

**Summer Training at
Rajiv Gandhi Cancer Institute and Research Centre, Rohini, New Delhi
(April 3 to June 2, 2017)**

**Process Mapping and Identification of Bottlenecks in Day Care Unit of
RGCRI and RC**

**By
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**Under the guidance of
Dr. Sandesh Kumar Sharma**

**MBA Hospital & Health Management
2016-2018**


**Institute of Health Management Research
The IIHMR University, Jaipur
2017**

CERTIFICATE

This is to certify that **Dr. Yashika Kapoor** has undergone summer training in **(Rajiv Gandhi Cancer Institute & Research Centre, New Delhi)** from 3rd April to 2nd June 2017.

The candidate herself/himself completed the project assign to his/her during summer training. Her approach to the project was sincere and proactive. This summer training is in partial fulfillment of the course requirement recommended for the award of MBA in Hospital and Health Management.

I wish ~~him~~/her success in all her future endeavors.



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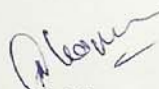
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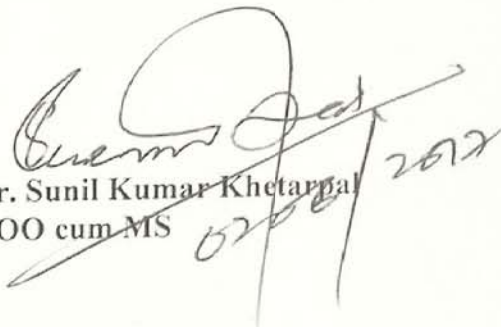
02/06/2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Dr. Yashika Kapoor, MBA in Hospital and Health Management student, from the IIHMR University, Jaipur, has completed her training in this Institute in the department of Operations, from 03rd April 2017 to 02nd June 2017.
Her project was on "Process Mapping and Identification of Bottlenecks in Daycare".

We wish her all the best for her future endeavor.


Swati Chopra
Manager – HR


Dr. Sunil Kumar Khetarpal
COO cum MS 02/06/2017

ACKNOWLEDGMENT

For a management student, the power of knowledge is accessible unless an element of practical observation and performance is not added. I consider myself fortunate for being provided an opportunity to pursue my summer internship from Rajiv Gandhi Cancer Institute and Research Centre, Rohini, New Delhi. It is a great pleasure to express my sincere gratitude to **Dr. Sunil Khetarpal (COO& MS)** for providing me this opportunity to undergo training in this highly esteemed organization.

I would also like to thank my mentor **Dr. Sandesh Kumar** (Associate Professor, IIHMR Jaipur), for his able guidance and support, constant help and motivation at every step of completion of this report.

It is my authentic pleasure to express my very special thanks to **Dr. Sushma Bhat** (Manager Operations) whose dedication and interest had been mainly responsible for the completion of this report. Her advice and scientific approach has helped me to a great extent to complete this task. She has been a constant guiding light and source of illumination to me. It entirely goes to her credit that this report has attained its final shape.

I would also like to thank the **staff of Day Care Unit**, for providing me the necessary detail and clearing my doubts whenever required. I acknowledge them for taking out time from their hectic schedules and helping me in completion of my report.

Lastly I would like to express my gratitude to my family and friends for being a constant source of inspiration for me.

DECLARATION

I do hereby declare that I am a student of 1st year, MBA in Hospital and Health Management, IIHMR University, Jaipur, Rajasthan session 2016-2018.

I would like to state that I have carried out my internship on the topic “***Process Mapping and Identification of Bottlenecks in Day Care Unit Of RGCI & RC***” under the guidance of **Dr. Sunil Khetarpal** (COO & MS) and **Dr. Sushma Bhatt** (Manager- Operations) at Rajiv Gandhi Cancer Institute & Research Centre, Rohini, New Delhi for the partial fulfilment for the degree of MBA in Hospital and Health Management.

This project work is my own and has not been submitted to any of the other institute or University for the purpose of any degree or diploma.

Yashika Kapoor

MBA-HM 21/ 516

2016- 2018

IIHMR University

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ABBREVIATIONS

S. No.	Abbreviations	Meaning
1.	CSSD	Centre sterile services department
2.	HDU	High Dependency Unit
3.	EUS	Endoscopic ultrasound
4.	EBUS	Endobronchial ultrasound
5.	IGRT	Image guided radiotherapy
6.	IMRT	Intensity modulated radiation therapy
7.	HOD	Head of department
8.	IAU	Internal assessment unit
9.	NABH	National Accreditation Board for Hospitals and Health care
10.	NABL	National Accreditation board for testing and calibration laboratories
11.	DICOM	Digital imaging and communication in medicine
12.	TPA	Third party administrator
13.	PSU	Public sector undertaking

HOSPITAL PROFILE AND OBSERVATIONAL LEARNING

INTRODUCTION

Rajiv Gandhi Cancer Institute & Research Centre is today counted amongst Asia's premier exclusive cancer centres that offer the unique advantage of cutting edge technology, put to use by renowned super specialists. This combination of man and machine ensures world-class cancer care to not only patients from India, but also from the neighbouring countries and others. We are very fortunate to have taken care of over 1.95 Lakh patients since inception in 1996. The Institute has been accredited by NABH and NABL for its quality of services, and holds ISO 9001 and ISO 14001 certifications.

The Institute provides super specialized services in Medical, Surgical and Radiation Oncology, streamlined into dedicated Site-Specific teams. Super Specialists at RGCIRC practice an organ specific multi-disciplinary approach to cancer diagnosis and treatment, with the Tumour Board acting as a second opinion clinic for cases that are more critical than others.

Spread over nearly 2 lakh square feet area with a current capacity of 302 beds, RGCIRC is one of the largest cancer care centres in the continent. The Institute's services are spread on four floors with 58 consultation rooms, and well-designed Radiation Therapy area. RGCIRC has 9 well equipped Operation Theatres and 3 Minor Operation Theatres for Day Care Surgeries. The Institute has 27 bedded Surgical ICU and an 11 bedded Medical ICU. RGCIRC has a dedicated Leukaemia ward and a Thyroid Ward. The Institute is also comprised of an independent Bone Marrow Transplant unit that is credited with pioneering unrelated donor transplants, MUD transplants and stem cell transplants.

RGCIRC is committed to bring the benefits of cutting edge technology to its patients. The Institute offers class in techniques such as whole-body robotic surgery, Intra-Operative Brachytherapy, True Beam (the next generation Image Guided Radiation Therapy), PET – MRI fusion, High Frequency Ultrasound, Tomosynthesis (first-of-its-kind revolutionary 3D mammography machine), Nucleic Acid Testing (for safest possible blood), and advanced diagnostic & imaging techniques, including PET CT, Circulating Tumour Cell testing, and Next Generation Sequencing. RGCIRC has executed alliances with internationally renowned institutes such as Thomas Jefferson University. This has thrown RGCIRC into a global league of select hospitals that are pioneers in new approaches to treat cancer.

RGCI & RC has been ranked amongst the 10 Best Oncology Hospitals of India and has won the award for Best Oncology Hospital in India at Healthcare Achievers Awards in 2014.

MISSION

The mission of RGCIRC is to be the largest oncology care provider in India.

- To offer comprehensive services at an affordable price.
- Based on core values of quality, ethics and respect for all.

VISION

The vision of RGCIRC is to avoid and treat cancer by giving reasonable and available care of global benchmarks in India.

OUR LOGO



**Rajiv Gandhi Cancer Institute
and Research Centre**

A Unit of Indraprastha Cancer Society
Registered under "Societies Registration Act 1860"

The philosophy behind the logo of Rajiv Gandhi Cancer Institute and Research Centre, is symbolic of the Crab representing Cancer. The Crab has been universally accepted as a symbol of Cancer – the deadly disease. Encased in a shield, with a sword piercing through it, is a symbol of a dreadful disease being kept at bay with the help of a shield as self-protection and swords as the weapon to destroy the enemy.

QUALITY POLICY



‘We proudly declare our commitment to meet and exceed the requirements and expectations of our patients and society by providing coordinated, compassionate and high quality health care services in the field of oncology. We provide a safe environment to enhance the outcomes of care and patient satisfaction regardless of their gender, disabilities, cultural or religious diversity.’

‘We accomplish this through consistent compliance with international health care standard and effective implementation of our quality system.

We also accomplish through keeping the safety and satisfaction of the patients and staff in the centre of continuous improvement process of our services.’

“TO DO THINGS RIGHT FIRST TIME, EVERTIME AND WITH EMPATHY”

QUALITY CERTIFICATIONS AND ACCREDITATIONS

- NABH accreditation for the hospital
- NABH accreditation for the blood bank
- NABL accreditation for the laboratory
- ISO 9001 Certificate for the quality management system
- ISO 14001 Certificate for the environment management system

FLOOR INFORMATION

OLD BUILDING

FLOOR	A BLOCK	B BLOCK
BASEMENT TWO	NA	NA
BASEMENT ONE	Laboratory, central sterile supply department, meditation room, bio repository unit.	Medical record department, administration, finance and billing, HR department, clinical research department.
GROUND FLOOR	Casualty, radiation oncology OPD, radiology including PET CT, counselling cell, homecare cell.	Kitchen, staff cafeteria, IPD pharmacy, cyto admixture unit.
FIRST FLOOR	Inpatient rooms and wards no. 101-121, minor OT	ECG, CT, MRI and nuclear medicine department.
SECOND FLOOR	In patient rooms 201-216, HDO	In patient rooms 251-260, thyroid ward, physiotherapy department.
THIRD FLOOR	PAC, operation theatres, surgical ICU, pain management clinic.	Bone marrow transplant unit, leukemia ward, medical ICU, bio engineering department.
FOURTH FLOOR	Maintenance department.	

NEW BUILDING

FLOOR	C BLOCK
BASEMENT TWO	IGRT (Radiation), purchase department, IT department, quality cell, material department, IGRT conference hall
BASEMENT ONE	Day care, molecular lab, cyto admixture unit, library.
GROUND FLOOR	Main lobby- front desk, OP cash counter, central report dispatch counter, pre admissions- counselling desk, public relations officers cabin, pharmacy, sample collection room, IAU, surgical oncology OPD, preventive oncology OPD.
FIRST FLOOR	Day care
SECOND FLOOR	IPD rooms from 2274 to 2291, Isolation room
THIRD FLOOR	IPD rooms from 2351 to 2374
FOURTH FLOOR	IPD rooms from 2451 to 2474, DMS office.

