

**Summer Training at
Zydus Hospitals, Ahmedabad, Gujarat
(April 3 to June 2, 2017)**

- **Time Motion Study of Patients from Ward to OT**
- **Determining Length of Stay and Utilization Pattern of the Emergency Services**

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**Under the guidance of
Col. (Dr) Ashok Kaushik**

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


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

CERTIFICATE

This is to certify that Ms. **Rima Agarwal** has undergone summer training in **Zydus Hospital, Ahmedabad** from 3rd April to 2nd June 2017.

The candidate herself completed the project assign to 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 her success in all her future endeavors.

Col. (Dr.) Ashok Kaushik

Dean (Academic & Student Affair)

The IIHMR University, Jaipur



ZHHRPL/HR/INTERN/MS/2016

Date: 2nd June 2017

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Rima Agarwal**, a student of Institute of Health Management Research, Jaipur, has completed Summer Internship Programme (SIP) from our Hospital under the guidance of **Dr. Medhavini Ayachit**— Lead, Medical Services. The duration of SIP was of **60 days** effective from **3rd April 2017 to 2nd June 2017**.

During above period we found her very **sincere** and **hardworking**.

We wish her all the best for her future endeavor.

For, Zydus Hospitals and Healthcare Research Pvt. Ltd.

Rajiv Ranjan
Lead – Human Resources

HUMAN RESOURCES

Zydus Hospitals & Healthcare Research Pvt. Ltd.

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With immense pleasure, I express my heartfelt gratitude to Dr. S.D. Gupta, Director of The IIHMR University, Jaipur and my mentor Col. (Dr.) Ashok Kaushik, Dean- Academics for having giving me this opportunity to undergo training.

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1. ABOUT THE HOSPITAL:

Zydus Hospitals, Ahmedabad-

Zydus Hospitals is a 550 bed Super speciality hospital consisting 16 floors and 2 basement floors. The highly sophisticated medical institution offers all major-medical specialities, subspecialties, investigation & diagnostics facility, rehabilitation & physical therapy care under one roof. Hospital's design ensures higher energy efficacy by allowing greater permeation of sun light throughout the day and harnessing solar energy for hot water provisioning throughout the hospital complex.

The hospital complex is in the posh western suburb of Ahmedabad, just 20 minutes from the airport and in neighbourhood of most hotels and shopping malls. With vast open spaces around the hospital it's situated & designed to ensure that patients and caregivers get a feel of the skyline of Ahmedabad city from their rooms and never feel claustrophobic. It's an attempt to give a feel of home at the hospital.

Quality

Zydus Hospitals brings in a tradition of Trust & Faith, being among the leader in pharmaceuticals vertical, have now extended their services to the society through a chain of multispeciality hospitals, offering world class infrastructure, highly skilled and experienced medical specialists, caring & compassionate nursing staff and technology which matches the best in the world.

Zydus Hospital are committed to All Round Quality, from patient care services to medical facilities aiming at achieving highest level of Quality Certifications. The flagship multispeciality unit in Ahmedabad has been accredited by NABH in Sept 2016. Hospital is committed to medical excellence & transparency across all the walks of hospital with "Patient First" approach.

Vision Statement:

To be a leading provider in healthcare service delivery to the community. To achieve 1000 beds under their management by the year 2016 and become a most preferred destination for comprehensive medical care and treatment.

Mission Statement:

To provide world standard healthcare solutions to the community by leveraging advances in medical research science and technology and adoption of best management practices.

Core Values:

The members of the Zydus Hospitals, hold the following values to be the foundation of their identity. To endeavor to think and act at all times in accordance with these values.

- Patient Centric

To be Patient Centric. To put the needs of the patient first in all our actions.

- Adaptable to Change

To welcome change for the better; their approach is always positive with a ‘can-do’ spirit.

- People-Driven

To build the capabilities of their people. This is fundamental for their growth in business.

- Committed to Deliver

To give their best in all that they undertake and are committed to deliver on time.

- Innovative in What We Do

To innovate through our ideas, approaches, and efforts - at every opportunity.

- Humble

To remain modest and humble in their achievements. Their work speaks for itself.

- Value-Driven

To seek value and maximize gains by using resources judiciously.

Features of The Hospital

- 160 ICU Beds equipped with facility for bed side dialysis
- GE 256 Slice Dual Energy CT Scan (first in Asia) - capable of performing Cardiac CT Angio at any heart rate and lowered radiation dosage for an array of CT Procedures
- GE 32 Channel Silent MRI - offers 30% reduction in scanning time and capable of detecting Micro Bleeds
- Philips Allura Clarity Fully Flat Panel Cath Labs with IVUS technology (first in Asia) - 2 side by side Cath units catering to Cardiac & Neuro Interventions with Zero Delay
- 3D & 4 D Capable Echo & Sonography Systems
- Tuttinauer Israel's Central Sterile Supply Services Units for fail safe sterility of surgical equipments, one of its kind system housing separate unmanned lifts for transfer of dirty & clean linen
- X-Ray with Fluoroscopy with Real Time Imaging (Casetteless / Plateless - console based system)
- C-Arm with Fluoroscopy with Real Time Imaging
- 17 Bed Dialysis Unit with advanced Fresenius Machines and an Isolation Dialysis Chamber

- 21 State of the Art Class 100 Operating Suits equipped with digitally controlled Mac Operating Led Lights with Color Differential Mode & Schaerer Operating Tables from Switzerland and touch free entry & exit doors
- Choice of 5 accommodation classes - Standard, Sharing, Executive, Deluxe & Suite
- Dedicated Wellness & Preventive Health check department
- Emergency Room with Triage & Isolation Provisioning
- Single Floor Diagnostics for all Emergency needs (total Diagnostics at ground level)
- 12 High speed Elevators with enhanced ride quality comfort - all lifts capable of transporting Patient Beds

Our Specialties:

- Cardiology & Cardiac Surgery
- Joint Replacement
- Spine & Scoliosis Surgery
- Neurology & Neurosurgery
- Plastic, Reconstructive & Cosmetic Surgery
- Nephrology
- Urology
- ENT & Audiology
- Gastroenterology & Gastro surgery
- Minimally access surgery
- Bariatric, Metabolic & Hepatobiliary Surgery
- Transplant Medicine (Kidney, Liver, Bone Marrow & Heart) - planned for future
- Critical & Intensive Care
- Dentistry
- Dermatology
- Emergency Medicine
- Genetic Sciences
- Gynecology & Obstetrics
- Ophthalmology
- Oncology

- Paediatrics
- Orthopaedics & Trauma
- Pulmonology
- Health Check-up
- Investigation Services
- Specialty Clinic

Hospital layout:

FLOOR	DEPARTMENTS
00	A-ZYDUS HEALTH CHECK UP B-RADIOLOGISTICS & IMAGING C-EMERGENCY & ER OT D-ADMISSION & BILLING, CAFETERIA, PHARAMACY
01	A-OPD, EEG & EMG B-OPD, ECHO, TMT, & ECG C-PHYSIOTHERAPY & REHABILITATION, DENTAL D-OPD
02	A-ENDOSCOPY, LITHOTRIPSY & URODYNAMICS B-MOTHER & CHILD CARE C-DIALYSIS D-FOOD COURT
03	A-SURGICAL ICU-3A B-OPERATION THEATER COMPLEX C-OPERATION THEATER COMPLEX D-TRANSPLANTICU & SURGICAL ICU-3D
04	A-RELATIVE STAY AREA, STORES B-CENTRAL STERILE SUPPLY DEPARTMENT C-MEDICAL RECORD DEPARTMENT D-DEPT. OF LAB MEDICINE AND BLOOD BANK

05	A-OPERATION THEATER COMPLEX B- OPERATION THEATER COMPLEX C- OPERATION THEATER COMPLEX D-CVTS ICU-5D
06	A-CATH LAB & CARDIAC ICU-6A B-CARDIAC ICU C-CVTS ICU-6C D-CVTS ICU-6D
07	A-CRITICAL CARE UNIT-7A B-PEDIATRUC ICU & NEONATAL ICU C-LABOUR DELIVERY COMPLEX & OT, PREMIUM ROOMS D-NEURO ICU
08	A-EXECUTIVE (TWIN SHARING)801-820 B-EXECUTIVE (TRIPLE SHARING)821-844 C- EXECUTIVE (TRIPLE SHARING)845-868 D- EXECUTIVE (TWIN SHARING)869-888
09	A-STANDARD BEDS 901-919 B-STANDARD BEDS 920-935 C-AUDITORIUM D-ADMINISRATION
10	PREMIUM ROOMS
11	PREMIUM ROOMS
12	PREMIUM ROOMS
13	PREMIUM ROOMS
14	SUITS
15	PRESIDENTIAL SUITE

Purpose:

To define the scope of services provided by ZYDUS hospitals, Ahmedabad Gujarat.

Scope:

All departments of the hospital.

