A Report on

Utilization Rate and Turnaround Time Analysis of OT and Cath-Lab Complexes

Kokilaben Dhirubhai Ambani Hospital and Research Centre

Mumbai

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19th MBA-HM

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

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that Dr. Kingshuk Kar has undergone his summer training at Kokilaben Dhirubhai Ambani Hospital, Mumbai from 6th April 2015 to 31st May 2015.

The candidate has himself carried out all the studies related to his summer training Project, with a sincere, scientific and analytical approach. The summer training programme is a mandatory course requirement before being awarded by a degree in masters in business administration (MBA) in Hospital administration.

I wish him success in all his future endeavors.

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Kokilaben Dhirubhai Ambani
hospital & medical research institute

Every Life Matters

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Kingshuk Kar** has worked as an intern in Kokilaben Dhirubhai Ambani Hospital from 6th April, 2015 to 31st May, 2015.

During his tenure here as an intern he has worked on the following case studies:

1. Study on Turnaround time and Utilization rate of Operation theatres in KDAH.
2. Study on Turnaround time and utilization rate of CATH labs in KDAH.

I wish him best of luck for his future endeavor.

Regards,

Dr. Mihir Dalal
Deputy General Manager
Kokilaben Dhirubhai Ambani Hospital
Mumbai.

KOKILABEN DHIRUBHAI AMBANI HOSPITAL MUMBAI 53.

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Acknowledgement:

A summer project is a golden opportunity for learning and self-development.

I consider myself very lucky and honored to have wonderful people leading me through the completion of this project.

I consider myself fortunate for having been provided an opportunity to undergo summer training at Kokilaben Dhirubhai Ambani Hospital, Mumbai and wish to express my indebted gratitude to Dr. Ram Narain ,CEO KDH, Dr Mihir Dalal

I also wish to extend a special thanks to Dr. Amit Marathe ,OT Manager who in spite of being extraordinarily busy with his duties, took time to hear, guide and keep me on the correct path and allowing me to carry out my project work at their esteemed organization during the training.

I take this opportunity to express my profound gratitude and keep regards to my Mentor, Dr. Ram Pandey, (clinical Administration) for his guidance and constant encouragement during the course of project.

I am thankful to Dr Arun Mishra , Dolly Midda , Prateksha Pal and Dr Havoi Fauzdar for the valuable information provided by them in their respective fields. I am grateful for the co-operation of all the Staff at Kikilaben Dhirubhai Ambani Hospital during the period of my project.

Dr. Kingshuk Kar

Introduction:

Operation Theatres

Operation theatres are mission-critical assets to all tertiary care hospitals as they contribute to almost two-thirds of hospital's total revenues. Moreover, OTs also account for about 40% of the hospital's total expenses including manpower costs, capital cost, the fixed and variable operating costs of the surgical facility. This makes it imperative that the functioning of the operation theatres is optimized. The business model of private hospitals is such that it generates earnings only when the OTs are fully utilized. Utilization Rate is therefore a simple and adequate measure of efficiency of Operation Theatre because its ability to generate revenue rises proportionately with the time for which it is used.

Improving efficiency of OT major undertaking due to the inherent complexity of the processes involved. This complexity can be attributed to several factors.

First, scheduling patients for surgery in a way that reduces clashes with other patients and boosts optimal utilization of the OT's resources (such as surgical team, nurses, technicians etc) is a complex problem. At this stage, decisions such as sequencing of patient arrivals, allocation of patients to ORs, and matching of patients with surgical teams need to be made meticulously.

Second, OTs are usually part of a surgical suite where they share common resources required in both reception of arriving patients and post-surgery recovery of patients. In the discharge of post-operative patients, ICU beds are a vital resource which is unfortunately prone to much uncertainty due to their multiple users. Therefore managing the patient traffic through a surgical suite requires a holistic approach with account of both upstream and downstream process requirements.

Third, there is significant uncertainty in several activities involved in the delivery of surgical care, such as the uncertainty related to arrival times of patients, OT personnel availability, duration of the surgical procedure, etc. Inevitably, this makes advanced planning of OT utilization very difficult.

