Summer Training at
Fortis Memorial Research Institute,
Gurgaon

Fortis Operating System (FOS)

By
Savin Yadav

Under the guidance of
Dr. S.D. Gupta

MBA Hospital and Health Management
2015-2017

The IIHMR University, Jaipur
2016

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

IIHMR UNIVERSITY

CERTIFICATE

This is to certify Dr Savin Yadav student of **MBA in Hospital and Health Management, 2015-17** from the IIHMR University; Jaipur has undergone summer training from 1st April to 31st May, 2016.

The candidate has successfully carried out the study designated to her during summer training and her approach to the study has been sincere, scientific & analytical.

The internship is in fulfilment of the course requirements.

I wish her all success in future endeavours.

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Fortis MEMORIAL
RESEARCH INSTITUTE
GURGAON

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2nd June'16

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Savin Yadav** has undergone a voluntary internship in **"OPD Department"** from**4th April to 2nd June'16.**

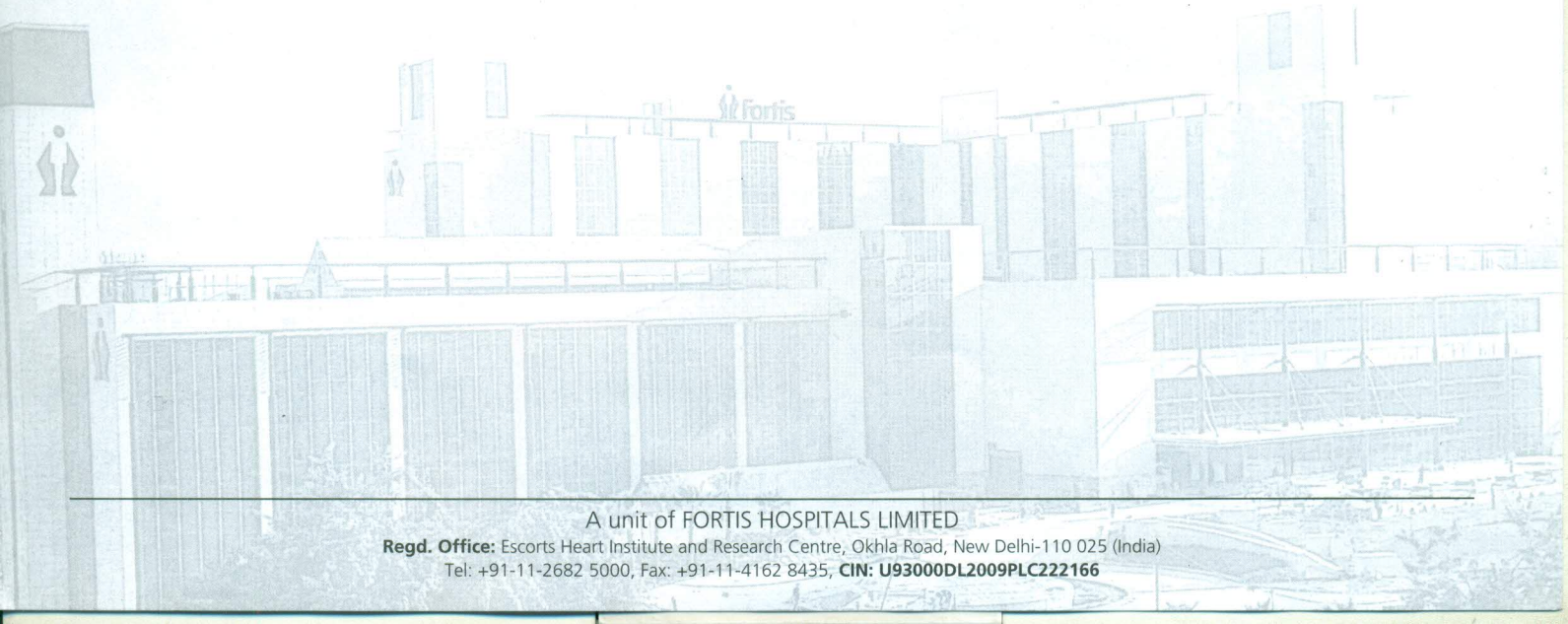
During his training **Dr. Savin Yadav** exhibited a high level of professionalism and a tremendous zest for learning.

We wish Dr. Savin all the best in her future endeavors.

With Best Wishes,

Ritu Verma
Head- Human Resources

Head of the Department



ACKNOWLEDGEMENT

The successful completion of any given task requires a lot of hard work and sincere efforts. Hard work and efforts are only the building blocks of an assignment, but the plinth has to be inspiration, suggestion, support and guidance.