SERVICES AVAILABLE

CLINICAL SERVICES

MEDICAL ONCOLOGY

- Medical oncology (All solid tumours)
- Haemato – oncology
- Paediatric Haemato oncology
- Bone marrow transplant

SURGICAL ONCOLOGY

- Uro onco surgery
- Gynae onco surgery
- GI onco surgery
- Head and neck onco surgery
- Breast onco surgery
- Bone and soft tissue sarcoma onco surgery
- Brain and spine onco surgery
- Reconstructive surgery
- Paediatric onco surgery
- Robotic onco surgery

RADIATION ONCOLOGY

- IGRT
- IMRT
- Brachytherapy
- Nuclear medicine
- Day care
- Preventive oncology
- Home care
- Dental clinic

IMAGING SERVICES

- PET CT
- CT scan
- CT guided liver, lung biopsy
- Bone scan
- MRI
- Gamma camera
- Ultrasound
- Digital X-ray
- Fully digital mammography
- Breast tomosynthesis
- Breast biopsy

- Colour Doppler
- Trans Arterial Chemo Embolization (TACE)
- RF ablation of tumours

INVESTIGATIVE PROCEDURES

- Bronchoscopy
- Biopsy
- Colonoscopy
- Upper GI endoscopy
- Virtual bronchoscopy
- EUS
- EBUS

LABORATORY SERVICES

- Cytopathology
- Clinical pathology
- Clinical biochemistry
- Haematology
- Clinical microbiology and serology
- Histopathology and immunohistochemistry
- Molecular biology

SPECIALIZED SERVICES

- Blood bank
- Pain clinic
- Rehabilitation services
- Palliative care
- Psychological counselling

MODE OF DATA COLLECTION

Data collection involved discussions with the HODs and other staff on the managerial issues and going through the records.

Sources of Data

➤ **Primary**

- By interacting with the HODs, Doctors and other employees of the hospital.
- By interacting with the patients and their attendants.

➤ **Secondary**

- Through registered records, national and international journals
- Through website of the hospital

GENERAL FINDINGS

1. FRONT OFFICE

- First contact point between the patients or their attendants coming for the facility.
- Gives directions to patients about the locations of various departments.
- Helps in planning timely discharge by inquiring about the same from the concerned consultants.
- Performs in patient and out- patient registration.
- Does appointment scheduling of the patients.
- Insurance management.
- Does registration and scheduling of preventive health check-ups.

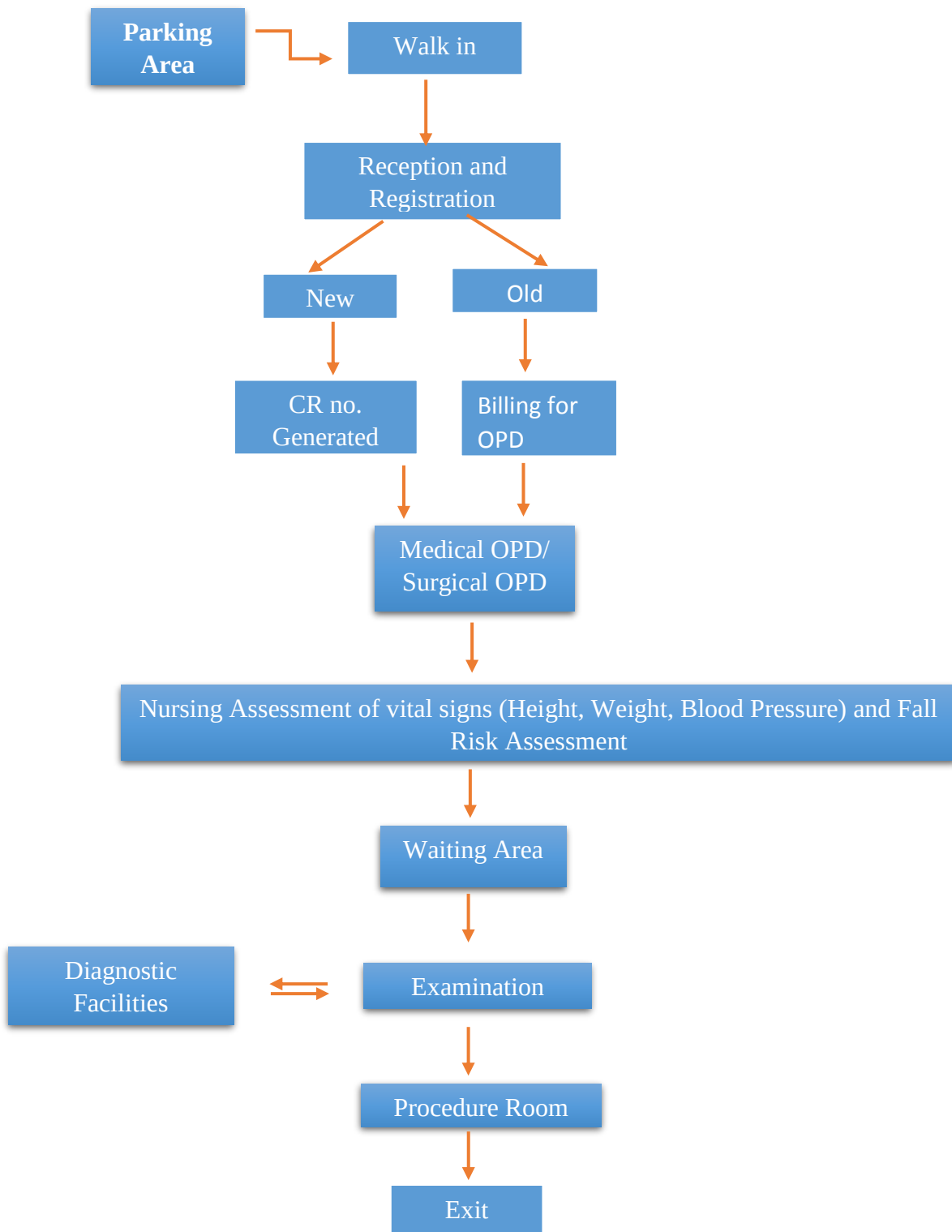
Challenges

- Shortage of staff.
- Huge rush during peak hours.

2. OUT PATIENT DEPARTMENT

- Rajiv Gandhi Cancer Institute has two OPD's – Medical OPD and Surgical OPD.
- Each OPD has a procedure room and its own front desk.
- In case of a new patient registration is done through a valid PARAS system and a CR no. is created and a smart/cash card from cash count is given to the patient.
- For all new patients post registration patient is directed to IAU at ground floor where doctors and nursing team takes medical history, do physical examination and check vitals etc. thereby reducing the workload of the senior doctors.
- After Initial assessment patient is directed to the concerned OPD i.e. medical OPD or surgical OPD where super specialist doctor do further assessment of patient's condition and accordingly advice investigation, treatment on OPD or IPD basis as may be the case.
- In case of old patient, for revisit patient is required to take an appointment for the particular doctor at the appointment desk.