The hospital shall provide following services: -

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
Laboratory Medicine	1. Clinical Pathology 2. Haematology 3. Bio-Chemistry 4. Microbiology 5. Immunoassay 6. Serology 7. Cytopathology 8. Histopathology	Sample Collection Time: 24 hours x 7 days
Blood Storage	1. Red Blood Corpuscles 2. Fresh Frozen Plasma 3. Cryoprecipitate 4. Cryopoorplasma 5. Platelets 6. Whole Blood	24 hours x 7 days
General Medicine	1. Hypertension 2. Diabetes 3. Infectious Diseases 4. Endocrine problems & other metabolic disorder 5. Disease of CNS, ANS, CVS, Respiratory System, Inpatient Department	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care Intensive Critical Care/ Emergency Care 24*7

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
	6.Intensive critical Care 7.Emergency Care 8.Basic and Advanced Life Support 9.Pleural & Pentoneal Tapping 10.Health Check up	
Nephrology	1. Hemodialysis 2. Plasmapheresis 3. Renal Biopsy 4. Graft biopsy 5. USG guided aspiration	8 am to 8 pm (OPD) 24/7 IPD & Emergency care
Obstetrics & Gynecology	1. Obstetrics including high Risk Obstetric Cases 2. Laparoscopic Gynec Surgeries, Myomectomy 3. Hysterectomy 4. D&C, Hysteroscopy 5. Cesarean section 6. Normal deliveries 7. Menopause clinic 8. Obstetric preventive health check up	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Orthopaedics	1. Trauma & fracture surgeries 2. Arthritis 3. Pediatric Orthopaedics	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
	4.Osteoporosis & other bone diseases 5.Joint Replacement surgery	
Ophthalmology	OPD Services	
General Surgery	1. Gastrointestinal Operations (oesophagus to anal canal, liver pancreas, biliary tree, gallbladder, spleen surgeries) 2. Trauma management 3. Limb soft tissue surgeries 4. Peripheral Vascular Diseases 5. Burns patients	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Cardiology	<u>Non Invasive Cardiology</u> 1. General cardiology patient management, ECG interpretation 2. Treadmill testing 3. Echocardiography procedures, 4. Holter Monitoring <u>Invasive Cardiology</u> 1. CAG 2. PTCA 3. COMPLEX PTA (POBA)	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

	4. PAMI 5. CAROTID Angiography 6. BAS- Balloon Atrial Septoplasty 7. BMV- Balloon Atrial Valvotomy 8. PDA- Patent Ductus Arteriosus 9. CRT- Cardiac Resynchronization Therapy 10. CRT-D—Cardiac Resynchronization Defibrillator Therapy 11. PTA- Percutaneous Trans luminal Angioplasty 12. EPS Electrophysiology Study 13. 3D Mapping 14. RFA 15. Pericardial Tapping 16. PPI, Cath Oximetry 17. MAPCA Coiling 18. TPI 19. Stage PTCA 20. Check Angiogram 21. RHC- LHC 22. BAV 23. ASD Closure 24. Carotid Plasty, Renal Plasty	
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SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
	25.Cath Angiogram 26.VSD Closure 27.AICD	
Cardiac Vascular and thoracic Surgery	1. CABG 2. CABG+SVR 3. MVR/Repair 4. AVR/Repair 5. Coarctaion of Aorta 6. DVR 7. MICAS 8. ASD 9. VSD 10. TOF 11. PDA, Complex Congenital HD-ICR 12. Palliative Shunts 13. Arterial Switch 14. Aorta Femoral Bypass 15. Femoral Palliative Bypass 16. Aortic Root Replacement 17. Lobectomy 18. Pneumonectomy	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Anesthesia	a. General Anesthesia b. Regional Anesthesia c. Spinal Anesthesia d. Epidural Anesthesia e. Pain Management	24 hours x 7 hours

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
Neurology & Neurosurgery	1. Brain Tumour & Neuro Oncology 2. Management of Head Injuries 3. Stroke 4. Epilepsy 5. Headache 6. Neuro-critical care 7. EEG & 8. Neuro and spinal surgeries for aneurysms	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Pediatrics and Neonatology	1. Comprehensive care to children from neonates, infants to young children 2. General Pediatric 3. Pediatric Surgery 4. Pediatric Asthma Treatment 5. Pediatric and adolescent Psychiatry, Early stimulation therapy for new born 6. Neonatal ICU 7. Immunization	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Gastro Intestine Surgery	a. Advanced Laproscopic Surgery b. Bariatric Surgery for Obesity	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
	c. Single port access Surgery d. Surgery for disease of Liver, Pancreatic, Hepato biliary etc.	
Gastro Intestine Medicine	a. Upper GI Endoscopy b. Colonoscopy c. ERCP d. Sclerotherapy & band ligation of varices e. Oesophageal dilations f. Balloon treatment for achalasia cardia g. Prosthesis Placement h. Extraction of stone from CBD i. Stenting of CBD & Pancreatic ducts j. Percutaneous endoscopic gastrostomy	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Joint Replacement	a. Total knee replacement b. Total hip replacement c. Hip resurfacing surgeries d. Total shoulder replacement	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
Spine surgery	a. Surgeries for spinal fractures b. Cervical and Thoracic Spine c. Discectomy Anterior Lumbar puncture d. Spinal Injections	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Urology	a. PCNL Percutaneous Nephro lithotomy, Urethroplasty b. V V F c. D.J Stenting d. TURP e. Hernias f. Hydrocele g. VIU, Prostatectomy h. Prostate Biopsy i. Pyeloplasty j. Hypospadias k. Orchidectomy l. Orchiopexy m. Radical Cystectomy n. Neobladder Lap/Open o. Radical Nephrectomy p. Radical Prostatectomy q. Lithotripsy	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
Pulmonology	1. Consultation 2. Diagnostic 3. PFT 4. Spirometry 5. Bronchoscopy- Flexible & Rigid	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
ENT	1. General Consultation 2. Tympanoplasty 3. Tonsillectomy 4. Sept rhinoplasty 5. Cochlear Implant 6. Thyroid Surgeries 7. Mastoidectomy 8. MIcrolaryngial Surgeries 9. Sinoscopy 10. Head and Neck surgeries 11. Speech Therapy 12. Vertigo Clinic 13. Snoring Clinic 14. Audiometry	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Radiology and Imaging	1. X-Rays 2. Sonography 3. Mammography 4. CT scan 5. MRI 6. BMD	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

SPECIALTIES	SUB SCOPE	SERVICE AVAILABILITY
Radiology and Imaging	7. X-Rays 8. Sonography 9. Mammography 10. CT scan 11. MRI 12. BMD	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Dentistry	1. Oral Medicine 2. Oral Radiology 3. Oral and Maxillofacial Surgery 4. Treatment of periodontal conditions 5. Cosmetic dental treatments 6. Endodontic procedures 7. Pediatric dental care 8. Orthodontic treatments 9. Orthographic surgeries 10. Prosthodontics treatments 11. Preventive dental care	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care
Physiotherapy	1. Cardiac rehabilitation 2. Neuro rehabilitation 3. Pain management 4. Physiotherapy in sports injury 5. Physiotherapy in Obstetrics & Gynaecology	8 am to 8 pm (OPD) 24/7 IPD & Emergency Care

	6. Physiotherapy in Orthopedics 7. Physiotherapy in Geriatrics 8. Physiotherapy in Pediatric patients	
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- The above services are provided on both Indoor and Outdoor basis as per the timings fixed by the hospital.
- Emergency services for all specialties are available around the clock all 365 days to all patients irrespective of their place of residence, paying capacity etc.
- Medico legal cases are accepted around the clock

Supplementary services

1. Central sterile and supplies department
2. Pharmacy
3. Dietary
4. Bio-medical engineering
5. Linen & Laundry (Outsourced)
6. Stores (General & Medical)
7. Medical gases (cylinders and piped medical gases)
8. Security (Outsourced)
9. Ambulance Services
10. Medical Record Department
11. Administrative office
12. Hospital management Information System

Services Currently Not available in the Hospital:

- 1) Nuclear Medicine
- 2) Radio Therapy
- 3) IVF
- 4) Psychiatric services

2.PROJECTS

2.1 TIME MOTION STUDY ON SHIFTING OF PATIENTS FROM WARD TO OT.

2.1.1. Introduction

Operation theatre complex is one of the most important departments of the hospital. An operating theatre is where the surgery and surgical procedures are conducted by a team of surgeons, anesthetics, technicians, nurses, etc. Surgical operations are an important part of acute hospital activity. For many patients, they are the sole reason for admission to hospital hence showing its importance. Surgical facilities represent a central lifesaving activity. Its performances, success and failures are highly visible. Among the most common performance indicators are patient throughput, utilization, patient's waiting time, team waiting time, surgeon idle time, surgery cancellation rate, patient deferral, and satisfaction level of patients/surgeons/staff.