Experience in a hospital environment is an important part of my course and this I have achieved from one of the esteemed health care organisation, Fortis Memorial Research Institute, Gurgaon. These two months of training has added a valuable and knowledgeable exposure in the development of my career and achievement of my objectives, for which I am highly grateful to the organisation.

Any attempt at any level cannot be a success without the support and direction of learned people. A heartfelt gratitude to **DR. SIMERDEEP SINGH GILL** (Regional Director) for giving me the golden opportunity to work with the India's leading health care provider.

My heartfelt gratitude to **RITU VERMA** (Head HR) for showing keen interest in my training , helping me to plan our agenda and guide me despite his busy schedule. Foremost, I would like to thank Mr **BHGAT SINGH MALIK**, OPD Head, FMRI, Gurgaon, who was kind enough to spare his valuable time and provided several important suggestions at every stage of my study. His impeccable suggestions have added loads of value to my knowledge base.

I would like to express my immense gratitude to **Miss KAVITA MEHTA** and **Mr DINESH** for providing support and guidance not only for the project in the hospital , but for broadening my horizon and making me learn various other aspects of hospital functioning, which will definitely help me a lot in my career.

My learning here in two months is all because of their help. Sincere thanks to all the staff at all levels for helping me at each and every step of my work.

TABLE OF CONTENT:-

ACRONYMS / ABBREVIATIONS:-

- FMRI – Fortis Memorial Research Institute
- FOS- Fortis operating system
- PCS- Patient care service
- ED – Emergency Department
- CSSD – Central Sterile Services Department
- CT – Computerized Topography
- ECG – Electrocardiogram
- FMS – Facility Management and safety
- HR – Human Resource
- ICU – Intensive Care Unit
- IPD – In-patient Department
- IT – Information Technology
- MICU – Medical Intensive Care Unit
- OPD - Out-patient Department
- OT – Operation Theatre
- DICOM – Digital Imaging and communication in medicines
- RFID – Radio Frequency Identification
- CPOE – Computerized physician order entry
- EMR – Electronic Medical Record
- PHC – Preventive Health Check-up
- POD- Person on duty
- MOD- Manager on duty
- MRD- Medical record department

INTRODUCTION:-

Summer training is an integral part of the MBA in hospital and health management.

The main purpose of this summer training is to get an orientation towards the layout, operations and workflow of the hospital, in order to understand the processes and systems in the hospital.

After completing the first academic year of MBA-HM, the students are supposed to undergo a two months training in a hospital, as a part of the curriculum.

Indeed I have got the golden opportunity to work in Asia's leading Healthcare provider, Fortis Group of Hospitals.

I joined Fortis Memorial Research Institute, Gurgaon, from 4th April 2016 for summer internship. The duration for summer training is of two months i.e. 4th April to 2th June 2016.

AIM:-

To have an overall orientation of the hospital setting.

OBJECTIVES:-

The overall objectives of the field training are:-

(a) To understand and learn day to day micro level operational management of a hospital/health care organisation.

(b) To gather knowledge about the process flow of major clinical and non-clinical departments in a hospital.

(c) To study identified issues/problems associated with some specific operational area/programmes.

SECTION – A

“Hospital Orientation

&

Departmental Study”

ORGANIZATIONAL PROFILE: FORTIS HEALTH CARE LIMITED

Fortis health care limited is a leading, pan Asia Pacific, integrated health care delivery provider. The healthcare verticals of the company span diagnostics, primary care and day care specialty and hospitals, with an asset base in 11 countries, many of which represent the fastest growing healthcare delivery markets in the world.

Currently, the company operates its healthcare delivery network in Australia, Canada, Dubai, Hong Kong, India, Mauritius, New Zealand, Singapore, Sri Lanka, Nepal and Vietnam with 76 hospitals, over 12,000 beds, over 600 primary care centres, 191 day care specialty centres, over 230 diagnostic centres and a talent pool of over 23,000 people.

The Fortis Logo

LOGO

"A HEALING PASSION"

The Fortis Healthcare Limited Logo defines the commitment to patient care. The logo reflects their endeavour to achieve excellence in healthcare delivery system by bringing together the best of technology, medical expertise and patient care. The logo also implies the human values that govern every facet of our organisation.

The two nurturing hands along with a red dot on the top depicts- "nurturing hands caring for human life"

GREEN is a colour of healing and depicts WELLBEING and RED is symbolic of steadfast focus, dynamic zeal and enthusiasm.

