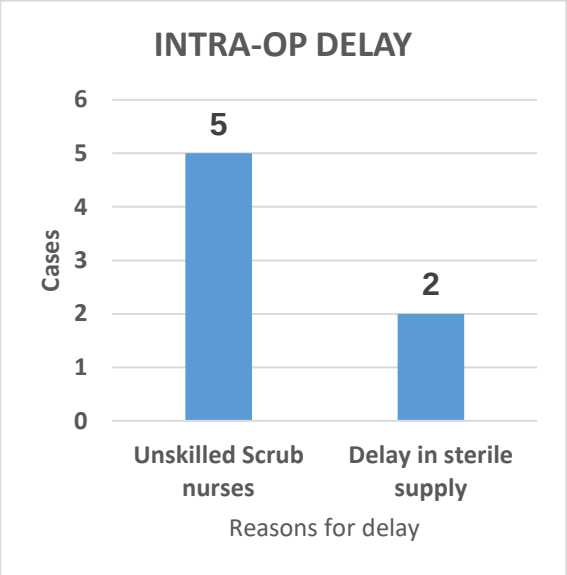

Chart 5.0 – Reasons for intra-operative delay

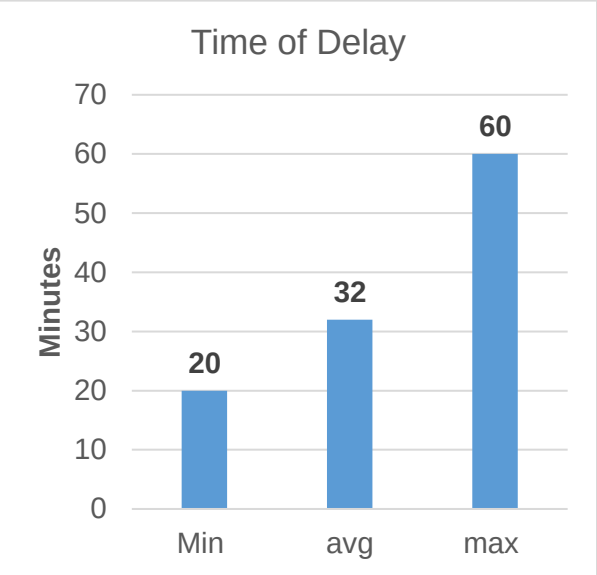

Chart 6.0 – Minimum, average and maximum time of delay

Intra-operative delay was observed in 14% cases (7 cases out of 50)
Major reason for intra-operative delay is due to unskilled scrub nurses. This was specifically observed in orthopaedics and General surgery cases.

- Unskilled scrub nurses is a major bottleneck. The tools and techniques of surgeries differ department wise. Availability of a skilled scrub nurse can improve the efficiency of the operating surgeon.

- Delay in sterile supply usually occurs for unplanned cases as the OT staff doesn't have enough time to prepare.

(III) Post-operative delay –

Post-operative delay was observed in 24% cases (12 cases out of 50)
Post-operative delay was due to delay in out shifting of patients to ICU and wards.

- It is the ward nurse's responsibility to shift the patient from post-operative recovery room to ward or ICU. The ward nurses are busy with ward work causing delay in shifting the patient.

- The delay was more in shifting the patient to ward than ICU. It was observed that in case the ICU nurses are busy the OT nurses have to change and shift the patient which hampers the OT schedule

2.2.9 Recommendations –

- First case should reach O.T. in time from the ward, to allow the O.T. to be started on time.
- The first case to be done in OT must be In-house so that delay because of late admission of the patient in the hospital can be avoided.
- The morning slots should be allotted to the full time consultants as much as possible.
- Constant communication with doctors responsible for delay.
- Adopt full time consultant model as far as possible.
- Online scheduling service, which will enable surgeons to directly schedule cases on their own which can be viewed in real time.
- Effective text message system for OT scheduling, where in a text message will be sent to all the concerned department heads once a case is booked , this will eliminate the chances of miss communication.
- Better coordination amongst the ward nurses and nurse aids.
- Once the hospital occupancy increases special transport team can be formed to take care of all transports to and from different departments.
- Policy change in case of insurance patient admission wherein patient will be admitted only after insurance clearance is obtained for the procedure to be performed.
- Preformed surgical kits for commonly performed surgeries. This will reduce preparation time and increase the efficiency.
- Hire trained scrub nurses for Orthopaedics and general surgery (trained to handle laproscopic surgeries)
- Initiate a incentive program for scrub nurses. Attrition amongst nurses is very high due to demand supply mismatch. But loosing skilled staff like scrub nurses can have adverse effects on OT which is a high revenue generating centre.

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3. Annexures –

3.1 Data collection table for Project 1

Date	Start time	Document number	Description of test	Machine time

3.2 Data collection table for Project 2

Surgery	Department	Pre op delay	Intra op delay	Post op delay	Reason for delay	Doctor (Full time/visiting)