Observed Process Flow:

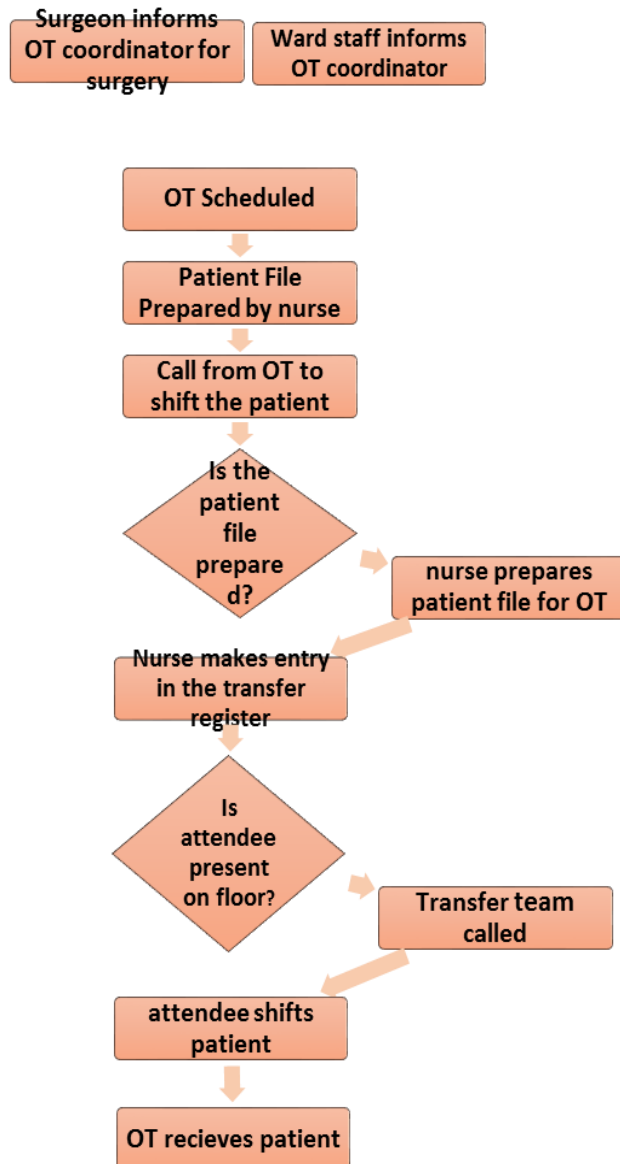


Figure 1: Process flow of shifting of patients from ward to OT

2.1.2. Literature Review

An operating room (OR) is one of the costlier functional areas within hospitals as well as its major profit center. It is known that managing an OR department is a challenging task, which requires the integration of many actors (e.g., patients, surgeons, nurses, technicians) which reflects the complexity, uncertainty and variability associated with surgery. Operations can be performed under an elective and non-elective scheme.

Both planning and scheduling activities deal with the distribution of available resources over time to perform a set of surgical procedures. Scheduling act as a major contributing factor to enhance the efficiency of operating theatres. Accurate and real-time scheduling assist in guessing staffing needs, ensuring availability of required equipment and supplies and thus lead to a smooth-running operating theatre. An accurate schedule must list realistically the starting and ending time of each surgery.

A common practice to schedule ORs is the use of deterministic surgical procedure durations (e.g., average of the last ten cases or surgeon's estimate), average patient flows and average needs. In addition, literature reflected the importance of defining the start time of each surgery and the impact of providing a precise duration to avoid confusion, allow proper allocation and distribution of surgeries.

2.1.3 Rationale:

The OR waiting time and patient's waiting time are affected by the time duration of the patient reaching the OT complex to the incision of surgery. A time series analysis of steps in between call from OT to ward to the shifting of patient from the wards a potentially helpful quality improvement tool and will help analyze the cause of delay.

2.1.4 Aim:

To study the shifting process of patients from ward to OT.

2.1.5 Objective:

- To find the major causes leading to delay in shifting of patient from ward to OT.
- To compare the difference between the time taken for shifting time the patient and the standard time taken.

2.1.6 Research Methodology:

- Type of study: Descriptive
- Sampling frame: In-patient department, Zydus Hospitals, Ahmedabad
- Duration: 8th April 2017- 4th May 2017
- Sample size: 155
- Sampling Method: Convenience Sampling
- Data collection Tool: Observation
- Data Analysis: MS Excel

Surgeries were divided into two sub-groups:

- Planned OTs
- Unplanned OTs

Planned OTs are those which are informed to the OT a day prior to the day of the actual OT.

Unplanned OTs are those which are announced the same day i.e., without any prior knowledge to the OT.

Patients from ICU and patients undergoing cardiac surgeries were not included in the study.

2.1.7 Data Analysis & Interpretation

The following pie-chart shows the no. of planned and un-planned OTs occur during the study duration.

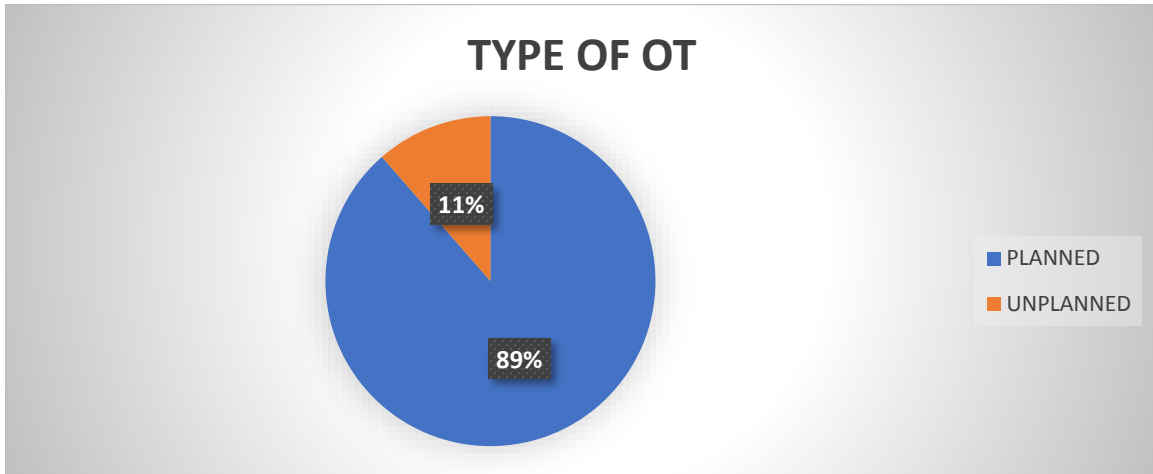


Figure 2: Type of OT

The following pie-chart depicts the time taken in shifting of patients on call from OT

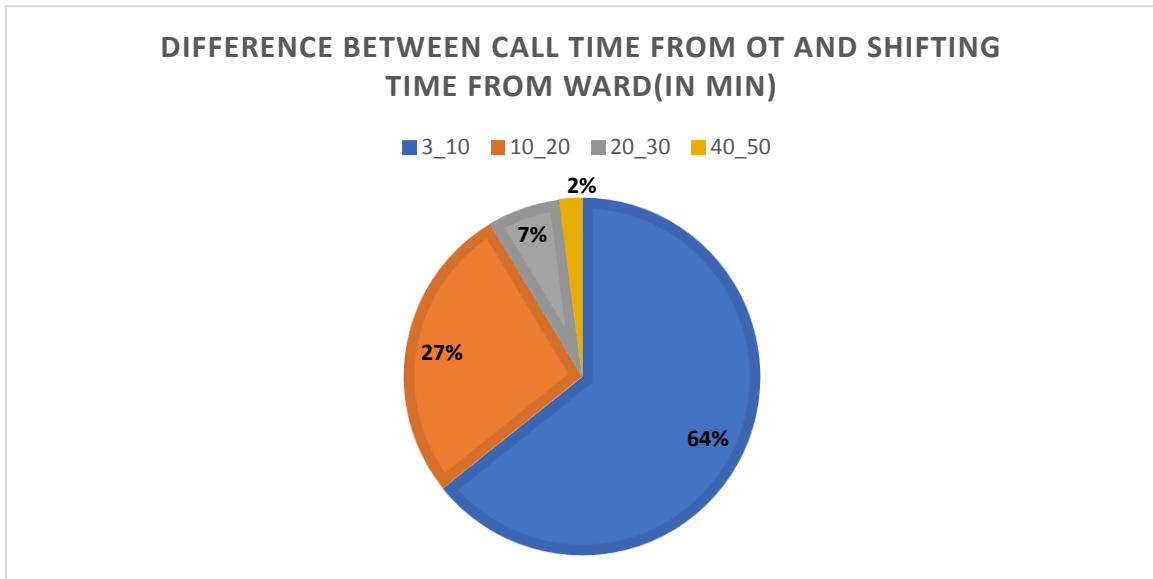


Figure 3: Difference between call time from OT and shifting time from ward (in min)

The curve shows that the 64% of the sample where shifted out from the ward within 10 min of call from OT. However, the shifting was delayed for 36% of the sample. The 2% sample delayed for more than 40 min was due to unavoidable circumstances.

Following pie-chart depicts the various factors observed for delay in the shifting process.