MISSION:

FMRI- To be the ultimate healthcare destination – "Mecca of Medicine"
• *FORTIS -To provide tertiary/quaternary care to the community in a compassionate, dignified and distinctive manner*
Motto: "Best is the Least We Can Do"

VISION:

Globally respected healthcare organization recognized for **Clinical Excellence** and **Distinctive Patient Care.**

VALUES:

They serve as a guideline for the routine conduct of each Fortisian. The core values of Fortis healthcare are:

Patient centricity	• Commit to 'best outcomes and experience' for our patients • Treat patients and their caregivers with compassion, care and understanding. • Our patients' needs will come first.
Integrity	• Be principled, open and honest. • Model and live our values. • Demonstrate moral courage to speak up and do the right things.
Teamwork	• Proactively support each other and operate as one team. • Respect and value people at all levels with different opinions, experiences and backgrounds. • Put organisation needs' before department / self-interest.
Ownership	• Be responsible and take pride in our actions. • Take initiative and go beyond the call of duty. • Deliver commitment and agreement made.
Innovation	• Continuously improve and innovate to exceed expectations. • Adopt a 'can do' attitude. • Challenge ourselves to do things differently.

FORTIS MEMORIAL RESEARCH INSTITUTE, GURGAON (FMRI)

FMRI is a multi-super specialty, quaternary care hospital with an enviable international faculty, reputed clinicians, including super-sub specialists and specialty nurses, supported by cutting-edge technology. A premium, referral hospital, it endeavours to be the 'Mecca of healthcare' for Asia Pacific and beyond. Set on a spacious 11-acre campus with 1000 beds, this 'Next Generation Hospital' is built on the foundation of 'Trust' and rests on the four strong pillars Talent, Technology, Infrastructure and Service.

INFRASTRUCTURE: - With landscaped greens, tranquil water bodies, sculptures, sunlit interiors, Fortis Memorial Research Institute follows a design philosophy aimed at healing. The hospital has been built keeping in mind all round wellness – mind, body and soul. Simultaneously meet simple needs of the caring attendants by means of facilities as the Tummy Luck, Meditorium, R&R Lounge, Holistic Health, Mamma Mia, Retail Therapy, Crèche,

FMRI FAQ

- Area of Hospital- 10.76 Acres
- Entry & Exit Points- 4
- Built up area- 750,000 sq. ft.
- Height of Hospital- 27.95 meters
- Lifts and Dumb Waiters- 10 and 3 respectively
- Staircases- 10
- Floors- 9
- MGPS- Medical Gas Pipeline system

BASEMENT

 Engineering and Biomedical

 Contractual Staff Dining

 Materials and Purchase

 PTS blower room

 Stores: Pharmacy, Kitchen & General store

 Radiation Oncology: ELEKTA's 2 Linear Accelerators with navigation system. Synergy and Accesses.

 First collaboration between Brain lab & ELEKTA in radiation oncology department

 MRD

 Mortuary

 Nursing training room

 Parking for staff and visitors

LOWER GROUND

➢Radiology with:-

•Asia's first Ingina's 3 Tesla MRI

•256 Slice i CT scan with Skylight

 NIC

 Nuclear medicine with PET-CT & Gamma camera

 Emergency

 CSSD

 In house Laundry

 SRL's Open Laboratory

 Fortis Totipotent Rx

 60 OPD's for Oncology, Paediatrics, Orthopaedics, Neurology and other medical and Surgical OPD's

 Staff entry, Fire control room & Mammamia

UPPER GROUND

- "Health 4 u" Preventive health Check

 Media Mart, Media Rent and Fila

 Chicco, Bouncing Babies, Religare Wellness Pharmacy & Being Human, Baby Oye, Fortibakes.

 IPD admissions and International Patient Services

 Tummy Luck-Subway, Haldiram's, Baskin Robbins and Whole Foods, Crunch box, Joost Food Ventures.

 Fortiplex- 36 seater Mini Theatre.

 VIP lounge

 Mother and Child, Breast Clinic and IVF

 Kitchen

 Administrative offices

FIRST FLOOR

- 4 Labour Delivery Suites with 02 Labour Rooms
- Meditorium- a 111 seat auditorium
- 40- Bedded Nightingale ward
- Paediatric Unit with 9 beds
- 11 bedded Dialysis Unit
- 10 bedded Chemotherapy Unit
- In-house blood bank
- Pathology Lab
- Rest and Relaxation (R &R) Lounge, with 76 recliners and 31 cubicles
- 13 Neonatal ICU warmers / incubators with a 5 bedded Well Baby Nursery

SECOND FLOOR

 Intensive Care Unit: 8 ICUs with Philips' IntelliVue
Clinical Information Portfolio (ICIP)
 Operation Theatre: 10Modular Operating Rooms (12 in total: 1 in ER & 1 in 1st Floor)

 Catheterization Laboratory, Single Plane and Neuro cath lab (12 bedded, Pre/Post Cath)

 Six Bone Marrow Transplant units.