Cath Labs

Cath Labs are an essential part of any tertiary care hospital. They are capable of performing both diagnostic and procedural services such as angiography, angioplasty, stent insertion, pacemaker insertion /removal etc. Cath lab procedures are usually short often lasting just 15-30 minutes, however, patients must be kept under observation for 4-8 hours depending on the type of procedure and the condition of the patient. Increasing the efficiency of the Cath Lab would directly lead to greater revenues as the procedures involve limited manpower and consumables while providing high revenues per unit.

This study sought to examine the process and measure the efficiency of 15 OTs in two OT Complexes and two CATH labs. The Turnaround Times (TATs) and Utilization Rates (URs) of all OTs and Cath labs were individually calculated from the time period of 24th April till 16th May.

Similar study was carried out in the Cathlab complex which had two functioning Cathlabs.

Objectives:

- To Calculate the turnaround time of each Operation Theatre and CATH lab
- To Calculate the Utilization Rate of each Operation Theatre and CATH lab
- To suggest solutions to increase the efficiency of Operation theatres and CATH labs

Research Methodology:

Study Location: OT complex 1 ,OT complex 2 ,CATH-Lab 2 and 3 in Kokilaben Dhirubhai Ambani Hospital, Mumbai

Study Period: 24th April 2015 to 16th May 2015

Study Design:

The study was a descriptive, cross-sectional study. All cases during the respective study periods were recorded. Part of the data was collected retrospectively from log books and the hospital MIS.

Study Area	Duration of Data Collection	No. of Cases Collected
5th Floor OT Complex	24th April – 6th May	240
3rd Flood OT Complex	2nd May – 13th May	150
Cath-Lab Complex	2nd May – 16th May	153

Population:

Instead of drawing a representative sample from retrospective data, the entire population in the study period was taken into the study in order to ascertain the reasons for delays and analyze the most frequent and most time-consuming reasons in real time.

OT 1	**Neurosurgery**
OT 2	**Neurosurgery**
OT 3	**Paediatric Cardiac**
OT 4	**Adult Cardiac**
OT 5	**Ortho & Spine**
OT 6	**Paediatric Cardiac**
OT 7	**General**
OT 8	**Ortho & Spine**

Fig1:OT Complex 1 (3rd Floor)

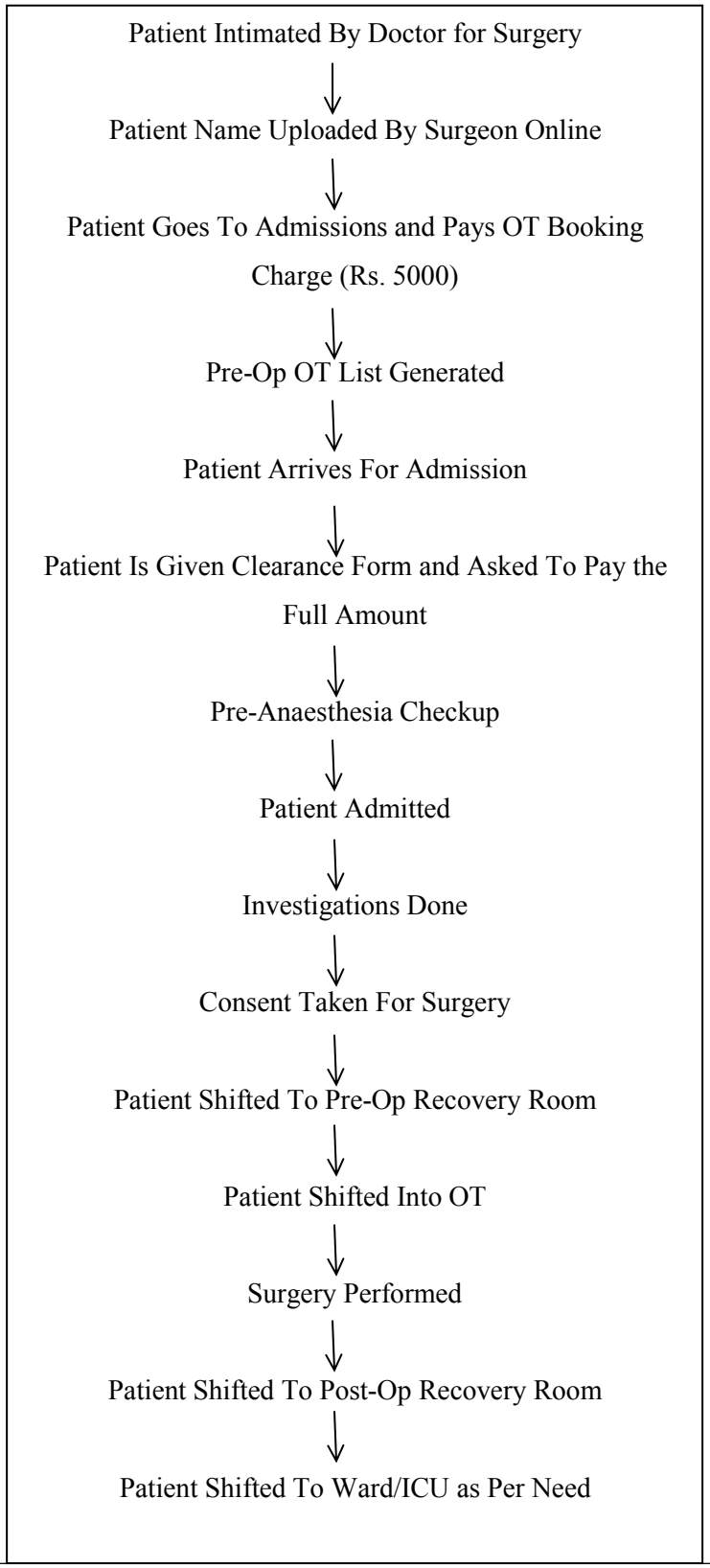
OT 1	**EnT & Opthalmology**
OT 2	**Urology**
OT 3	**Urology + General**
OT 4	**Urology + General**
OT 5	**General Robotic**
OT 6	**Ortho & Transplants**
OT 7	**Transplants**