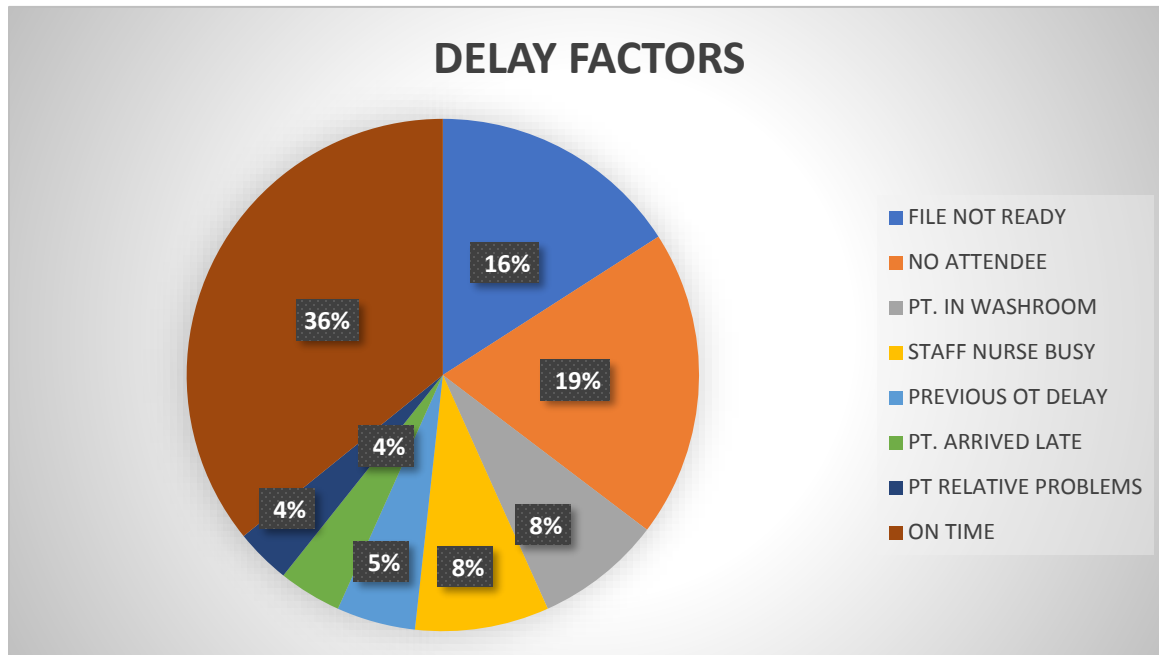


Figure 4: Delay factors

The curve depicts that the while 36% of the patients where shifted on time, 16% delay occurred because the patient file was not prepared, while 19% delay was due to absence of attendee on floor at the time of call from OT. However, 8% delay occurred because the patient.

2.1.8 Recommendations

- On call from OT firstly, the patient can be informed by the nurse about the call, so by the time the patient file is rechecked by the nurse, and an entry made in the transfer register, the patient can finish his job in the washroom. (OR)
- The nurse can send an attendee to the patient immediately after call from OT; while the nurse can follow afterwards.
- Addition of estimate finishing time of OT to surgery list prepared for the following day.
- Nurse-in charge should make sure the patient file is prepared on time, for OT.
- The nurse -in charge aware of the OT time should make sure of the presence of an attendee in the ward around that time.
- Making sure of the availability of a wheelchair in the ward at the time of OT.
- OT delay time should be informed to the ward.
- If the nurse-in charge is busy, the Head nurse should manage the situation.

2.2 DETERMINING PATIENT LENGTH OF STAY AND UTILIZATION PATTERN OF EMERGENCY SERVICES

2.2.1 Introduction:

Emergency Medicine Department (EMD) is a frontline area of patient care in a hospital and is committed to providing appropriate transport and treatment in its pre-hospital care and quality emergency care to all patients visiting the emergency department. Resources exist in the emergency department to accommodate each patient from the time of arrival through evaluation, decision making, treatment and disposition. The evaluation, management, and treatment of patients aims to be appropriate and expedient. The emergency physician, emergency nurse, and additional medical team members are the core components of the emergency medical care system.

The emergency department is used both by individuals brought by ambulance and by those presenting themselves for treatment. The latter include people whose medical conditions vary widely in severity. The emergency department therefore performs a sorting function, deals itself with a range of less seriously ill patients and assesses more serious cases for admission as inpatient.

2.2.2 Literature Review:

Emergency Department (ED) serves additional functions beyond emergency treatment, , acting as an initial gateway to many of a hospital's services, and (from a business standpoint) providing the hospital with a steady stream of new customers. [5] ED wait time and length of visit are important measures of the timeliness, efficiency, safety and patient-centeredness of emergency care. [6]

Elderly subjects have higher ED utilization rates and in particular when they are above 75 years old. A further dramatic increase in the general population aged 75 years and above is expected to further raise the absolute numbers of ED visits of older people. Evolving diagnoses often take time to clarify, requiring longer observation time and greater number of resources. [7] Furthermore, increases in emergency department (ED) length of stay (LOS) have been associated with increases in inpatient LOS, suggesting that initial ED delays in diagnosis and management may correlate with additional delays in inpatient care. [8]

Patient length of stay (LOS) is a key measure of ED throughput and a marker of overcrowding. Understanding the factors that contribute to ED process times and patient care delays is a critical step in improving ED patient care efficiency. Time study analyses of ED care processes are a potentially useful quality improvement tool and will help clarify and quantify the causes of patient care delays. [9] Internal and external factors contribute to patient care delays. These factors include patient characteristics, ED staffing patterns, access to stretchers and health care providers, time of patient arrival, management practices, and testing and treatment strategies chosen. [10]

Testing and treatment are the essentials aspects of the delivery of emergency care. Recognition of the effects of these activities on emergency department length of stay (LOS) has implications for administrators planning efficient operations, patients regarding expectations for length of visit and help providers and policy makers design systems that allow services to be performed more efficiently in the environment. [11]

Identified factors that health care providers and other stake holders perceive to be important causes of ED crowding: shortage of treatment areas, shortages of nursing staff, delays in ancillary services, boarding inpatients, and hospital bed shortages. Transport delays and treatment delays are commonly studied effects of increased length of stay pertaining to reduced quality. [12]

2.2.3 Rationale:

Time studies that assess key ED processes will help clarify the causes of patient care delays and prolonged LOS. The objectives of this study were to identify and quantify the principal

ED patient care time intervals, and to measure the impact of important service processes (laboratory testing, imaging, and consultation) on LOS for patients in different triage levels.

Understanding the factors that contribute to ED process times and patient care delays is a critical step in improving ED patient care efficiency. Time study analyses of ED care processes are a potentially useful quality improvement tool and will help clarify and quantify the causes of patient care delays.

2.2.4 Aim:

To quantify the patient length of stay and study the utilization pattern of emergency services.

2.2.5 Objective:

- To find major causes leading to increase in patient length of stay for more than 2 hours.
- To compare the utilization pattern of emergency services.

2.2.6 Research Methodology:

- Study type: Descriptive
- Sampling frame: Emergency department, Zydus hospitals, Ahmedabad
- Duration-8th May'17-27th May'17
- Sample size:100
- Sampling Method: Convenience Sampling
- Data Collection: Observation
- Data Analysis: MS Excel

Sample taken was from the duration of 6am to 4pm during the entire duration of study.

Patients arriving at the emergency department for minor dressing procedures were not included in the study.

2.2.7 Data Analysis and Interpretation:

The following chart shows the division of the emergency department in units based on triage.