 Three EndoscopySuites, (5 bedded Pre/post endo)

 98 Beds in ICU's including NICU (Excluding Cath lab and endoscopy suites)

 7 Beds in Liver Transplant ICU

THIRD AND FORTH FLOOR

- 23 Single Beds on 3rd Floor and 24 Single Beds on 4th Floor
- 44 Double Beds on 3rd Floor and 44 Double Beds on 4th Floor
- Nuclear Medicine Therapy room on 3rd floor
- Discharge Area on each floor
- Patient Attendant waiting Lounge on each floor
- Three wings T1, T2 and T3
- One Central Nursing Station on each Floor

CLINICAL INFRASTRUCTURE

Operation Theatres	12	NICU & Nursery	18
Cath Labs	2	Dialysis	11
LINAC	2	Chemotherapy	10
LDR Suites	4	Pre & Post Cath	12
Delivery Rooms	2	ER Beds	14
Endoscopy Suites	3	Labour beds	3
Nightingale ward	40	Pre-OP	6
Double Bed Rooms	88	Pre post Endo	5
Single Bed Rooms	47	ICU beds	98
Deluxe Rooms	8	Operating Rooms	12
Suites	4	Operating Beds (Internal Info Only)	288
Signature Apartment		1	
Maharaja Suite		1	

SIGNATURE FLOOR

- 1 Signature Apartment
- 1 Maharaja Suite Room

- 4 Suite Rooms
- 8 Deluxe Rooms

- Express check-in and check out
- Executive Offices & Board room

Cutting Edge Specialities are: - Organ Transplant, Robotic Surgery, Stem Cell Therapy

DEPARTMENTAL PROFILE

OPD:-

Functions:-

- Reception/Information
- Appointment
- Registration-OPD, Diagnosis
- Billing-OPD, diagnostics, emergency
- Report/document delivery
- Customer feedback

REGISTRATION PROCESS

PATIENT ENTERS INTO THE HOSPITAL

PATIENT RECEIVES TOKEN AT TOKEN MACHINE

PATIENT APPROACHES THE OPD REGISTRATION

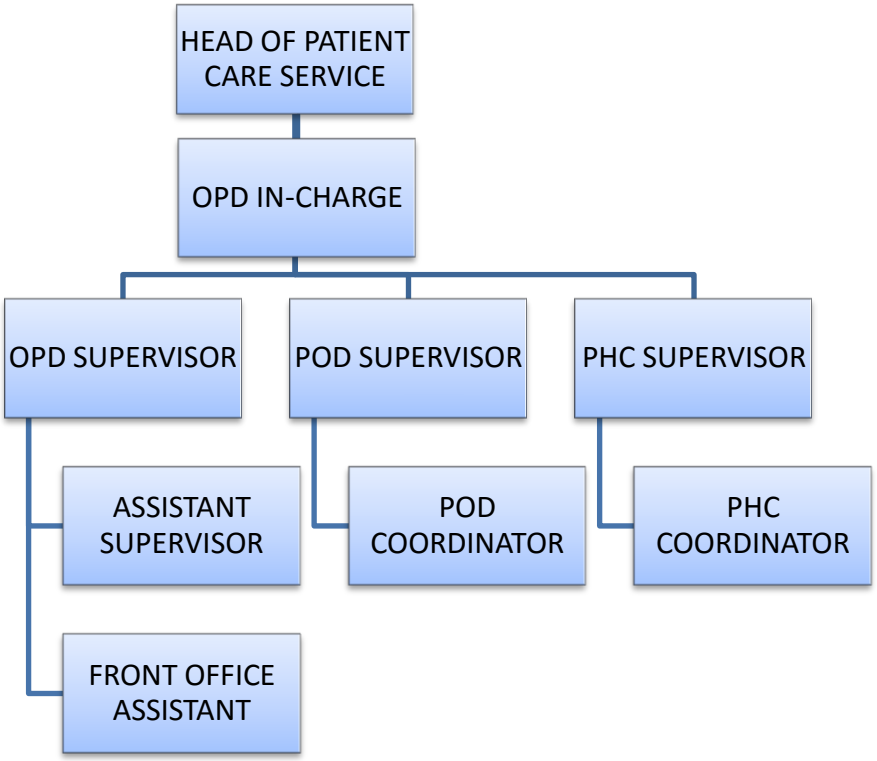
PATIENT FILLS THE REGISTRATION FORM

INFORMATION IS ENTERED IN TO THE HIS OF THE HOSPITAL

THEN, UHID (UNIQUE HOSPITAL IDENTIFICATION) IS GENERATED

BILLS ARE PROCESSED

ORGANOGRAM FOR OPD:-



HR DEPARTMENT:-

Functions:

- Development of HR policies and strategies
- Manpower planning
- Recruitment and selection
- Employee training
- Salary determination
- Performance appraisal
- Personnel data entry and record maintenance
- Consultation and advisory services to management and employees
- Grievance handling

MEDICAL RECORD DEPARTMENT:-

Functions:

- Proper storage and maintenance of medical records. Maintenance of integrity and confidentiality of medical records. Submission of required data to government. Classify the medical files as per ICD-10 obtaining missing patient files.