Flow of patients in an outpatient department

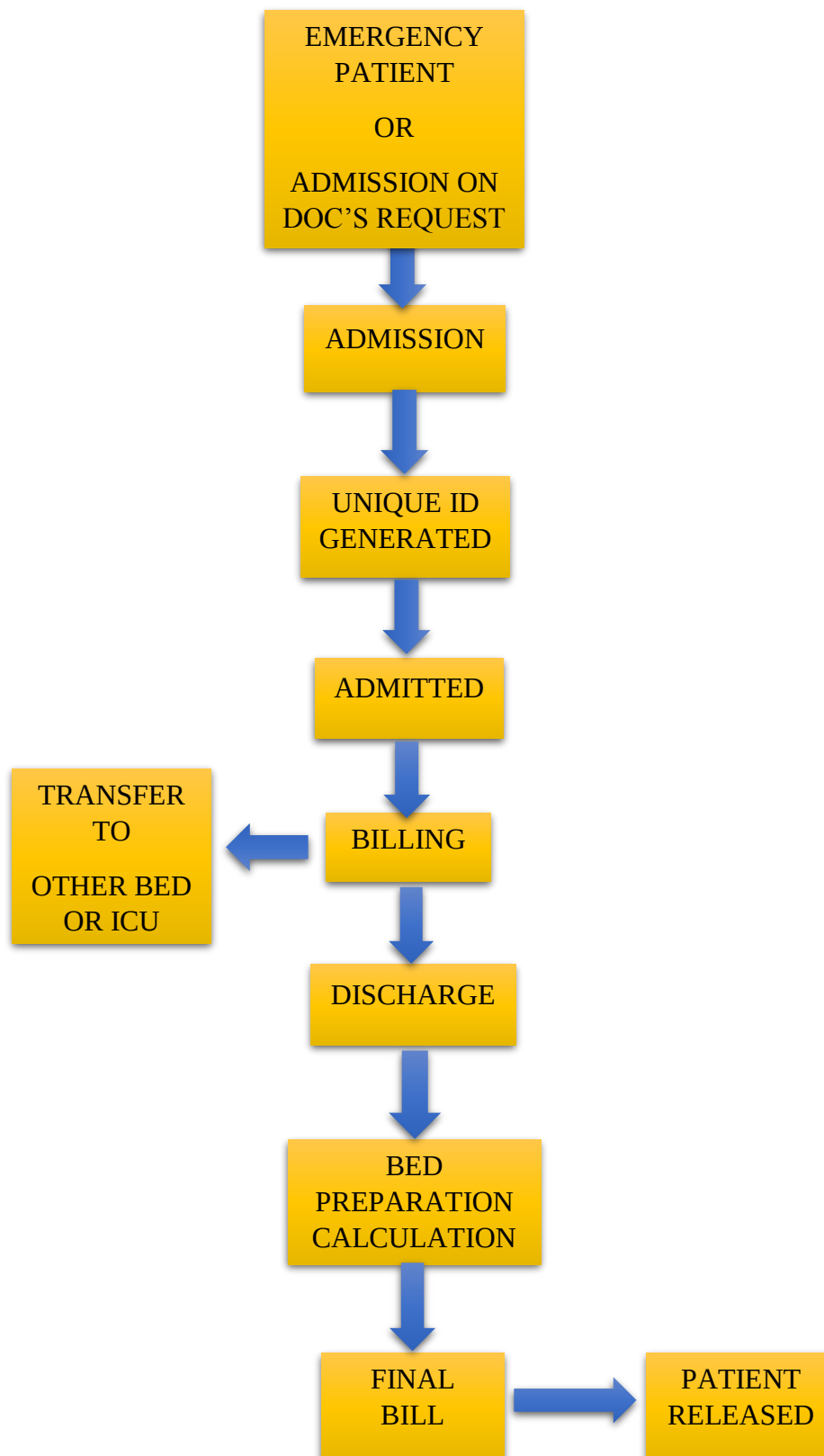


3. IN PATIENT DEPARTMENT

ADMISSION PROCEDURE

- Admissions may be in two ways
- Through emergency department
- Through OPD
- If the doctor decide patient requires an Inpatient treatment, patient will then be issued an admission slip with the details of the kind of treatment and expected duration of stay of the patient.
- Doctor also informs patient about the estimated cost on the given admission.
- Patient then proceed to the admission counter situated on the ground floor of new building. Admission staff allots the room / bed according to the patient's requirements, if available.
- IPD is distributed over four floors (1st – 4th) in the old and new building of Rajiv Gandhi Cancer Institute including a total number of 302 beds.
- Every bed is provided with oxygen supply, suction facility and nurse call facility.
- The types of rooms available at RGCI & RC:
 - Deluxe suite
 - Deluxe room
 - Private room(old)
 - Semi private deluxe (2 bedded)
 - Semi private (4 bedded)
 - Economy special (3 to 10 bedded)
 - General ward (3 to 10 bedded)
- Every floor has a central nursing station with
 - Information Board covering:
 - Designation & Contact numbers of
 - Duty doctor
 - Administration Staff
 - Ward Secretary
 - Nurses names with shift timing and designation(8-10 nurses per shift)
 - Crash Cart parked next to the nursing station
 - Computer on wheels (COW) - 3
 - Cupboards with forms- down time form, investigation track sheet, blood request form, PAC sheet, informed consent, inventory files and registers

INPATIENT WORKFLOW



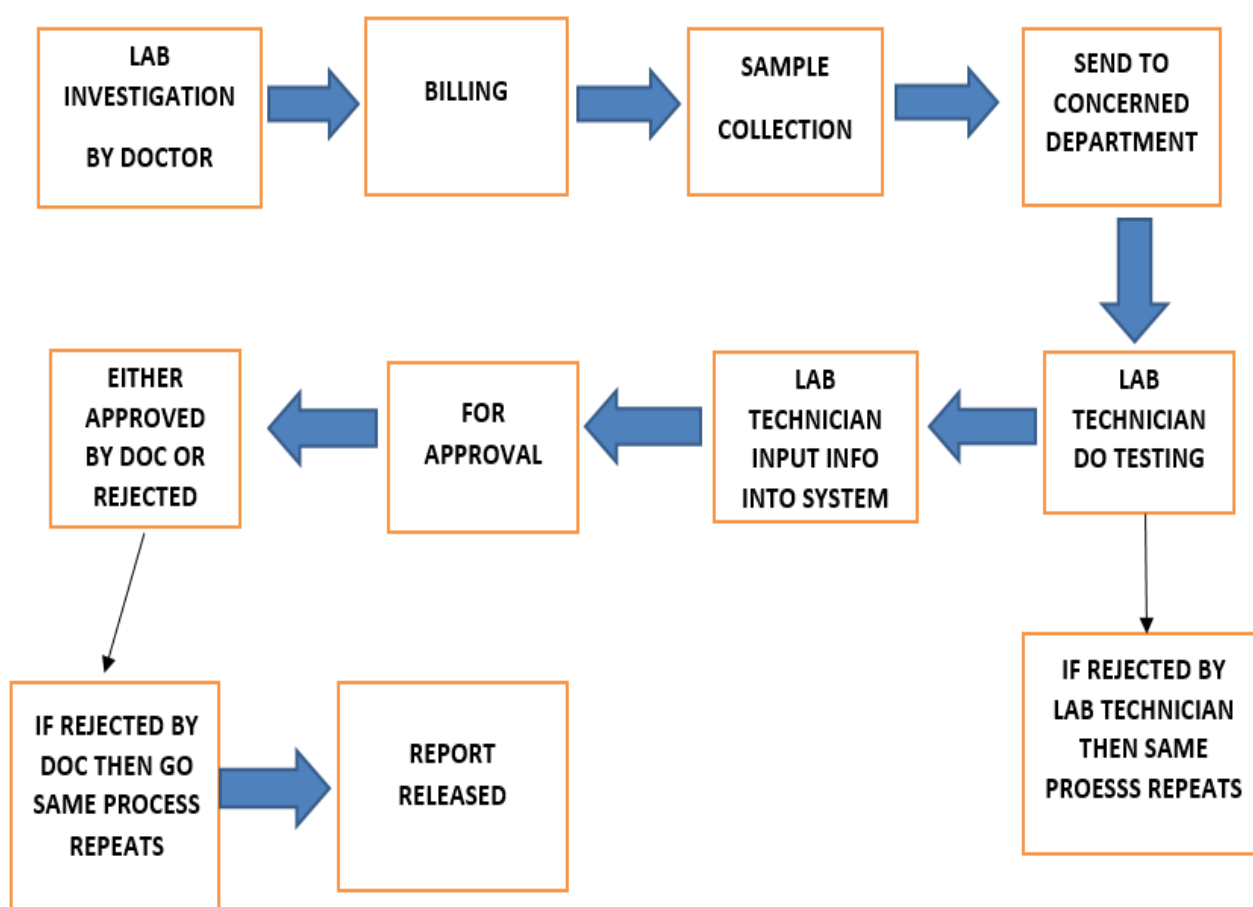
4. DEPARTMENT OF LAB SERVICES

‘The department of Laboratory Services plays an important role in supporting the RGCIRC Mission of patient care by providing high-quality services for diagnosis of cancer patients. An ISO 9001 certified lab opens 24 hours a day. It is a high tech lab with fully automated instrument which are directly interfaced with PARAS system. The prime step to a good clinical practice in cancer care is accurate and early diagnosis which has huge therapeutic implications. Our team of highly trained doctors, medical technologists and other personnel staff assure rapid TAT and efficient reporting of test results.’

The Laboratory Services is organized into following departments:

1. Cytopathology
2. Histopathology
3. Microbiology
4. Haematology
5. Blood Transfusion Services
6. Biochemistry

LAB WORKFLOW



5. CSSD

The CSSD department provides clean and sterile supplies which helps in reduction of infection and improving the quality of care. The department provides infection control by educating staff on biomedical waste management, by reviewing surveillance data, identifying areas of intervention, by identifying patients or staff with communicable/potentially communicable infections and incorporate appropriate measures in each cases.

6. BIOMEDICAL ENGINEERING

The department installs, commission and maintains all the medical equipment in an efficient and cost effective way and makes technical appraisal and recommendation for purchase of new equipment. The department provides inputs to commercial department about new/renewal of contract with equipment supplier including annual maintenance/comprehensive maintenance contracts.

7. FINANCE

The department provides relevant, accurate financial information necessary in making right business plan and decisions. The finance department looks into business building insights, areas for lowering cost and improving profitability, updating of bills on daily basis for IPD patients. The billing staff has overall responsibility for coordination of various functions like pharmacy, wards etc. and daily basis report for admission and provide the necessary solution to daily problems.

8. INFORMATION TECHNOLOGY

The department provides IT value to end users with respect to their day to day function. The department provide services to various department for IT infrastructure, hardware and network, antivirus services, internet services.

9. FOOD AND BEVERAGE

The department provides food and beverages to the esteemed customers and staff as well. The department performs daily audits of the store and kitchen areas, take rounds of the entire service area with and after the service timing, monitoring of services and sales at staff cafeteria and visitor's cafeteria, executive/doctors dining hall.

10. PHARMACY

The goal of the pharmacy is to procure and provide medicines and surgical items to the patient. The pharmacy serves various areas of hospital like day care, ICU's, OT's, IPD's and biomedical. The department services include procurement and providing medicines to the patient.

The department also delivers medicines to the ward like day care and collects the billing amount from the attendant there itself.

11. HOUSEKEEPING

To achieve defect free room with 100% hygiene and cleanliness to maximise patient satisfaction with minimum cost. The department performs activities like cleaning, providing room amenities and pest controlling and waste disposal.

12. HUMAN RESOURCE DEPARTMENT

To ensure availability and retention of quality talent to meet organizations goals and objectives. Overall growth and development of employee's orientation and functional training. The department looks into matters like attendance and leave management, appraisal and promotion process, medical benefits, employee welfare programmes, payoff management, grievance handling, medical by laws.

13. MEDICAL RECORD

Medical record department is the custodian of all the discharged/ expired health record charts. The MRD staff ensures confidentiality, preservation, storage and retention of the documents.

The department deals with record collection, codification, storage, analytical evaluation and retrieval of records if needed.

14. RADIOLOGY DEPARTMENT

It is a very much outfitted office with best in class innovation which contrasts and the best on the planet. A completely practical PACS with secure private distributed storage in an entire computerized condition for all our indicative imaging administrations makes it a special office. Our turnaround time for all reports is under 24 hours. Our important qualities are our ability in managing oncology patients and enhanced imaging conventions complying with worldwide practice. Our routine with regards to fresh clinically arranged reports helps our clinicians in the correct basic leadership. Our staff is included in completing most bed side interventional methodology. Our commitment in patient administration through dynamic interest in multi-claim to fame centres and tumour executive gatherings separates us.

Services Available

- Comprehensive reviewing of all imaging studies even if not performed in house. For our patients we scan their outside imaging studies and integrate with in house studies under one unique identity (CR number)
- X-rays and special procedures which are stored on PACS.
- Magnetic Resonance Imaging with multiple imaging protocols
- Multiphase CT Scans, Angiography and Virtual Endoscopy
- Hepatic imaging with segmentation and volume estimation for surgical planning.
- Computed Tomography or Ultrasound Guided biopsy / FNAC / pleural and ascites aspirations/catheter drainage and other Interventional procedures
- PET CT scans and PET guided biopsies
- Target delineation and fiducial placement to optimize IGRT and IMRT outcomes
- Therapeutic embolization and TACE, biliary drainage procedures
- Target delineation and fiducial placement to optimize IGRT and IMRT outcomes

- Ablation and celiac plexus blocks for pain management
- Colour Doppler, Trans rectal Ultrasound and 12 core prostate biopsy
- Full field digital mammography, Digital breast tomosynthesis, CAD, Stereotactic Biopsy/FNAC of breast / wire localization of non-palpable lesions in the breast
- Radiofrequency ablation to treat tumours in liver, lung, kidney, bone and soft tissue
- Treatment response evaluation assessment
- Bone densitometry'

SPECIALITIES OF RGCI & RC

1. 'SURGICAL ONCOLOGY

The Department of Surgical Oncology is a fast developing speciality at RGCI & RC. The Department consists of units:

- Head and Neck Services
- Breast and Thoracic Services
- Orthopaedic Services
- Uro Gynae Oncology Services
- G I Oncology Services
- Neuro-surgical Oncology Services
- Reconstructive Services

Surgical Oncologist can give special surgical ability in cases new to general specialists. The Surgical Oncology Department goes for the accompanying:

- To enhance personal satisfaction stressing on multimodal treatment
- Practice prove based medication
- To execute insignificant horribleness and almost zero mortality which is adequate by any International standards
- Careful preoperative observing and great readiness and postoperative care'

The personnel of Surgical Oncology comprises of 8 Senior Consultants in different subspecialties, 10 Consultants, Clinical Assistants notwithstanding Residents and DNB understudies.