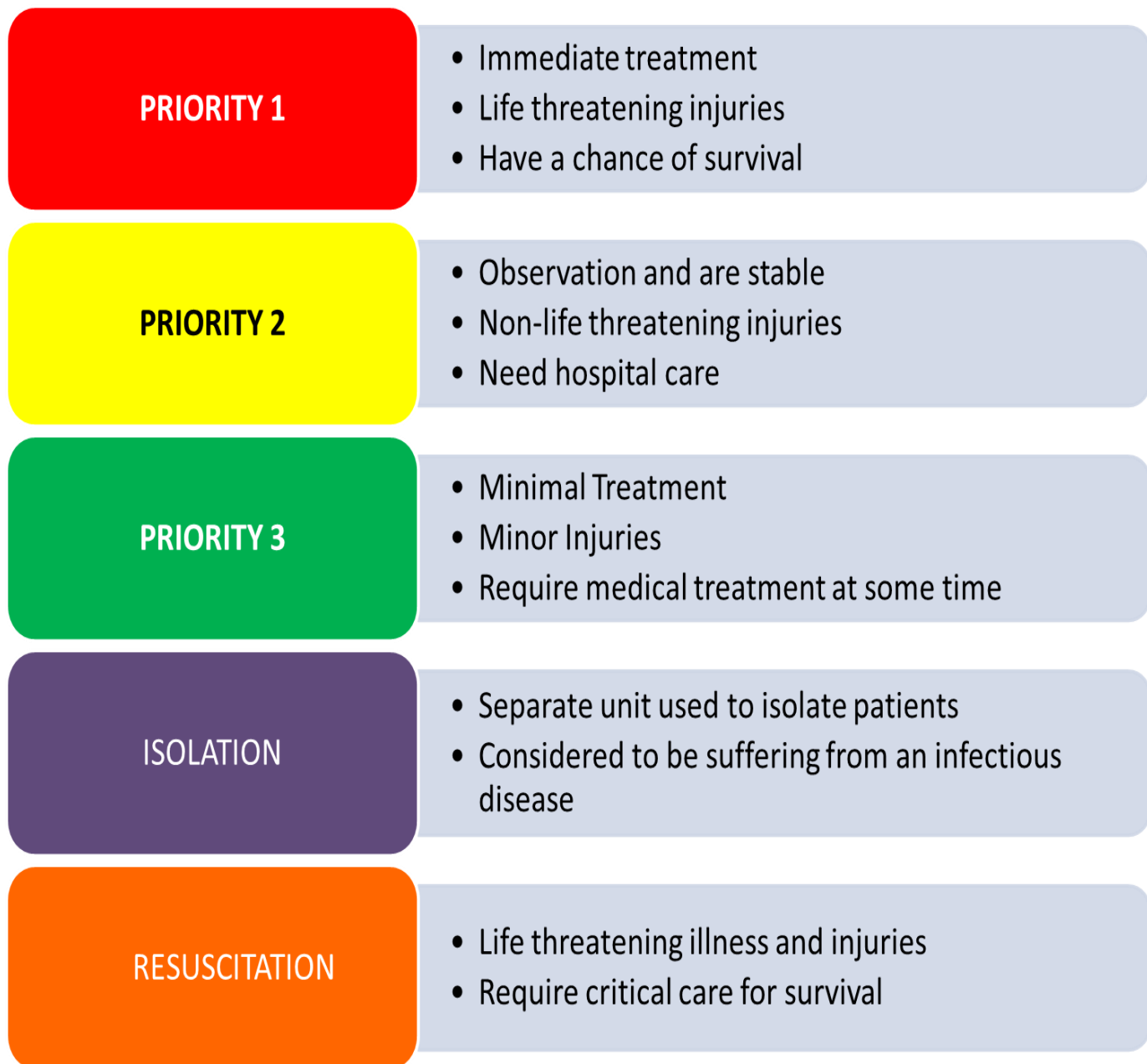


Figure 5: Priority wise division of Emergency Department

The following pie-chart shows the priority utilization of the emergency department within the study duration.

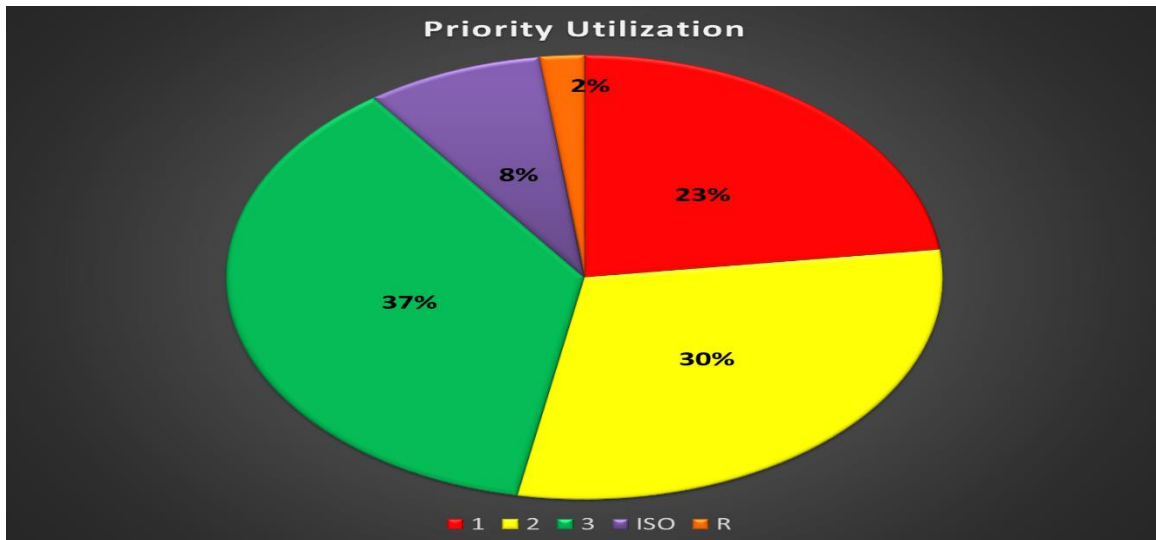


Figure 6: Priority Utilization

The curve shows the maximum utilization of priority 3, followed by priority 2, while utilization of priority 1 was 23%.

The following graph shows the age wise priority utilization of the emergency department.

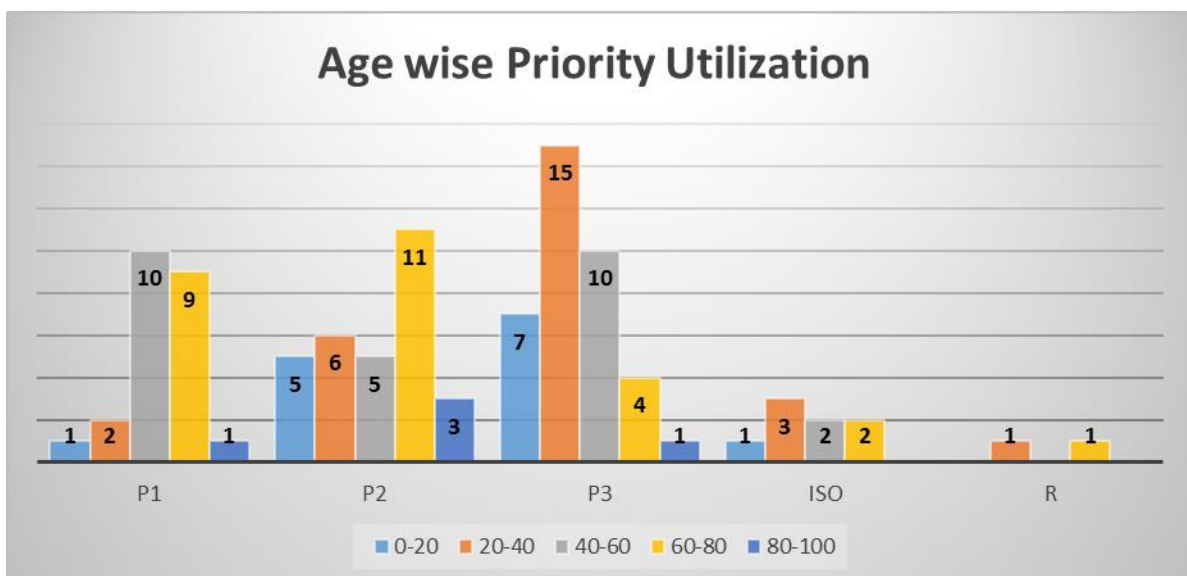


Figure 7: Age wise priority utilization

The graph shows maximum no. of patients in priority 3 to be in the age group of 20-40 years, while that in priority 2 are in the age group of 60-80 years and that of in priority 1 are in the age group of 40-60 years.

The following pie-chart shows the specialty utilization in the emergency department.