IT DEPARTMENT:-

Functions: Maintenance of all the software's in the hospital. Modifications of the software are as per the requirements of the department. It covers the following modules:-

IPD Billing

OPD Billing

Administration

House Keeping

Ward/Nursing

Diet

Visitor's Pass

Stores

Purchase

Laboratory Information System

Radiology Information System

ACCIDENT AND EMERGENCY DEPARTMENT:-

The ED in a hospital plays a very important role for all people who are in acute need of immediate care. The ED at FMRI is 6 bedded along with 8 beds in observational room. Also there is a procedure room to conduct simple surgical procedure.ED has separate entry, far away from the general entry and is quite spacious in order to allow free movement of stretchers/trolleys from ambulance to the emergency room.

While bringing in the patient from ambulance, TRIAGE is done so patients are placed according to the triage beds.

The TRIAGE pattern followed here is:-

- 1 red bed for category 1 patients i.e. critically ill.
- 2 yellow beds for category 2 patients who need to be admitted.
- Remaining category 3 patients are kept in observation room.

A code blue team is designated which consists of:-

a) Critical care team
b) Emergency team
c) Cardiology team
d) Anaesthetist team

BLOOD BANK:-

A blood bank is a bank of blood and blood components, gathered as a result of blood donation or collection, stored and preserved for later use in blood transfusion.

LICENSE: - Blood bank of FMRI, Gurgaon is located on first floor. It is NABH and NACO accredited and was able to get the accreditation within six months of the functioning of the hospital. The blood bank has a valid license from Central Drugs Standard Control Organisation (CDSCO) and approved by Drug Controller General (INDIA), central license approving authority under Drug and Cosmetic Rules-1945 with further amendments.

The blood bank is run by the FMRI in order to provide blood and blood components to its patients and is licensed by Drug Controller of India.

LABORATORY:-

The laboratory here at Fortis is outsourced to SRL Lab and all the routine investigations are carried out here only. The samples are received from both IPD and OPD patients. The sample is received in boxes from departments and the house keeping staff carries the same. Also, for emergency investigations, a red seal is marked on the sample so as to give it a priority. Also, all the equipments in the lab are automated i.e. they are linked to computers and so all the test results are automatically transferred in the computer and a report is generated. The laboratory has LIS. It is connected to the HIS of the hospital in which the entire information like- patient's name, IPID or UHID, test to be done and the reports is stored. Also, to maintain employee safety i.e. prevent occupational hazard, when an infected sample or any chemical bottle breaks in the laboratory, HAZMAT(Hazardous Material) team is called and immediately the spillage is cleaned up.

CSSD:-

CSSD stands for central sterile supply department. It is the department that is solely responsible for sterilization of all the instruments used all over the hospital.

CSSD has three zones:

a) Dirty/Receiving area
b) Clean area
c) Sterile area

a) In dirty area all used instruments from IPD and OPD are received. This movement takes place manually, while it is received through a dumb waiter from OT. Here, an ultrasound cleaner is located. This is a fully automatic machine in which the used instruments are dipped in a solution and are sterilized. This machine produces vibrations which sterilize the instruments. After the above procedure is over, the sterilized instruments are washed under running water. After this, the sterilized instruments are dipped in preserve solution for 10-15 minutes.
b) In clean area the sterilized instruments are kept packed in a double wrapped green colour cloth.
c) In Sterile area there is 1 autoclave machine that is used to sterilize the used instruments. It is a double door machine. Through one door the unsterile instruments are loaded and through the other door the instruments are de-loaded after the procedure are over.
Temperature is set according to the instrument to be sterilized.

After the sterilization process is over, the sterilized instruments are packed and batch monitoring labelling is done through a labelling gun. This labelling consists of:-

- ✓ Expiry Date
- ✓ Packaging Date
- ✓ Machine No.
- ✓ Loading No.
- ✓ Sterilization Date

ICU:-

ICU is located at the second floor of the IPD building making it accessible to all the outside services like lab, diagnostics, OT's etc.