Surgical Department has 8 noteworthy Operation Theaters, 3 Minor OT's, 28 had relations with Post-operation Ward and Extensive Intraoperative and Post-operation checking offices round the clock. Post-Operative care is given by specialists and master medical caretakers.

2. RADIATION ONCOLOGY

Radiation Oncology refers to the treatment of cancer patients using radiation, which could be X-rays or gamma rays or electrons .Rajiv Gandhi Cancer Institute & research centre with its tradition of quality and excellence offers comprehensive and modern radiotherapy services it the patients.

The hospitals radiation oncology department is located on the ground floor, in the A block of the hospital and 2nd basement in the C block .the department is equipped with linear accelerators, stimulators, high dose rate remote after loading brachytherapy system, dedicated treatment planning computers and mould room to fabricate lead shields and

templates in house. The department has been intricately networked to CT scan and MRI with DICOM image transfer capability that makes it one of the best radiation oncology hospital in India.

Intensity Modulated Radiation Therapy (IMRT)

Rajiv Gandhi Cancer Institute and Research Centre boasts of being the first cancer centre in the country to put intensity modulated radiation therapy into clinical practice. Intensity Modulated Radiation Therapy is an approach to radiation therapy which delivers a high dose to the tumour while restricting the exposure to surrounding normal tissue.

Image Guided Radiation Therapy (IGRT)

The department is well equipped with equipment- ARTISTE from Siemens. IGRT combines the traditional radiation treatment with a simultaneous cone beam CT scan to allow for greater precision and accuracy when targeting and treating tumours.

3. MEDICAL ONCOLOGY

Branch of Medical Oncology at Rajiv Gandhi Cancer Institute and Research Centre, offers cutting edge treatment modalities, including autologous and allogeneic Bone Marrow Transplant. There is a generous patient workload, which is taken care by very qualified and experienced Medical Oncologists, Paediatric Oncologists and Haematologist, who works all day for this foundation. Offices are accessible to attempt outpatients' Chemotherapy in particular day mind units. The healing centre's therapeutic oncology office incorporates exceptionally prepared nursing staff that aids organization of Chemotherapy, in both Day Care and in addition Inpatients. Chemotherapy Drug blending is done at an independently assigned territory, under laminar wind current, to guarantee quiet and staff security to forestall wellbeing risks. Keeping in mind the end goal to make organization of chemotherapy protected and more patient well disposed, utilization of focal catheters and ports is a routine in the office.

4. PEDIATRIC HEMATOLOGY ONCOLOGY

The Department of Pediatric Cancer treatment and Oncology at RGCI and RC, is remarkable in India, as it offers far reaching Oncology Care to all youngsters up to the age of 18 years. It is a place, where specialists send some of their most difficult and wiped out patients. The Department has a committed group of specialists in the field of Pediatric Hematology/Oncology. The group constituted by experienced Pediatric Oncologists, Hematologist, Pediatric Oncosurgeon, Radiation Oncologist, Pediatric Oncology Residents and Nurses, Child Psychologist and Playroom Teachers' who strives to guarantee, that best care is conveyed to each youngster.

Kids with a wide range of Hematological and Solid Organ Malignancy get particular Oncology benefits here. The different sort of Cancers treated in the Department incorporates Leukaemia (ALL, AML, CML), Lymphomas (non-Hodgkin's and Hodgkin's), and all Pediatric strong Tumours like Neuroblastoma, Wilms Tumour, Bone and Soft Tissue Sarcoma, Brain Tumour, Hepatoblastoma, Testicular and Ovarian Tumours and so forth. Patients with various Hematologic issues like serious Aplastic Anaemia, MDS, Haemolytic Anaemias, Chronic ITP, and so forth are likewise overseen.

A STUDY ON
PROCESS MAPPING AND IDENTIFICATION OF BOTTLENECKS IN DAY CARE
UNIT OF RGC I & RC

AT

Rajiv Gandhi Cancer Institute and Research Centre, Rohini, New delhi

INTRODUCTION

Cancer, a term that brings out a stun in the nerve endings of each individual touches each nation on the planet. Cancer is one of the illness influencing more than 10 million new cases for each year around the world. In India, commonness of disease is evaluated to be around 3.5 million, with 8, 50,000 new cases and 5, 00,000 deaths for every year. Growth is the second biggest driving reason for death and inability all around the globe. Number of individuals biting the dust because of cancer is more than kicking the bucket from every one of the instances of AIDS, tuberculosis and intestinal sickness. As indicated by World Cancer Report, there is enormous occurrence rate of cancer all through the world and it might reach over 20 million by 2030 (WHO, 2008). In creating nations there is the greater part of new disease patients and 66% of cancer related deaths that happens. Disease has turned out to be one of the significant reasons for deaths in India, consistently around 0.4 million deaths happen in India. In India because of disease (Government of India, 2010), it has been evaluated that around one million new instances of cancers will be analysed by 2018 and about 0.67 million individuals are relied upon to bite the dust. Carcinoma of oral cavity and lungs in males and carcinoma of cervix and breasts in females represent over half of all malignancy deaths in India (Government of India, 2005). Greater part reasons for malignancy are identified just in the propelled stages, when they are hard to follow. With an expected occurrence rate of 8 lakh new cases each year and pervasiveness of 2.4 million cases, the malignancy treatment advertise needs high consideration.

The Indian oncology advertise with the Rs.10 billion is required to develop at a rate of 21 percent for the up and coming five years, a committed oncology setups inside doctor's facilities are in the pipeline to cater around 2 million cancer patients. With such developing number of patients looking for administer to disease has made healing centres understand that treatment of cancer is significant area for growth. Today the mindfulness about cancer has expanded and individuals will go to perceived associations for cancer treatment. Individuals, especially in urban India are perceiving the reality gradually that cancer patients can have an ordinary existence, much the same as it is there with whatever other chronic infection. Thus more number of individuals will experience treatment, demonstrating a positive pattern.

CHEMOTHERAPY-

Chemotherapy is the use of chemotherapeutic agents or anticancer drugs to destroy cancer cells or may aim to prolong life or to reduce symptoms. There are over 50 different chemotherapy drugs. Some are given as single drug but often involves combination of drugs. The type of chemotherapy given depends on type and stage of cancer. Chemotherapy may also be given with other types of treatment such as surgery, radiotherapy, hormonal therapy, or a combination of these.

Principles of chemotherapy

1. The first and most crucial decision is whether active specific anti-cancer treatment (surgery, chemotherapy targeted therapy or radiotherapy) is appropriate or not. Factors involved in this decision will include performance status and the patient's own wishes. Patients will also receive palliative/supportive care alongside active treatment, or palliative/supportive care alone where appropriate.

2. Most patients referred to the Unit have disease which is clearly inoperable, but there are exceptions. A key early decision, therefore, is to consider whether there is a possibility that surgery might be appropriate. The decision whether to make a surgical referral can be a difficult one and must be made at consultant or senior registrar level in consultation with radiology colleagues.
3. Where chemotherapy, targeted therapies or radiotherapy is appropriate, the intensity, type and duration of treatment depends on performance status, extent of disease and associated co morbidity. Details of investigations and pre-treatments are contained in individual protocols and these should be checked carefully for each patient on treatment. All patients for chemotherapy, targeted therapy and radiotherapy must sign a consent form after reading and having time to ask questions relating to appropriate written and verbal information.
4. Patients receiving anti-cancer treatment who have progressive disease should discontinue therapy. Standard practice is to assess chemotherapy response using CT after every 2-3 cycles of chemotherapy and at 6 weekly interval while on treatment.
5. Treatment should also be discontinued if the toxicity is proving unacceptable, even if there is no evidence of progressive disease.

DAY CARE UNIT

- The Day Care Unit gives the care to individuals who require treatment as day cases and don't require remaining in hospitals as inpatients. Its primary capacity is to evaluate and treat the patients who are getting chemotherapy.
- It gives care to the individuals who are experiencing chemotherapy and need help with identified with their treatment and condition.
- The objectives of day care unit are to enhance quiet wellbeing and prosperity, diminish medicinal services consumptions, and to give brilliance in administration conveyance and solace to patients.
- The cost of methods performed in day care unit is significantly lower when contrasted with patient conceded in an inpatient department, which is for the most part because of the distinction in infrastructure and staffing necessities.
- The treatment methods at day care are performed around the same time and don't require overnight remain. This thus offers greater consistency in the planning. It is to a great degree helpful for the youngsters and the elderly as they don't need to rest in an unfamiliar environment.

GENERAL FINDINGS

- Day Care is situated on First Floor and First Basement of C block of the new building.
- Day care unit is a 22 bedded unit in the new building for the patients who are admitted for chemotherapy or for observation following under minor procedures.
- The Oncology day care is open from Monday to Saturday.
- Timings: - 8:00 AM to 8:00 PM.
- Before chemotherapy is administered the patient is assessed to make sure that he/she understands and consents to the planned treatment. Blood tests are performed to ensure that their levels are at the required limits.

- The time taken to administer chemotherapy varies, some may only take a few minutes while others may take up to a few hours.
- The services that are provided in day care unit are: - All type of Chemotherapies administered, Supportive care, Blood transfusion, Observation following minor procedures.

PATIENT REGISTERED

There are three type of patients that come in the day care.

- **CASH PATIENTS:** - Patients who pay for their treatment and investigations out of their pocket are considered as cash paying patients. They are charged as per the schedule of charge for the cash category.
- **CREDIT PATIENTS:** - Patients who have been referred by the empanel PSU's and form health insurance companies (TPA's) come under this category.
 - A. Patients from PSU: The patients are requested to produce an authorization letter from the company, which must be handed over to the billing at the time of admission.
 - B. Health insurance beneficiary: Cashless services for all planned medical treatment are subject to pre admission authorization. In all the credit cases it is responsibility of the beneficiary to inform and procure credit authorization from concern PSU/TPA.
- **ADVANCE PATIENTS:** - Patients of this category are required to deposit an advance cheque with the billing department. Services can be availed till the balance in the account.