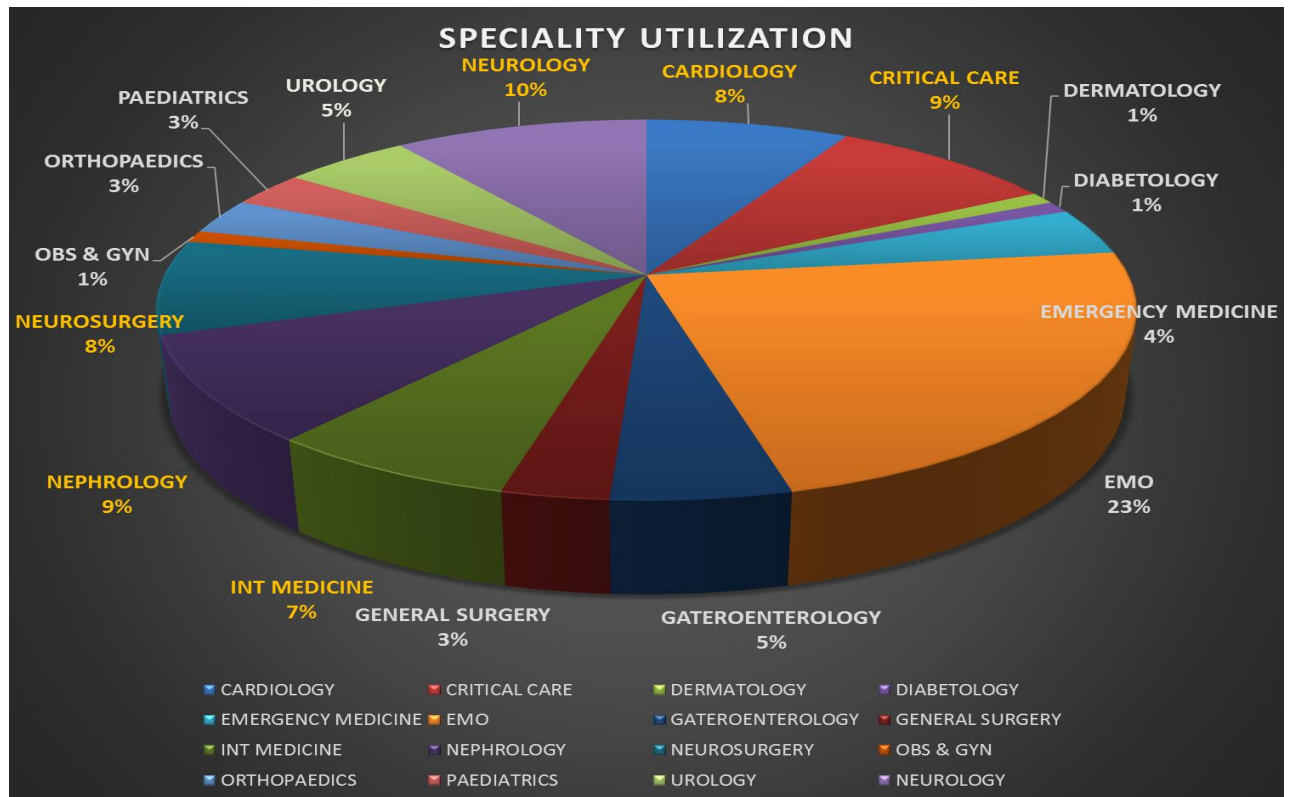


Figure 8: Specialty Utilization

The curve shows most utilized department to be of neurology, nephrology, neurosurgery, critical care, followed by cardiology and internal medicine.

The following graph shows the hourly utilization of the emergency department

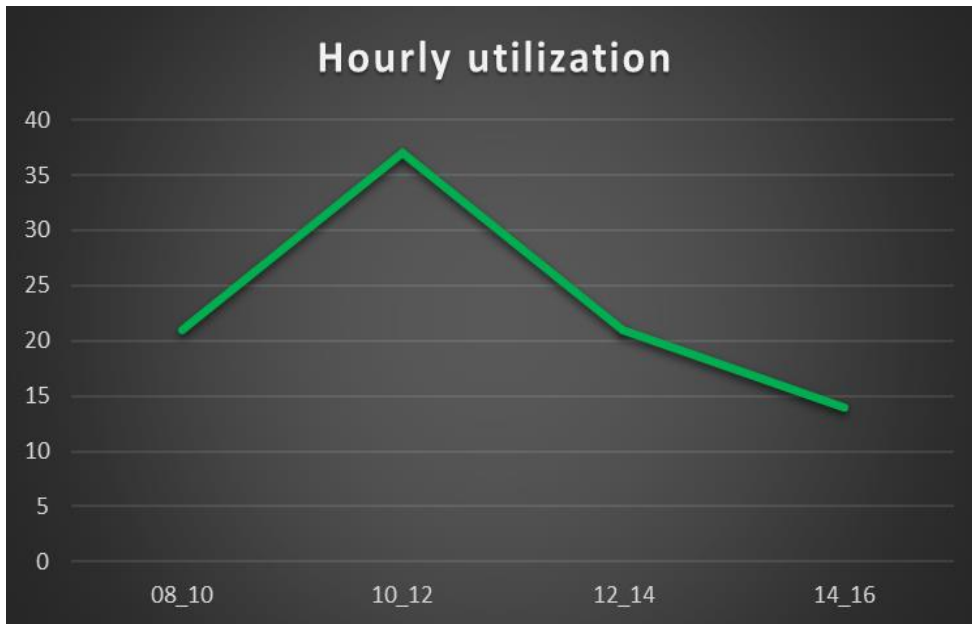


Figure 9: Hourly Utilization

The following pie chart shows where the patient shifted after departure from the emergency.

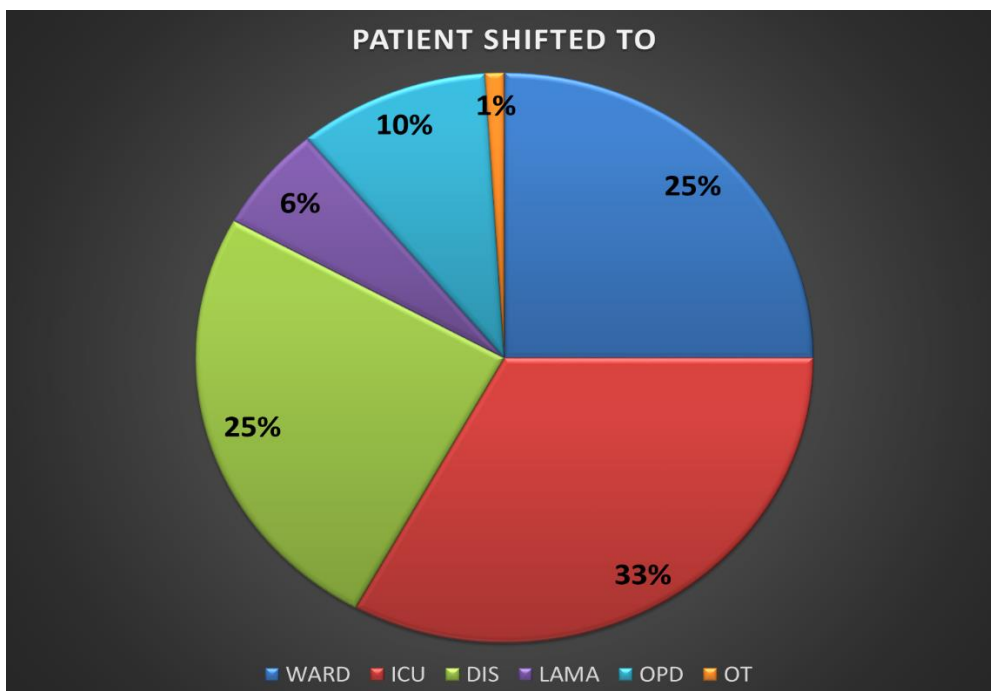
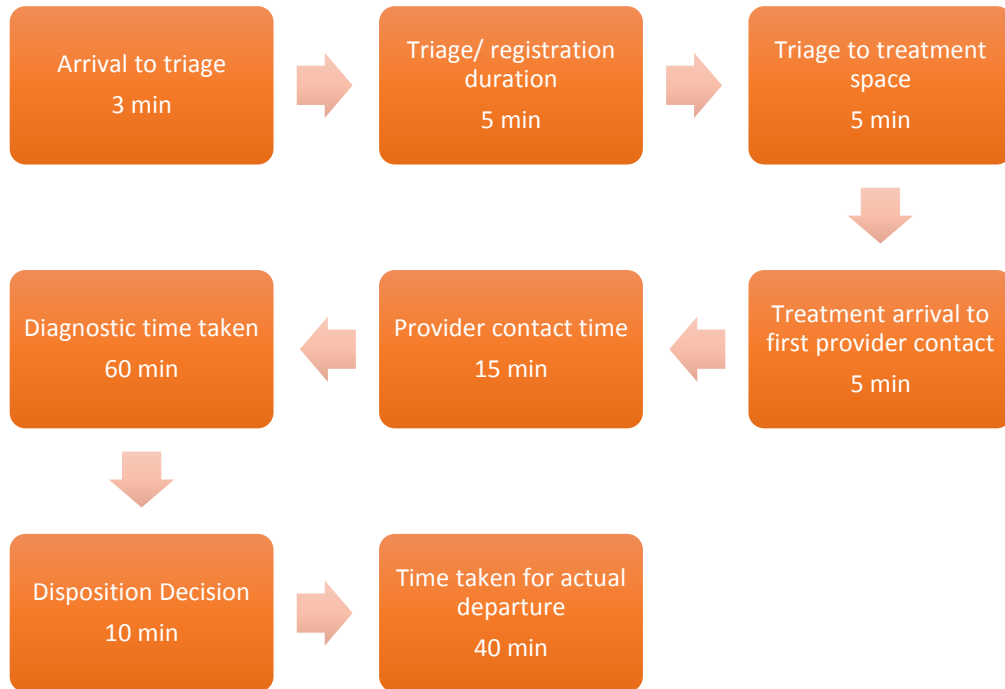


Figure 10: Patient shifted to after departure.

Figure 11: Process mapping of the total length of stay



The chart shows the step analysis of length of stay with the observed duration of time taken at each step in the emergency department, while the **mean length of stay= 143 min.**

The pie-chart shows the delay of patients whose length of stay is more than 2 hours.