There are 7 different types of ICU's in the hospital which are as follows:-

- Neurology, orthopaedic, polytrauma
- Cardiology and Transplant
- CTVS
- Medical ICU
- Bone Marrow Transplant
- Paediatrics ICU
- NICU

The nursing station is centrally located in the ICU and the nurse to patient ratio in ICU is 1:1or 1:2 as per the requirement.

Also, here at FHN, Barrier nursing is practiced in ICU's so as to minimize the risk of Hospital Acquired Infection (HAI).

Equipments used in ICU- a) Ventilator b) IABP (Intra Aortic Balloon Pump) c) Suction d) ICD (Inter Costal Drainage System) e) Portable Ultrasound-ray (when needed) f) DVT (Deep Vein Thrombosis) Pump g) Bi-pap to give oxygen to patient. There are 98 beds (52 ventilated) cubicles.

OPERATION THEATERS

The operation theatres are located on the 2nd floor of the OPD building having a direct connectivity with ICU (2nd floor of IPD building) so that patient is easily and quickly shifted to and from the ICU'

At FMRI, there are 8 OT's-

1) OT 1- Orthopaedics & Liver Transplant OT
2) OT 2 & OT 3- Neurosurgery OT
3) OT 4- Major & General
4) OT 5- Cardiac & Transplant
5) OT 6- Planned & emergency cases
6) OT 7- MIS, Minor day care & emergency
7) OT 8- Minor surgeries

ZONING:-It is basically dividing the OT area according to the hygiene maintained in the different zones. Here we observed three zones:-

a) DIRTY ZONE i.e. outside corridor, changing rooms.
b) CLEAN ZONE i.e. supply store, scrub area, pre-op room.
c) ASEPTIC ZONE i.e. operation theatre, sterile preparation.

This zoning is very essential in OT's as it helps to prevent infection.

SECTION-B: PROJECT

ON

FORTIS OPERATING SYSTEM

(FOS)

INTRODUCTION:-

An **outpatient department** or **outpatient clinic** is the part of a hospital designed for the treatment of outpatients, people with health problems who visit the hospital for diagnosis or treatment, but do not at this time require a bed or to be admitted for overnight care.

At FMRI, there are 60 OPD's in total for all departments. An average of 500 patients is seen each day. OPD is distributed in 2 parts:

- Upper ground floor – admissions, international patient lounge, dental, ophthalmic departments, nephrology etc.

- Lower ground floor – billing counters, laboratory, oncology, internal medicine, orthopaedic, psychiatric, neurology, paediatric, and cardiology department etc.

FUNCTIONS OF OPD:-

General functions of an OPD are as follows:

- Information /reception
- appointment
- registration-OPD , Diagnosis
- report/document delivery
- customer feedback

FOS team keeps a check on turnaround time of patients in OPD.

TURNAROUND TIME: time taken during the patient enters a hospital till he gets to meet the doctor for consultation.it includes billing time and waiting time for doctor.

After analysing the feedback forms filled by patients, it has been observed that 80 -90 % of patients were complaining about long queue for billing and too much waiting for consulting doctor. So FOS team decided to work upon the turnaround time of OPD patient.

OBJECTIVES:-

1. To minimize the turnaround time for OPD patient and make OPD flow swift.
2. To standardize all patient care services.
3. To maintain authentic FOS data for all OPD's.
4. To analyse and improve hurdles in OPD flow.

RESEARCH METHODOLOGY:-

S**tudy type:** An interventional study was carried out within a time period of 60 days and turnaround time was calculated for each patient of internal medicine.

Area and period of study: The study was carried out in outpatient department located in lower ground floor of the hospital in a time period of two months.

Sampling: 100% sample was taken from 7th April to 31st july 2016

Data collection:

- Primary data source: By direct observation of the processes & discussion with the staff.
- Secondary data source: Review of OPD Billing system and appointment schedule given in ORACLE software.
- Two sets of data was collected for the following timing of patients:
  1. Billing time
  2. Appointment time
  3. In time (when patient went inside doctors consultation room).