RATIONALE

This study is to understand the process flow, identify the delays. In order to to maximize the utilization of oncology day care, it is essential to know the process flow and reasons leading to its underutilization. The study also focuses on identifying of bottlenecks in the current process with appropriate suggestions for improvement.

RESEARCH QUESTION

- a) What is the current process flow in Day Care of RGCI & RC?
- b) What are the causes of delays in the current process?
- c) What can be the solutions to improve the process flow?

OBJECTIVES

- To observe and analyse the process flow of day care at RGCI & RC.
- Identification of bottlenecks and delays in the process.

- To give recommendation for further improvement in the process and minimise the patient waiting time.

LITERATURE REVIEW

A thorough literature review reveal focusing on prior researches related to the topic of the study which gives a strong foundation on to base knowledge thus the survey of literature is one of the vital parts of any research endeavour.

As proposed by Santibáñez, Pablo, and et al. this review was embraced to address huge and expanding challenges in regards to the utilization of assets in the Ambulatory Care Unit (ACU) in the Vancouver Centre of the British Columbia Cancer Agency (BCCA). Doctor's office space, administrative support and examination rooms were frequently hard to come by on occasion of pinnacle volume prompting packing, deferrals, and concerns in regards to patient fulfilment. The three disease programs i.e. therapeutic oncology, radiation oncology and surgical oncology direct patient arrangements inside the ACU. Arrangement sorts includes new patient, development and cross program counsels. Normal volume at the VC was 200 patient visits for each day amid the year 2007-08. The ACU additionally fills in as a scholastic educating and research focus. BCCA experts prepare huge quantities of therapeutic understudies, inhabitants and colleagues, and in addition understudies and assistants from numerous different nations. Furthermore, an expanding number of patients take an interest in clinical trials, which brings about popularity for space and staff. ACU arrangements are regularly unpredictable and include oncologists, inhabitants and restorative understudies, notwithstanding different clinicians including medical caretakers, dieticians and advocates.

In this paper the authors have considered a few operational qualities of a disease mind outpatient benefit, the majority of which have been examined some time recently. Rather, they dissected the concurrent effect of booking, operational, and asset designation changes on framework execution. Further, study is recognized by the additional multifaceted nature of dealing with the simultaneous operation of a few facilities, and the preparation of colleagues, inhabitants and medicinal understudies amid patient counsels. With an expanding pattern towards the utilization of wandering consideration offices to give medicinal services benefits, the creators trust this review is especially convenient.¹

As indicated by Bohni Lianga, Ayten Turkcana, Mehmet Erkan Ceyhanb, Keith Stuarth a discrete reproduction model was produced by Department of Mechanical and Industrial Engineering, North-eastern University, Boston, MA 02115 h Lahey Hospital and Medical Center, Burlington, MA 01805, to display the mind boggling stream of chemotherapy patients in oncology facilities. The model considered various patient classes with fluctuating routings and asset necessities, unpunctual landings, vulnerabilities in administration and treatment lengths, add on, and cancelations. The model was utilized to assess the execution of a genuine centre and to test elective operational choices to enhance framework execution. Prior recreation ponders, which proposed changing the landing rates to have a smoother workload, did not build up any booking technique to discover a

calendar that considers the conditions amongst oncologist and chemotherapy arrangements. Lahey Hospital built up an improvement model to decide an organized arrangement plan for oncology and mixture facilities. The proposed booking technique decided the quantity of oncologist and chemotherapy meetings with the target of limiting the deviation amongst low and high use schedule openings. The effect of the proposed planning technique was tried utilizing the recreation show that consolidated a few instabilities of a genuine centre condition.²

Murray, Mark, and Donald M. Berwick proposed that postponement of care is a steady and undesirable element of current human services frameworks. Despite the fact that postpone is by all accounts unavoidable and connected to asset impediments, it regularly is not one or the other. Or maybe, it is generally the aftereffect of spontaneous, nonsensical booking and asset allotment. Utilization of lining hypothesis and standards of modern building, adjusted suitably to clinical settings, can lessen delay considerably, even in little practices, without requiring extra assets. One model, once in a while alluded to as cutting edge get to, has progressively been appeared to decrease holding up times in essential care. The centre standard of cutting edge get to is that patients calling to plan a doctor visit are offered an arrangement that day. Propelled get to is not economical if persistent interest for arrangements is forever more prominent than doctor ability to offer arrangements. Six components of cutting edge get to are imperative in its application adjusting free market activity, decreasing overabundance, lessening the assortment of arrangement sorts, creating emergency courses of action for abnormal conditions, attempting to alter request profiles, and expanding the accessibility of bottleneck assets. In spite of the fact that these standards are effective, they are counter to profoundly held convictions and set up practices in human services associations. Embracing these standards requires solid initiative speculation and support.³

In 1998, as per Dobish, Roxanne expanding quiet volumes and workloads identified with wandering chemotherapy started to bring about deferrals in the outpatient facilities, research facility, drug store and the chemotherapy organization territories. The different divisions that were being affected met to survey the circumstance and propose an answer. The group suggested that a following day chemotherapy calendar be actualized, whereby patients would have their research facility and doctor arrangement on one day and their chemotherapy managed on the following day. Initially, this was turned around senior administration, be that as it may, after a year similar issues remerged and the following day chemotherapy planning was at the end of the day proposed and endorsement gotten to execute. A timetable was made and chemotherapy organization arrangements were planned in view of the accessible timeslots. The objective was to have the larger part of patients planned for chemotherapy organization on the day taking after their meeting with the doctor. Patients who might be special cases to the following day planning framework were recognized and instruction of staff and patients with respect to the change was finished. Resistance from patients and staff was experienced and overseen through proceeded with instruction and support in regards to the explanations behind the change. Drug store directed a subsequent planning study and the outcomes upheld that the timetable change was effective in enhancing drug store's capacity to set up the chemotherapy for the patient's arrangement time. Drug store operational issues must be worked through, be that as it may,

by and large the change was observed to be sure. The usage of a following day chemotherapy organization plan has brought about enhanced efficiencies for drug store and nursing and a diminishing in sitting tight circumstances for patients to get their chemotherapy.⁴

RESEARCH METHODOLOGY

STUDY DESIGN: Descriptive cross-sectional

SAMPLING: Convenience Sampling

SAMPLE SIZE: 100 patients in day care

STUDY POPULATION: Day care patients of RGC I & RC

STUDY AREA: Day Care unit of RGC I & RC

DURATION OF STUDY: 8 weeks

SOURCES OF DATA:

- Primary data: semi structured questionnaire
- Secondary data: medical records, website of the hospital, journals

QUESTIONNAIRE

A semi structured questionnaire was formulated to capture the delays in the process of day care. The questionnaire is formulated to capture the waiting time of the patients coming for the treatment in the day care.

The waiting time from the patient entry to the hospital and to the exit from day care was captured. These waiting time were analysed on the basis of data collected and mainly four types of delays were found:

- a) Admission Delay
- b) Treatment initiation Delay
- c) Total treatment delay
- d) Discharge delay

MAPPING OF THE PROCESSES IN DAY CARE

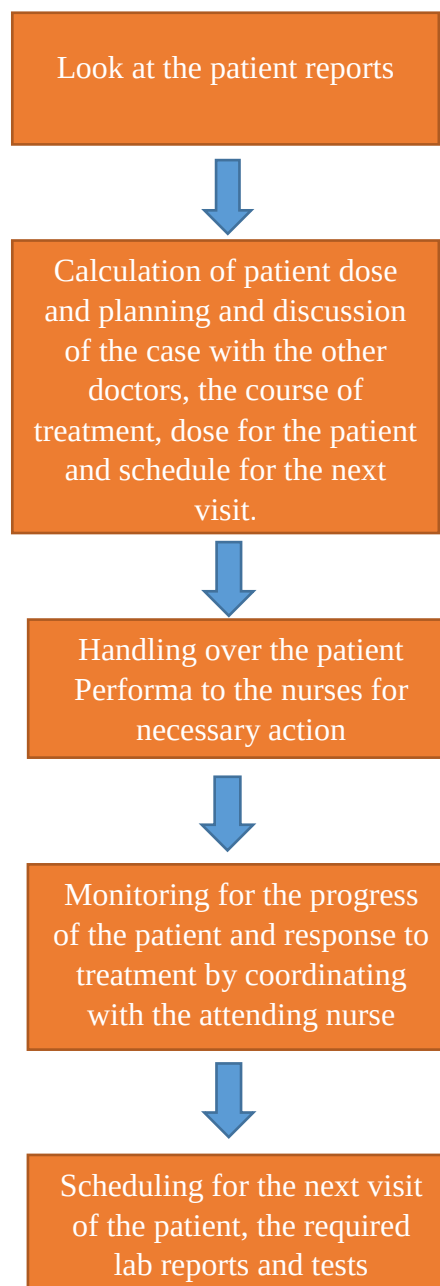
PROCESS FLOW OF PATIENTS IN THE DAY CARE