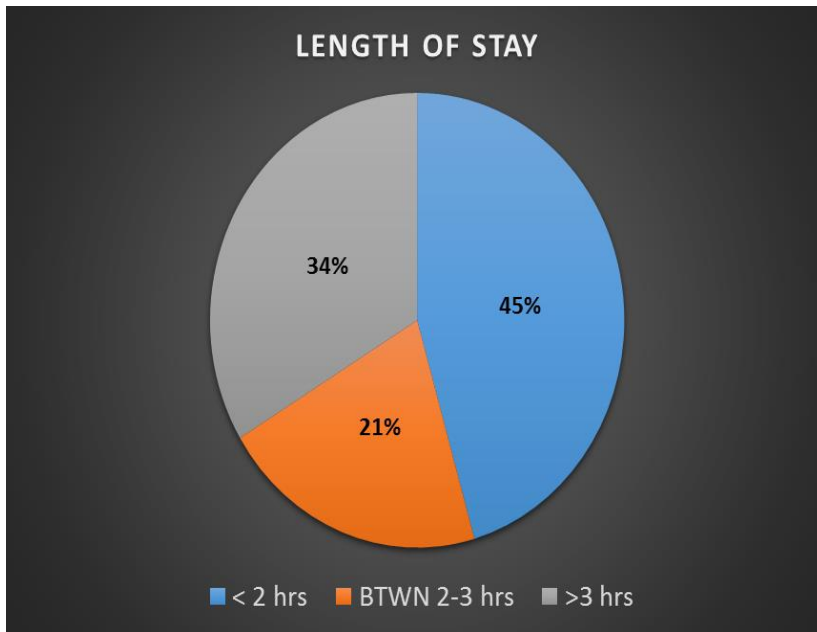


Figure 12: Length of stay

The following graph shows the priority wise delay which is greater than 2 hours.

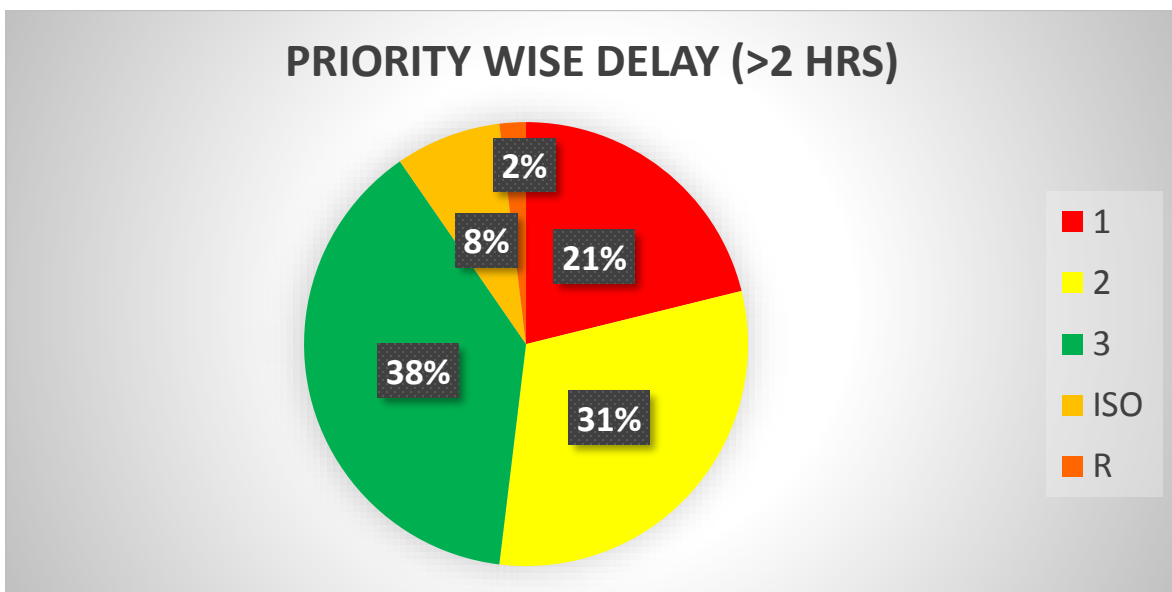
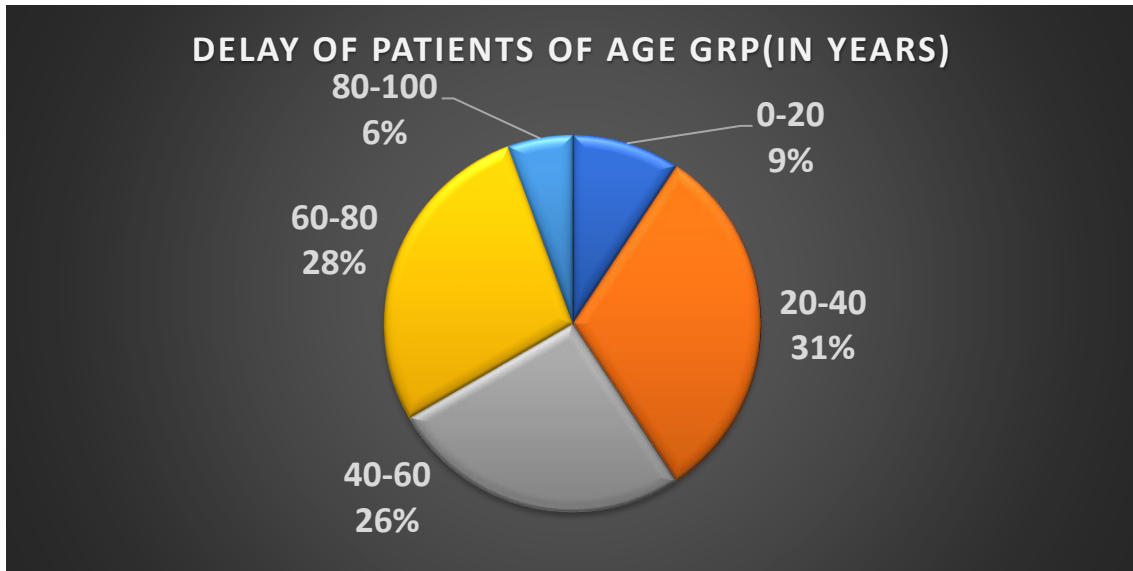


Figure 13: Priority wise delay (>2 hrs)

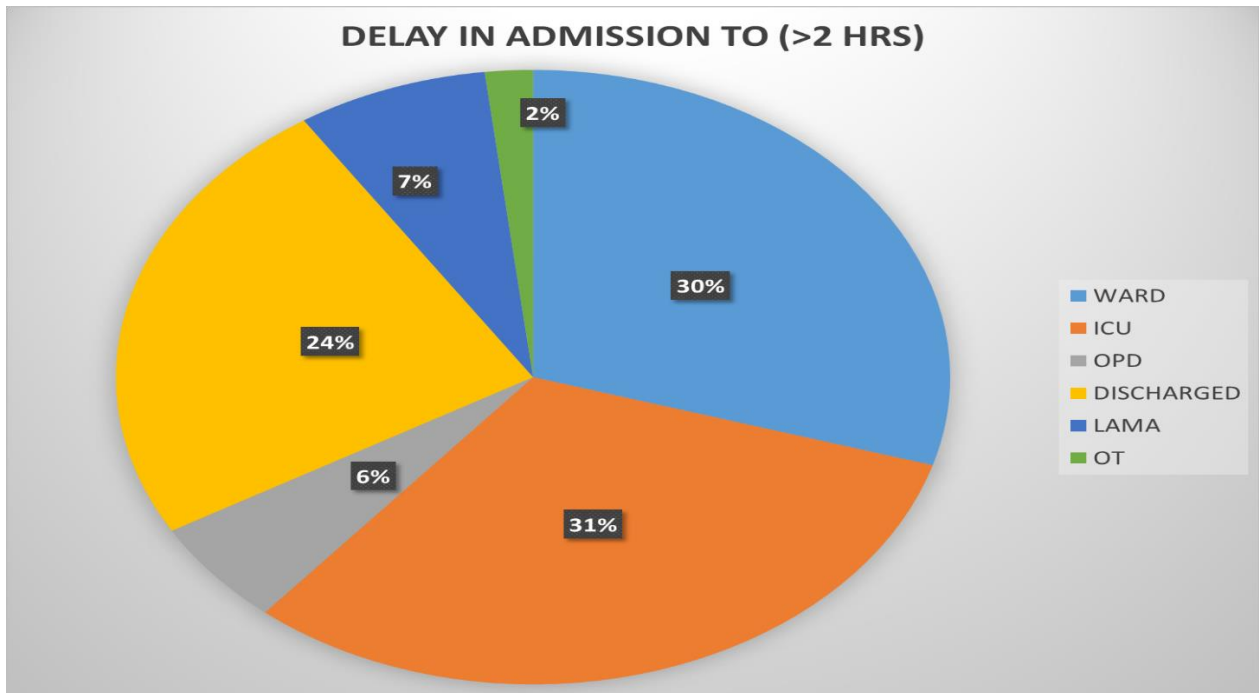
The results showed that more delay occurred for patients in priority 3 than priority 1 considering their length of stay to be greater as time taken more stabilizing patients of priority 1 is more compared to priority 3 patients.