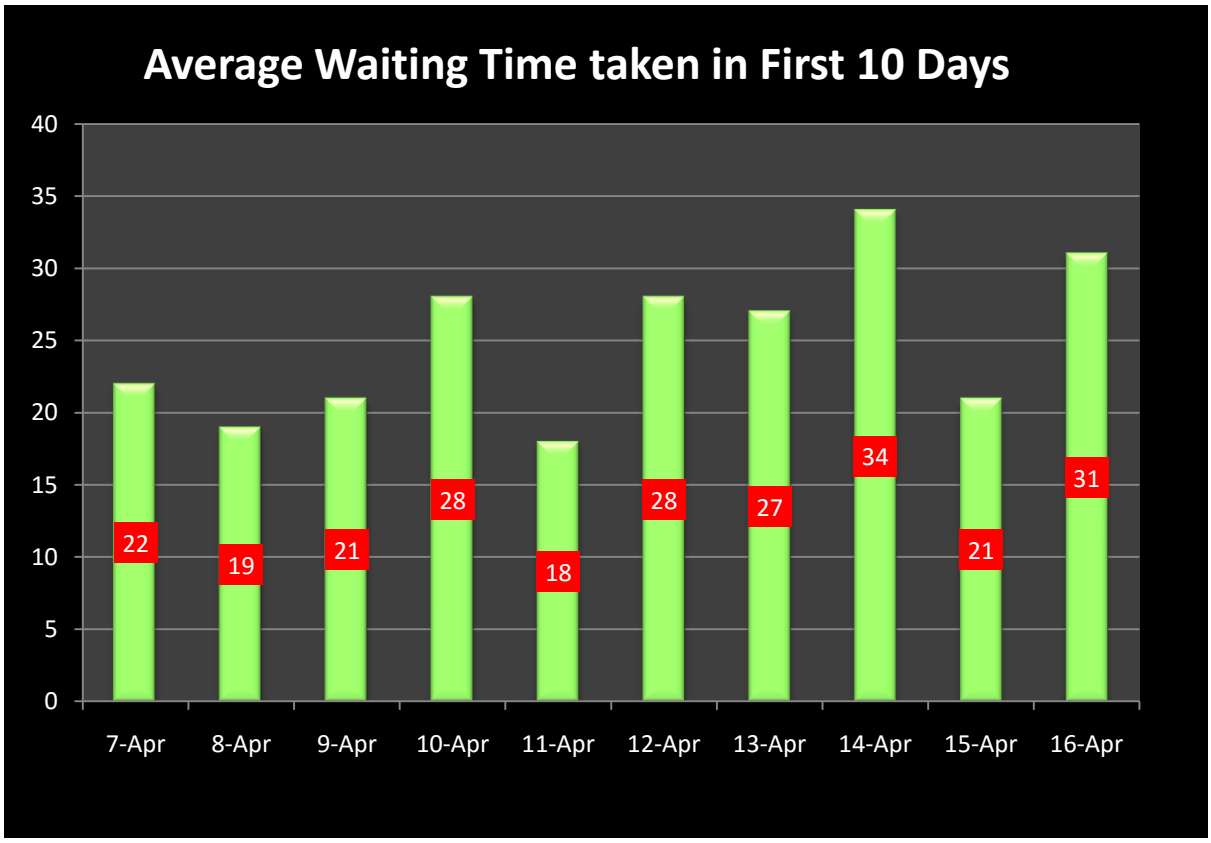
- Second set of data was collected after implementing following changes in the OPD:
  1. Separate desk created for international patient billing.
  2. 5 wheelchairs allotted to OPD department .
  3. Patients are motivated to use myfortis app for appointment.
  4. Evening shift kept for reports and follow ups
  5. OPD flow chart attached with bill to guide patient

Collected data in excel sheet is subjected to following parameters for further analysis:

- Total number of consults.
- New consult for the week
- Average waiting time
- Maximum waiting time
- Minimum waiting time
- Number of patients for which data was captured
- Number of patients waiting beyond 15 minutes.
- Percentage of patients waiting beyond 15 minutes.
- Percentage of patients for which data was captured
- Total number of consultants for who data was captured
- Total number of consultants for the day
- Number of consultants delay beyond 15 minutes.
- Percentage of consultant delayed beyond 15 minutes
- Percentage of consultant for which data was captured
- Number of consultants delayed beyond 15 minutes for first consultation
- Percentage of consultant delayed beyond 15 minutes consultation for 1st consultation.