A. Process flow- Registration and Admission

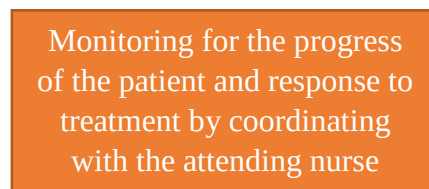
Patient facing staff

1. Doctors-

a) Pre-treatment phase



b) Treatment phase

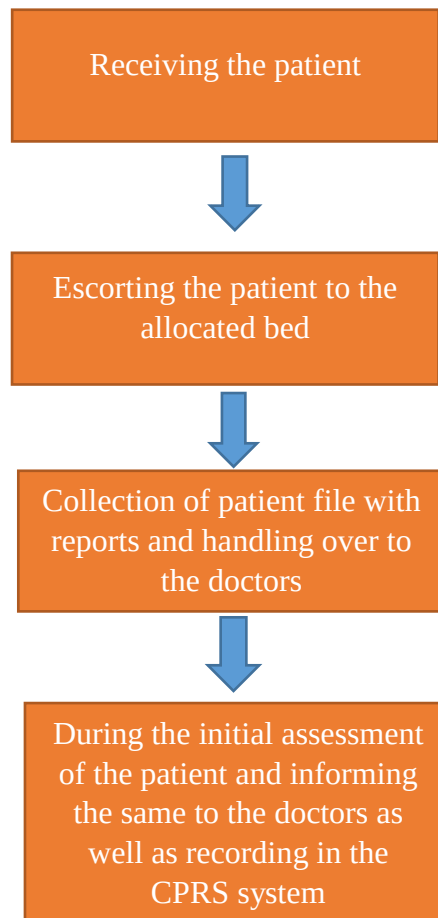


c) Post treatment phase

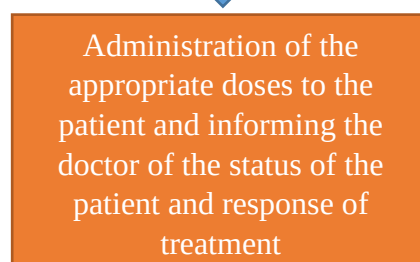


2. Nurses-

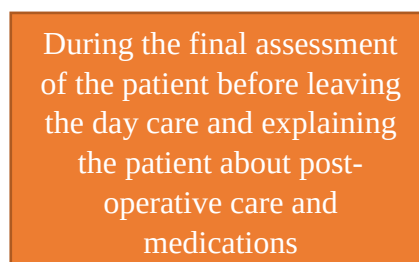
a) Pre- treatment phase



b) Treatment phase

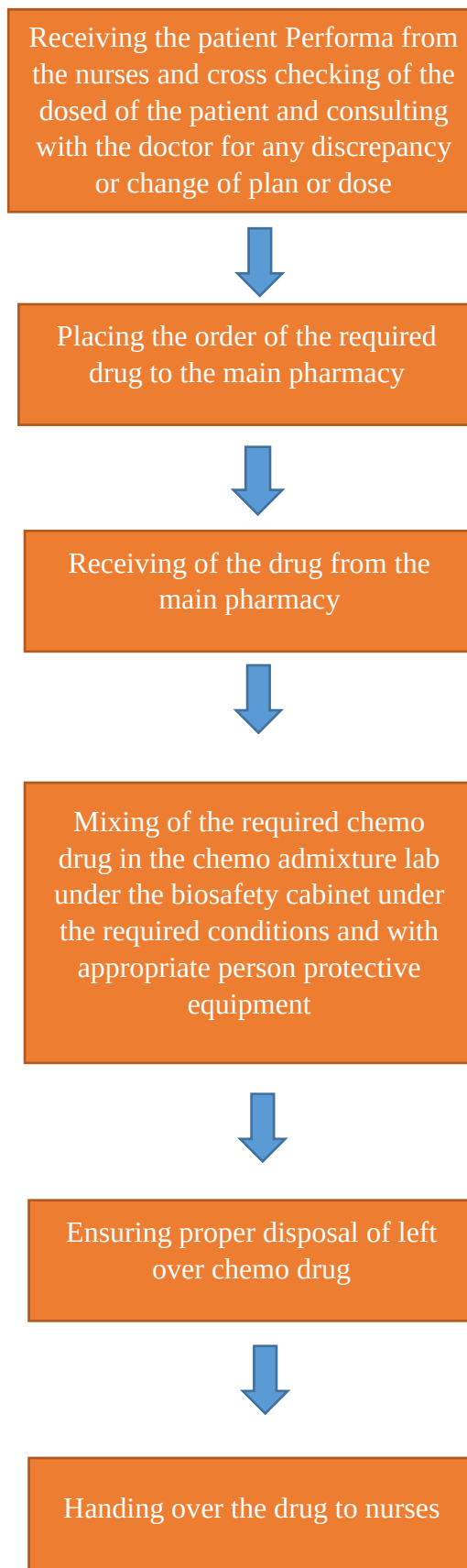


c) Post- treatment phase



Back end staff in day care

1. Pharmacist-



2. Housekeeping

Cleaning and mopping of day care. Ensuring that the toilets are functional and nearby to use.

3. Food and Beverage

Ensuring supply of eatables and drinks to the patient and attendants as and when needed.

4. Others

Dietician and referrals as and when ordered by the attending consultant.

B. Discharge Process Flow

Patient facing staff

1. Doctors-

Intimation from the doctor
post treatment of the patient on
the system

2. Nurses-

Nursing clearance from the
team leader

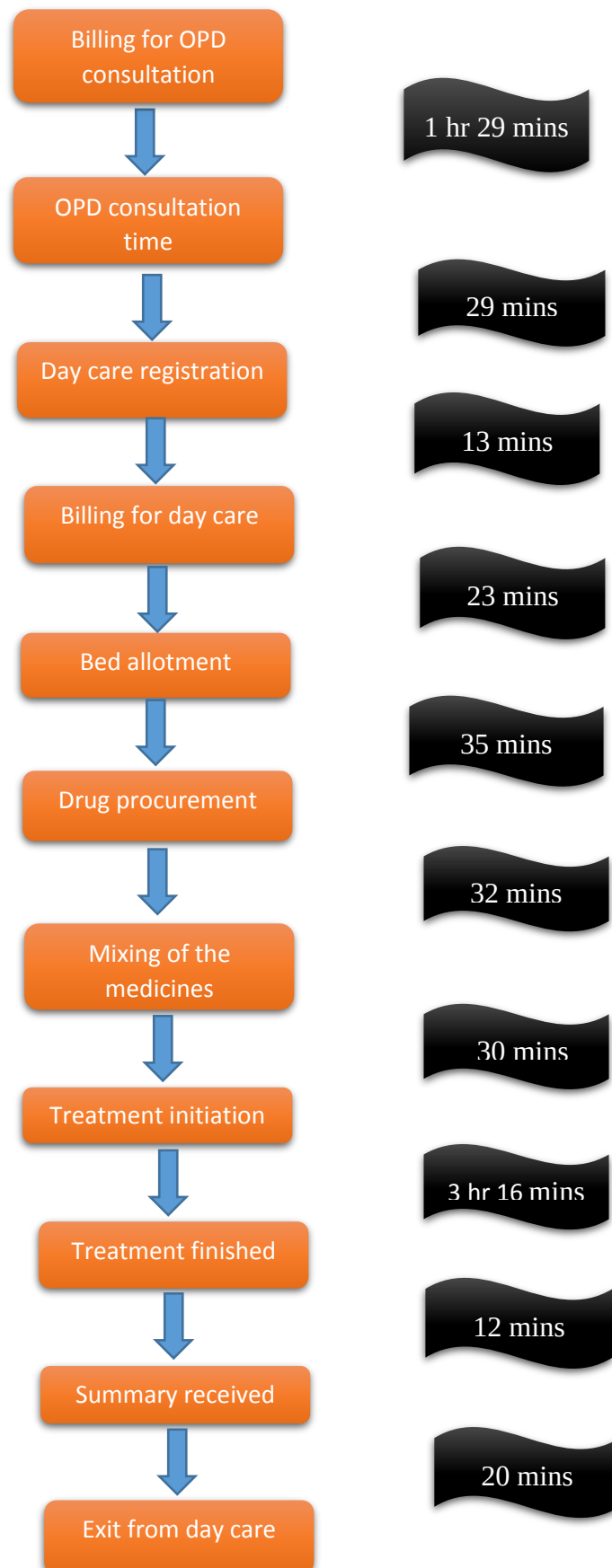
3. Pharmacy

Clearance from the main
pharmacy

Handing over of the discharge
summary to the patient by the
doctor on duty in day care

DATA ANALYSIS

Process flow showing average time taken between the steps patient follows are as follows:-

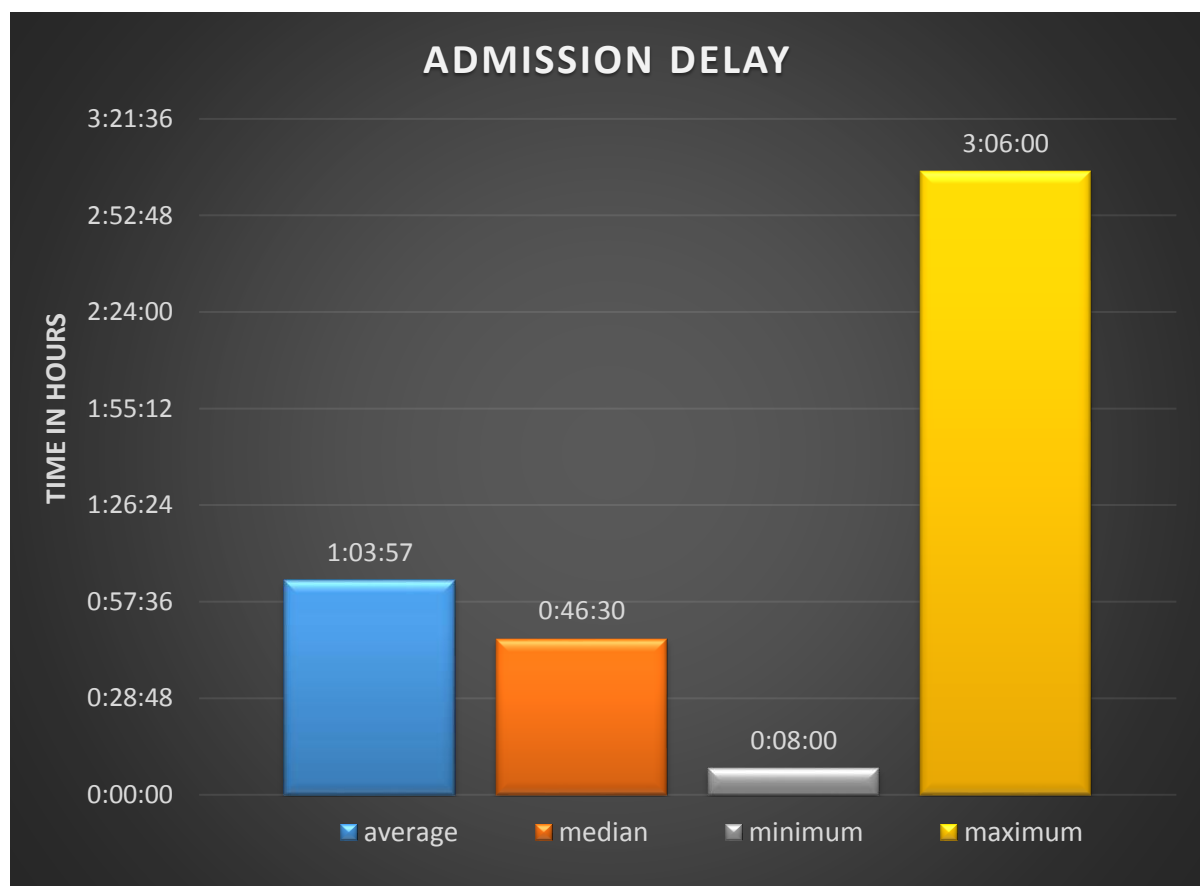


The four types of delays that are analysed on the basis of waiting time recorded:

- a) Admission Delay
- b) Treatment initiation Delay
- c) Total Treatment Delay
- d) Discharge delay

1. ADMISSION DELAY

AVERAGE	MEDIAN	MIN	MAX
01:03:57	00:46:30	00:08:00	03:06:00



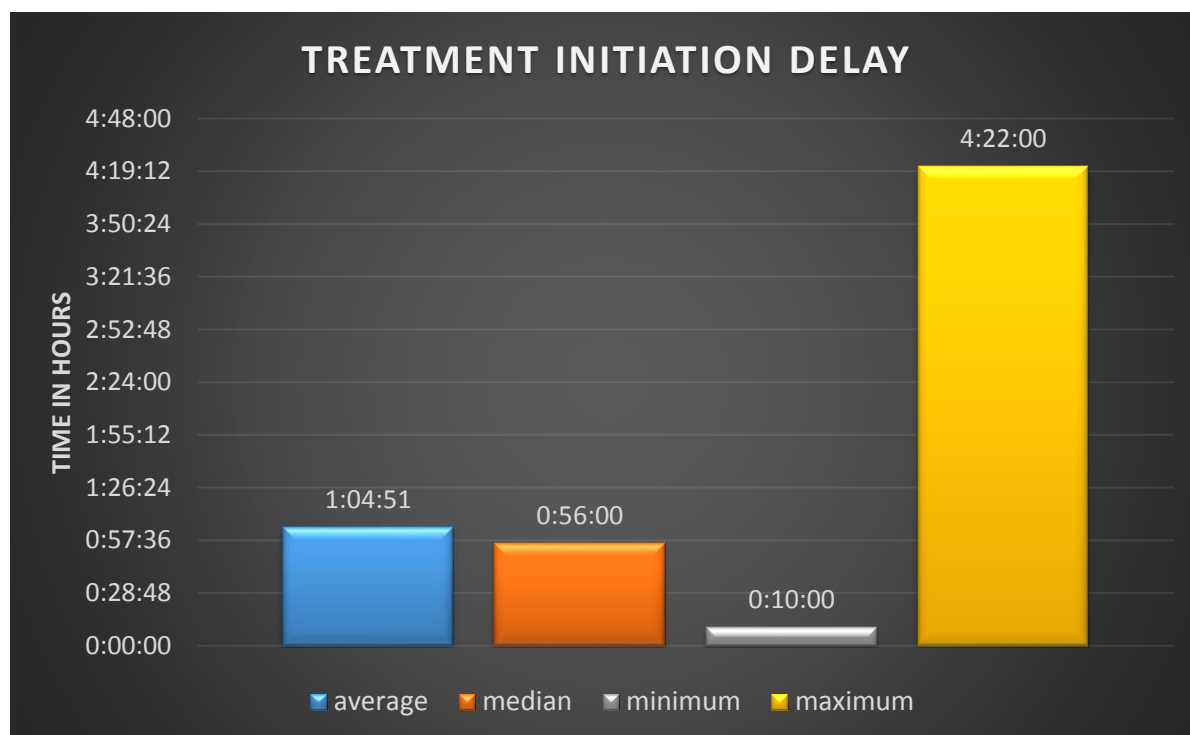
The above graph explains the average, median, minimum and maximum waiting time of the patients for the admission and the registration to the day care unit. It was calculating by subtracting from the day care entry timings of the patients, the entry of the patients in OPD. It measures the admission turnaround time.

Out of a sample of 100 patients studied,

- Average time for the admission delay was 1hr 4 min.
- The median admission delay timing was 46 minutes.
- The minimum waiting time for admission was 8 min.
- The maximum waiting time for admission was 3hr 6min which is definitely a concern for the day care unit.

2. TREATMENT INITIATION DELAY

AVERAGE	MEDIAN	MIN	MAX
01:04:51	00:56:00	00:10:00	04:22:00



The above graph explains the average, median, minimum and maximum waiting timings of the patients for start of chemotherapy treatment. It was calculated by subtracting bed allocation timings (the timing where the patient comes to bed) from the start timing of the treatment of the patient in day care. It calculates the turnaround time in initiation of treatment.

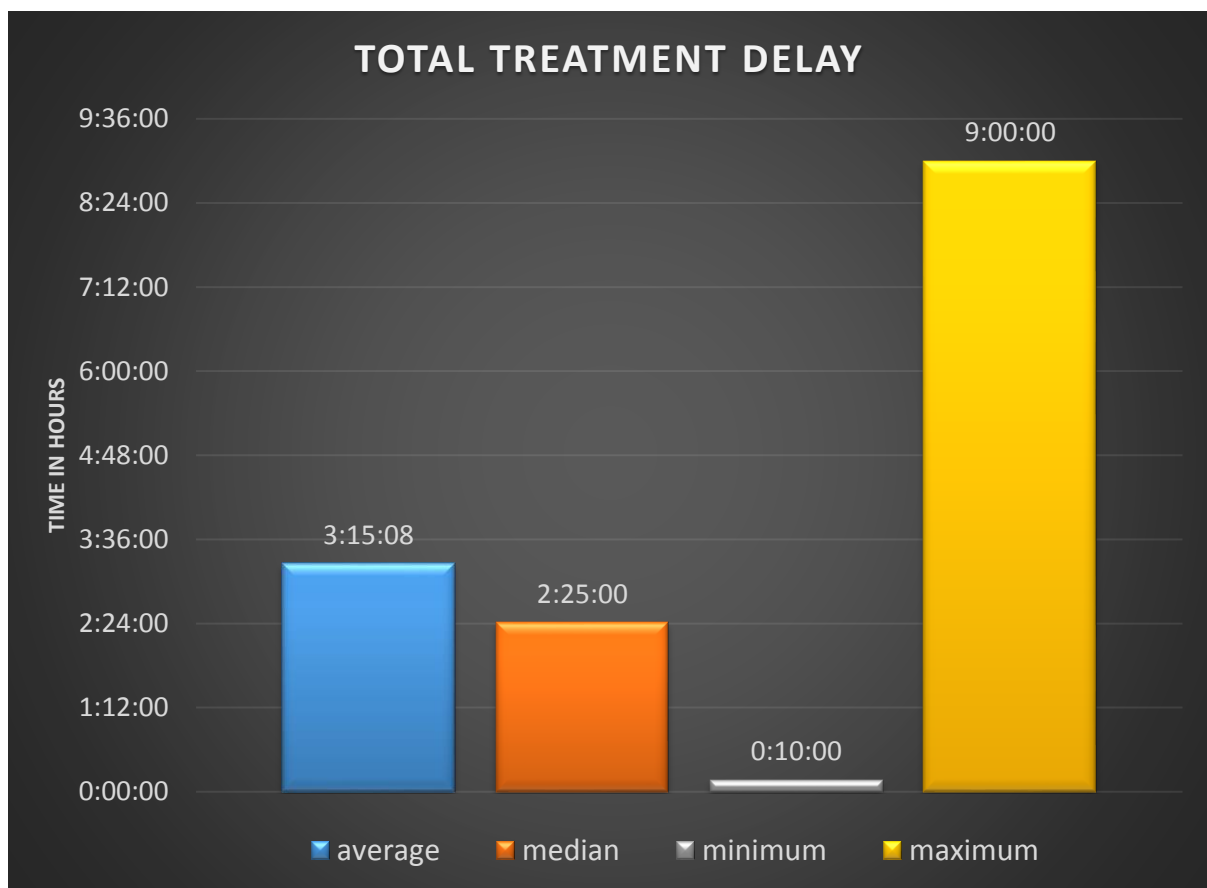
Out of a sample of 100 patients studied,

- Average time for treatment initiation delay was 1hr 05 min which is of concern.

- The median time for delay was 56:00 mins.
- The minimum waiting time for treatment to start was 10 min.
- The maximum waiting time was 4hrs 22 mins which is definitely a concern for the day care.

3. TOTAL TREATMENT DELAY

AVERAGE	MEDIAN	MIN	MAX
03:15:08	02:25:00	00:10:00	09:00:00



The above graph explains the average, median, minimum and maximum waiting timings of the patients for the total treatment. It was calculated by subtracting starting timing of the treatment from the timing when the treatment got finished. It measures the total treatment turnaround time.

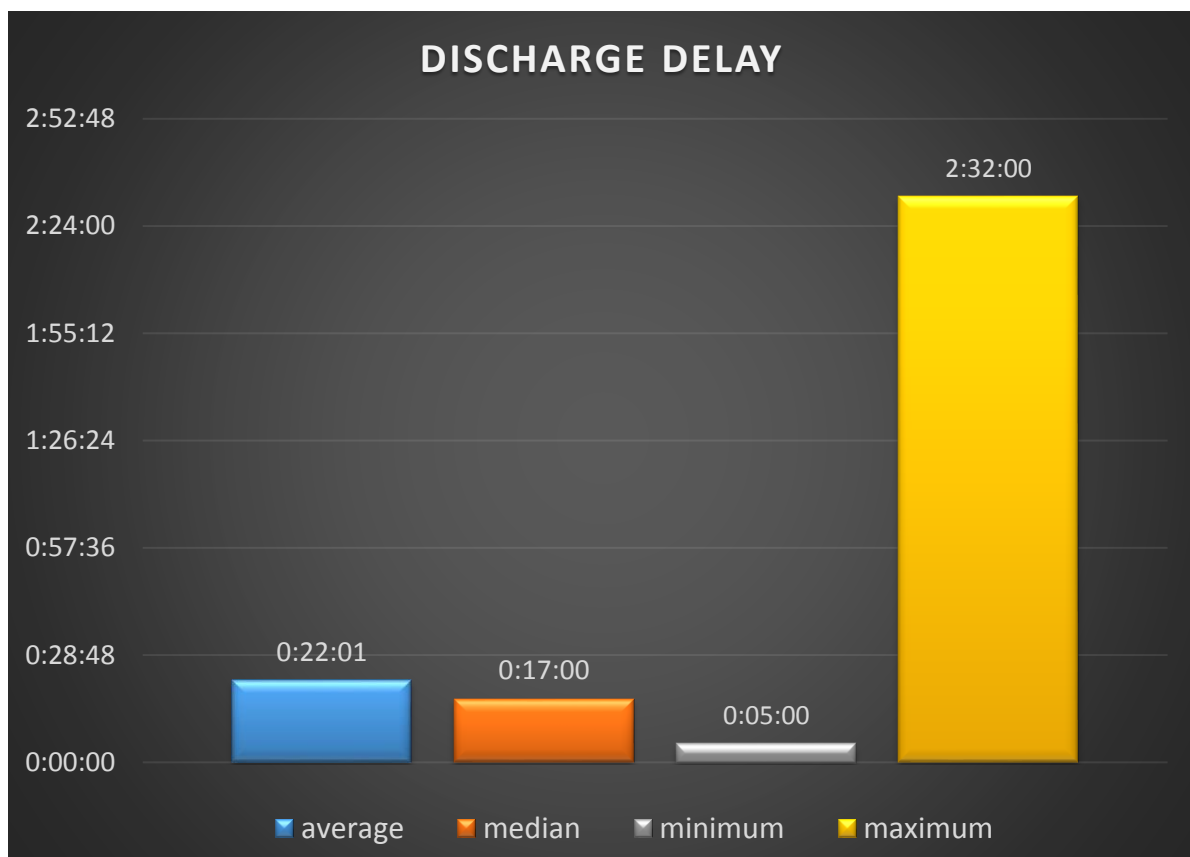
Out of a sample of 100 patients studied,