Figure 14: Delay of patients of age group (in years)



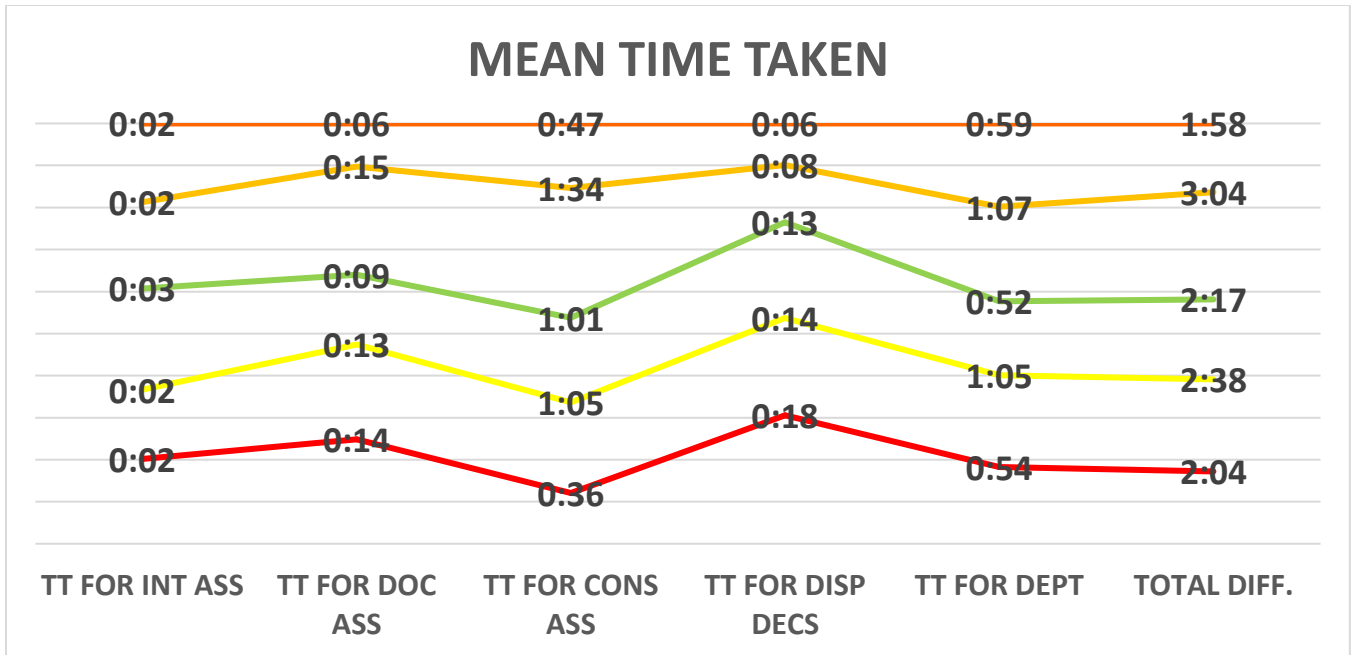
The delay in shifting of patients between 40-60 years to that of those between that of 60-80 years was almost equal, while that of patients within the age group of 20-40 were comparatively higher and hence, old age of the patient has least impact on the patient length of stay.

Figure 15: Delay in admission to (>2 hrs)



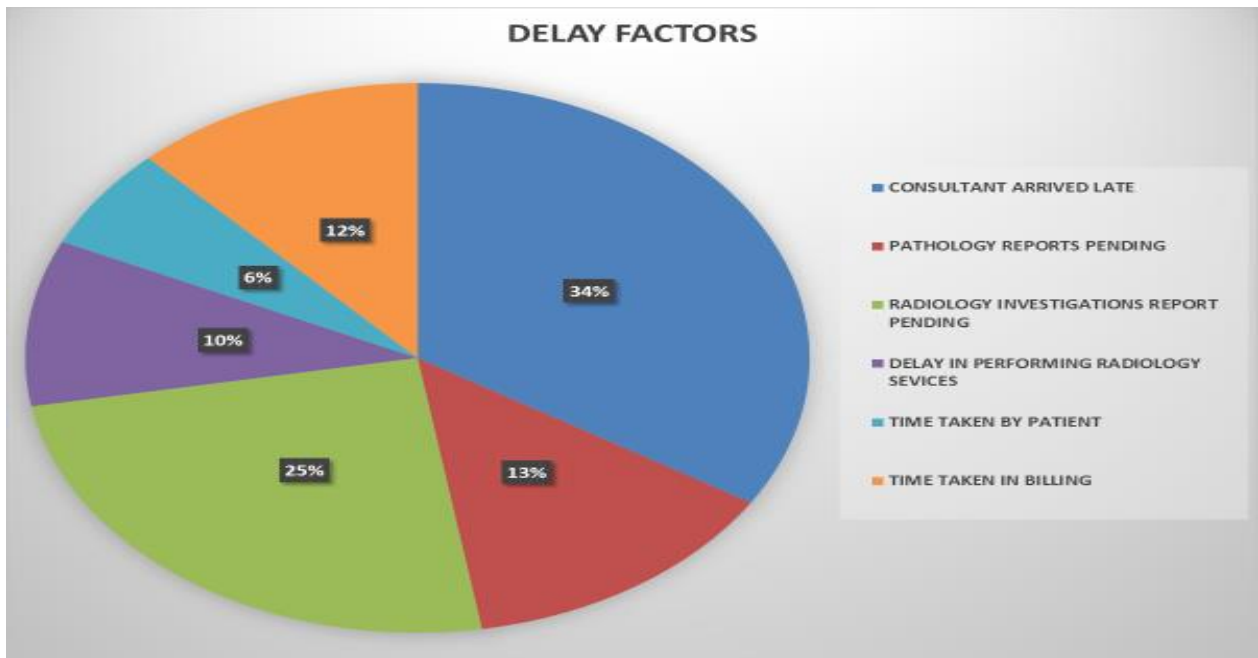
The curve shows the delay in shifting of patients was almost similar to all departments and hence did not have much effect on the admission to a specific department had least impact on the length of stay.

Figure 16: Mean time taken



The graph shows the mean time taken for each step benchmarked in the process flow for each priority unit. The mean time for isolation is comparatively higher while that of resuscitation is least.

Figure 17: Delay Factors for length of stay



The curve shows factors observed for causing increase length of stay. While the consultant arriving late remained a dominant factor, other factors included wait for blood and radiological investigations report. While 12% delay occurred in billing, 8% delay occurred because the patient was ready for treatment.

Figure 18: Delay of Consultant



The graph compares the total no. of patients for each specialty to delay occurred for the number of patients due to the consultant late arrival.

2.2.8 Recommendations:

- While the printed investigation reports are pending, if completed, the patient file can be sent for billing.
- To produce a copy of the reports of the radiological investigation carried out in the emergency for the patient, to prevent the carrying out of the same procedure twice.
- Call to the emergency department from the path lab, as soon as the blood investigation reports are prepared.
- Ensuring timely cross reference of patients by consultants.
- Formation of a “bridging ward” to facilitate patients who are to be kept under observations or disposition is on hold for wait for reports, but are stable, to maintain a smooth flow in the emergency department.

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Annexure

1. Checklist made for step analysis of patient length of stay

	1	2	3	4	5
DATE					
AGE					
GENDER					
REGISTRATION NO.					
MODE OF ARRIVAL					
PRIORITY					
ARRIVED TO THE HOSPITAL					
TRIAGE ASSESSMENT TIME					
ARRIVED IN THE WARD					
VITAL MARKERS					
CALL TO PHLEBOTOMIST					
PLEBOTOMIST ARRIVED					
SAMPLE COLLECTION					
DOCTOR'S ASSESSMENT					
REGISTRATION DONE					
HISTORY TAKEN FROM RELATIVE					
CONSULTANT CALL TIME					
CONSULTANT ARRIVED					
PATIENT OLD FILES EXAMINED					
CALL FOR RADIOLOGICAL INVESTIGATIONS					
INVESTIGATIONS COMPLETED					
REPORT OF INVESTIGATIONS					
PATIENT ID					
CONSULTANT ASSESSMENT					
DOCTOR CALL TIME					
DOCTOR'S ARRIVAL					
OVER FROM CONSULTANT					
DOCTOR REFERS TO PATIENT RELATIVES					
DISCUSSION OF CONSULTANTS					
SUGGEST PLAN FOR PATIENT					
PATIENT FILE PREPARED					
ENTRY IN SYSTEM FOR RADIOLOGY SERVICES					
CALL FROM RADIOLOGY DEPARTMENT					

SHIFTED TO RADIOLOGY DEPARTMENT					
TIME TAKEN IN RADIOLOGY DEPARTMENT					
RETURN TIME TO EMERGENCY					
CALL TO BOOK ROOM FOR PATIENT					
PATIENT PREPARED					
CONSENT FORM SIGNED					
CONFIRMED BOOKING FROM WARD					
FINAL PATIENT FILE PREPARED					
PATIENT SHIFTED TO WARD					
PATIENT SHIFTED TO ICU					
PATIENT DISCHARGED					
RETURN WITHIN 24HRS					
RETURN WITHIN 48HRS					
REMARKS					