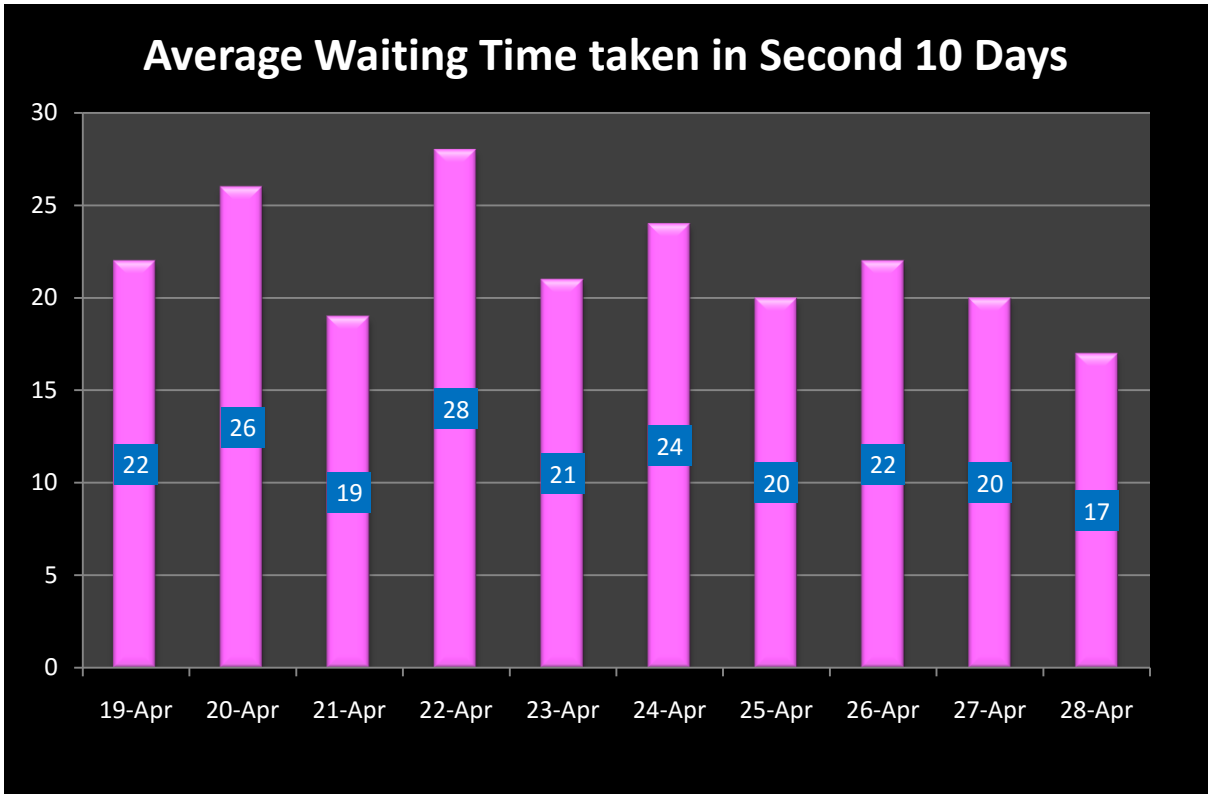
DATA ANALYSIS

OBSERVATIONS AND RESULT



INTERPRETATION:

- The average waiting time of first 10 days comes to be 24.7 minutes.
- Fluctuations in average waiting time is due to more OPD on weekends .



INTERPRETATIONS:

- The average waiting time of second 10 days comes around 19 minutes.
- Noticeable reduced average waiting time after implementation of changes in OPD.

OTHER CAUSES OF DELAY:-

1) Most of the delays occur due to lack of staff i.e. doctors, coordinators, translators, POD manager, nurses etc.
2) Due to lack of knowledge of patient about the OPD infrastructure.
3) Due to lack of communication between international patient and staff.
4) emergency and IPD rounds during OPD hours
5) follow ups and reports without appointments
6) walk in patients and appointment patients given equal importance
7) wheel chair , stretcher unavailability
8) Staff absent, for example – coordinator, interpreter, nurses in vital sign room.
9) Sign boards with directions should be placed for appropriate areas.

RECOMMENDATIONS:-

1) As, most of the delays happen due to lack of staff so optimum number of staff should be recruited.
2) VIP patients should be given preference post old age and pain patients.
3) Reports can be analysed over mails in case on negative results.
4) IPD rounds can be taken little early in order to maintain smooth OPD flow
5) In order to reduce the waiting time even more we need to keep applying new changes for better functioning .

REFERENCES:-

1) www.nhs.uk

2) International Journal of qualitative studies on health and well being 2009.

3) Eldabi T, Irani Z, Paul RJ. A proposed approach for modelling health-care systems for understanding. J Manage Med. 2002;16(2/3):170–87. [PubMed]

4) *Prof.* ***Dinesh T.A***[1] *, MHA, Ph.D*
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5) Iran Red Crescent Med J. 2013 Sep; 15(9): 865–869.

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PMCID: PMC3929826

Reducing Outpatient Waiting Time: A Simulation Modeling Approach

Afsoon Aeenparast,[1,2,*] Seyed Jamaleddin Tabibi,[3] Kamran Shahanaghi,[4] and Mir Bahador Aryanejhad

6) . Taylor S, Kuljis J. Simulation in health care management: modelling an outpatient clinic. OR Insight.1998;11(3):7–11.