- Average turnaround time for total treatment was 3 hours 15 mins which is of concern.
- The median delay in total treatment was 2 hours 25 mins.

- The minimum delay was found to be 10 mins.
- The maximum delay time in treatment of patient in day care was 9 hours which is a high concern for the day care.

4. DISCHARGE DELAY

AVERAGE	MEDIAN	MIN	MAX
00:22:00	00:17:00	00:02:00	02:32:00



The above graph explains the average, median, minimum and maximum waiting timings of the patients for discharge. It was calculated by subtracting the time at which treatment was finished from the time when patient left the day care. It measures the delay in discharge of the patient.

Out of a sample of 100 patients studied,

- Average delay time for discharge was 22mins.
- The median delay time for discharge was 17 mins.

- The minimum delay was found to be 2 mins.
- The maximum delay for discharge was 2hours 32 mins which is a high concern for the day care.

OBSERVATIONS

Delay in process flow at different stages is the main key factor that hinders optimal flow of patients and has a significant impact on the economic outcome of the hospital.

During the course of this study 4 major delays were identified after collection of the data and the reasons for the same were later analysed and solutions were then proposed.

DELAYS:-

- a) Admission Delay
- b) Treatment initiation Delay
- c) Total Treatment Delay
- d) Discharge delay

A. Reasons behind delays in admissions

1. Improper planning of patients.
2. Choice/requirement of bed by the patients.
3. Non availability of beds in the day care.
4. Patients not turning up on time for bed allocation after the billing is done.
5. Patients not bringing along the required documents for the TPA.

B. Reasons behind treatment initiation delay

1. Required laboratory or radiology tests not being done by patients.
2. Fluctuation in patient blood counts or lab reports.
3. Delay in reaching out to the concerned consultant.
4. Delay in protocol prepared by the doctor and handing over to nurse.
5. Delay in medicine to reach at the patient's bed.
6. Non availability of desired drug or dose in pharmacy
7. Prescription of new tests and waiting for the results (mainly in change in clinical condition of the patient)
8. Change of drug or drugs dosage for the patient.
9. Waiting for referral opinion from the consultants (for example Opinion from the nephrologist for a patient with kidney disease or a cardiologist for an underlying cardiac conditions)
10. Ongoing concurrent radiotherapy of the patient.

C. Delay in total treatment

1. Nurses attending too many patients.
2. Some adverse drug reaction to the patient.
3. Patient not coping well with the drug and showing symptoms.
4. Delay in mixing of the chemotherapy drugs.

D. Delay in patient discharge

1. Delay in clearance from pharmacy.

2. Delay in preparation of discharge summary by the doctor on duty
3. Delay in corporate and insurance clearance.
4. Patient having food or rest after the treatment.

SUGGESTIONS AND RECOMMENDATIONS

Based on the above reasons that were identified during the course of the study, the following solutions can be proposed:

A. Solutions for delay in patient admission

1. As one of the major reasons for delay was patient have to go to different desks at different places for registration of day care, billing for day care and finally for bed allotment. It lead to patient dissatisfaction at the time of admission and allotment. Therefore, registration, billing and bed allotment for day care procedure can be done at same desk which will decrease patient waiting time.
2. Proper communication to the patient regarding the hospital policies and awareness of the TPA, private and corporate policies prior to the patient admission would likely improve the patient flow.
3. Proper communication to the patient regarding the process that includes registration, billing and allotment of bed can further help in reducing the workload on the staff and would decrease the patient dissatisfaction at the time of admission and allotment.

B. Solutions for delay in initiation of treatment

1. As the prime function of any healthcare facility is to provide the best of the treatment to our patients, fluctuations in patient reports and changes in the doses of drugs, plan of treatment of some of the things which cannot be hampered within the best favour of our patients.
2. Preplanning of the chemo drug and dosage of the patient by consultation with the attending consultant duly assigned by the consultant one day prior the schedule appointment day would smoothen the whole treatment process and avoid delays like reaching out of the consultant.
3. Awareness of the patient regarding the test and lab reports to brought at the schedule appointment day to avoid any delay in the planning and calculation of drug dosage and course of treatment.
4. Reducing the time span for reaching out to the referrals and the concerned consultants based on the diagnosis of the patient.
5. Reducing the time taken by pharmacy staff to deliver medicines at patient's bed can initiate the treatment early.

C. Solutions for the delay in total treatment

1. Proper planning of the attending nurse to the patient ratio depending on the footfall of the patient in the day care.
2. Proper allotment of nurses shifts.
3. Reducing the time taken in mixing of chemotherapy drugs in cytoadmixture unit and bringing back to the attending nurse.
4. Proper planning with the consultant regarding the drugs in case of any adverse reaction to the patient.

D. Solutions for delays in discharge of the patient

1. Standardization of the discharge process would lead to a significant opportunity to create important benefits for increasing bed capacity and day care throughout and productivity.
2. Billing for day care procedure can be done after the treatment is finished and therefore billing can be done for the time slot taken by the patient in whole procedure, this will reduce the time wasted in things like patient having rest or food after the procedure.
3. Planning would ensure an early and certain discharge as well as better bed assignment because then there will be information about which beds would be available. The communication and awareness of the patient to the required insurance and TPA formalities would further smoothen the discharge process.
4. The discharge process should start in the admission point itself, as it is the mismatch between demand and supply of beds that promotes delays and bottlenecks in the system.

CONCLUSION

Cancer patients frequently get numerous sessions of chemotherapy in the day care over the more extended timeframe. Services, for example, blood tests, physical examination, drug preparations, and chemotherapy administration are required to be performed in various departments, for example, laboratories, cyto admixture unit, drug stores and treatment rooms.

The services for each patient are performed by different resources, for example, nurses, drug specialists, and medical oncologists. Clinical administrators confront troublesome choice of enhancing productivity in this complex multi-facility condition. The coordination of these services and assets is basic for opportune, proficient and successful treatment of patients.

Oncology is being a to a great degree requesting segment as far as elite desires and work stack comprising of the considerable number of vulnerabilities and difficulties at work, dealing with the substantial footfalls of patients. The day care staff have been devoted totally and functioned as a group together that included capability. In this review my point was to discover the delays due to in proficient care delivery that can be overcome by better coordination, scheduling and planning. Instabilities, for example, unpunctual arrivals, delay in admission of patient, treatment start, total treatment and discharge areas, increment or diminishing in treatment span because of reactions or dosage changes, cancelations, and additional items happen in day care unit. Every one of these uncertainties effect the patient flow and staff work process.

Patients experience long waiting time due to delay in admission, delay in treatment initiation, delay in total treatment and discharge. Reducing patient waiting times should be among the highest priorities for quality improvement and patient satisfaction in day care unit for cancer treatment facilities. Solutions in admission process such as staggering of the day care patient list, standardisation of admission and discharge process, preplanning of patient drug dose with the consultant prior to appointment day etc., would greatly help in reducing the waiting time for the patients and would thereby increase overall efficiency of the hospital and give the patients a good overall experience.

ANNEXURE

QUESTIONNAIRE- DAYCARE SURVEY

CR No.

Treatment type:

Date:

QUESTION	TIME/ YES or NO
1. Your time of arrival in the hospital today?	
2. Investigations were done after meeting consultant or before?	
3. Investigations were done in RGCI or outside?	
4. Incase in RGCI, billing time for investigation:	
5. Incase in RGCI, sample collection time:	
6. Reports available time:	
7. Billing time for OPD consultation:	
8. OPD consultation time:	
9. Daycare registration time:	
10. Daycare billing time:	
11. Bed allotment time:	
12. Drug availability: Yes or No	
13. Outside medicine: Yes or No	
14. Medicine procurement time:	
15. Mixing time:	
16. Drug started at:	
17. Finished at:	
18. Summary received at:	
19. Left at:	
20. Problems faced:	
21. Any suggestions to improve daycare services: • •	

Mobile No.

Signature:

REFERENCES

1. Santibáñez, Pablo, et al. "Reducing patient wait times and improving resource utilization at British Columbia Cancer Agency's ambulatory care unit through simulation." *Health care management science* 12.4 (2009): 392-407.
2. Bohni Lianga, Ayten Turkcana, Mehmet Erkan Ceyhanb, Keith Stuarth a Department of Mechanical and Industrial Engineering, Northeastern University, Boston, MA 02115 h Lahey Hospital and Medical Centre, Burlington, MA 01805
3. Murray, Mark, and Donald M. Berwick. "Advanced access: reducing waiting and delays in primary care." *Jama* 289.8 (2003): 1035-1040.
4. Dobish, Roxanne. "Next-day chemotherapy scheduling: a multidisciplinary approach to solving workload issues in a tertiary oncology center." *Journal of Oncology Pharmacy Practice* 9.1 (2003): 37-42.
5. World Cancer Report 2014. World Health Organization. 2014. pp. Chapter 1.1. ISBN 9283204298.
6. Kravchenko J, Akushevich I, Manton KG (2009). *Cancer mortality and morbidity patterns in the U. S. population: an interdisciplinary approach*. Berlin: Springer.