Fig 2:OT Complex 2 (5th Floor)

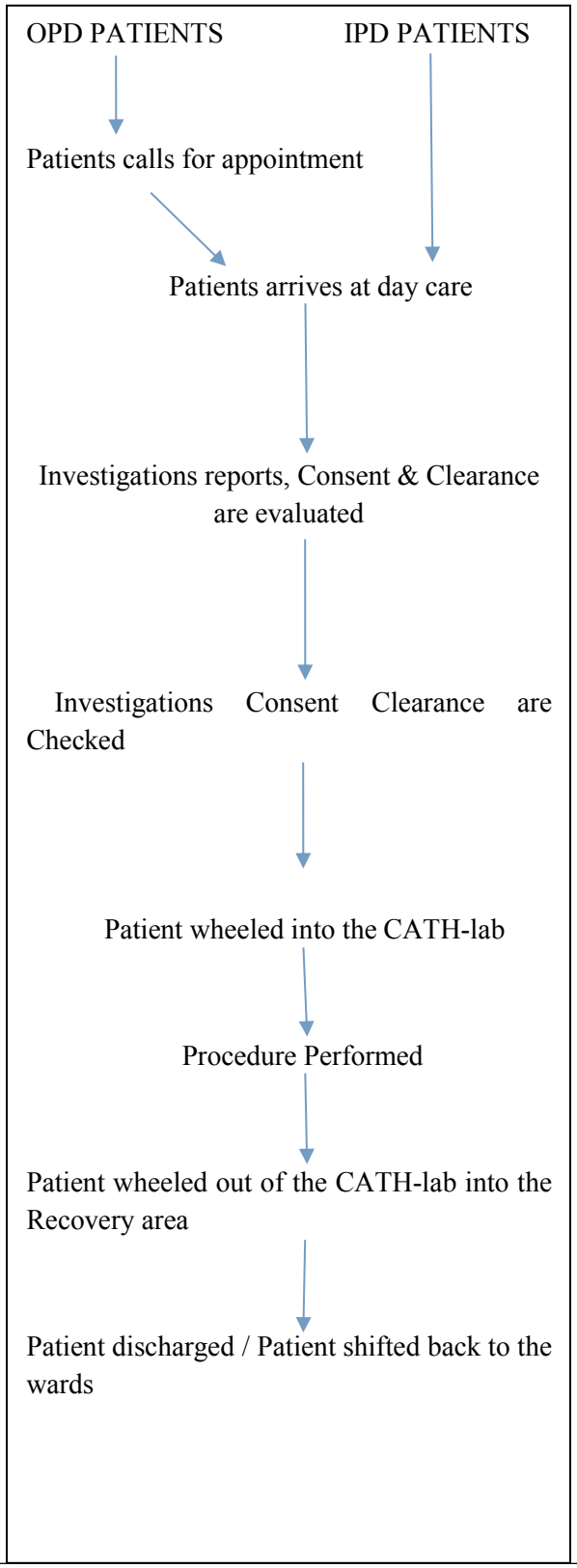
Data Collection & Process Flow:

The process flow in the OTs and Cathlab is represented in the diagrams below. (From the time the paptient comes to the doctor till the time he/she enters the operation theatre or Cath-Lab)

OPERATION THEATRES



CATH-LAB



The data points collected for analysis were:

- Arrival in the pre-operative recovery room
- Patient entry into the OT
- Incision time
- Patient exit from OT

Data was collected by observation in the OT complexes and the Cath-Lab during the study period. Data was entered into a printed form and later entered into MS Excel for further analysis.

Data Analysis:

The data collected was used to calculate the following factors:

- Turnaround Time
- Utilization Rate
- Delay Percentage

Turnaround Time: The time between one patient leaving the OT/Cath-Lab and the next patient entering. The median of the Turnaround Times of all cases in a particular OT was calculated to reflect the true average TAT for that OT (due to the presence of extreme values).

Note: Median TAT is taken instead of the Avg TAT as there was vide variations in the TAT times on specific days in all the OT's . Hence Median TAT would give a closer estimated result to than the Avg TAT.

Utilization Rate: This is the number of productive minutes per 12-hour period. Normally cases are scheduled from 8 AM to 8 PM, so a 12 hour period (720 minutes) was considered. Productive time is that period of time in which the OT was productive – i.e. surgical time and time taken to prepare the OT for the next case.

Down Time :Period of time when the Operation theatre is not used

Working Duration = total no. of minutes that the OT was functioning – i.e. 8:00 AM to OT Closing
Wastage = Actual Down Time – Expected Down Time
Actual Down Time = Sum of all TATs + Delay in starting the first case of the day
Expected Down Time = (Median TAT for that OT) × (N-1)
N = number of surgeries performed in that OT on that day

Utilization Rates of a given OT were calculated on every day in the study and their mean was considered the Average Utilization Rate for that OT.

Delay Percentage: The percentage of cases that were delayed beyond 30 minutes.

Calculations:

Utilization Rate (Example) On the 29th of April, OT 7 on the 5th floor OT Complex had the following situation:

No. of Surgeries performed = 4
Working Duration = 745 min (OT closed at 8:25 PM)
Expected Down Time = 35.5 × 3 = 106.5 min
Actual Down Time = 223 min
Wastage = 218-106.5 = 116.5 min

From the above data,

The Utilization Rate of OT 7 (5th floor) on 29th April was 87.29%

Results:

Turnaround Times:

Table 1 – Median TATs in OT Complex 2 (5th Floor)

OT No.	Time	Reasons
OT 1	16 minutes	Opthal cases ,Small cases less TAT
OT 2	25 minutes	Urology cases with expected TAT
OT 3	35 minutes	Urology and general cases with irregular scheduling of minor cases.
OT 4	43 minutes	Different surgeons varied time allotted to patients
OT 5	35 minutes	Robotic cases and general cases with relative TAT
OT 6	72.5 minutes	Long scheduled ortho and transplant cases, cases getting over early with next case schedulled not ready
OT 7	35.5 minutes	Mostly single cases, less cases ,less schedulling ,less variation in TAT

Table 2 – Median TATs in OT Complex 1 (3rd Floor)

OT 1	65 minutes
OT 3	60 minutes
OT 4	51.5 minutes
OT 5	37.5 minutes
OT 6	35 minutes
OT 7	39 minutes
OT 8	41.5 minutes

TAT for OT 2 on the 3rd floor was not calculated as it rarely had more than one case per day, so there was no possibility of measuring Turnaround Time.

Note :The TAT of OT complex 2 on the 3rd floor has wide variation in TAT as the cases scheduled are mostly long cases and cases schedulled per OT is generally one ,hence any case schedulled after that are additional cases hene a wide variation in turn over times.

Table 3 – Median TATs in Cathlab Complex

Cathlab 2	17.5 minutes
Cathlab 3	12.5 minutes

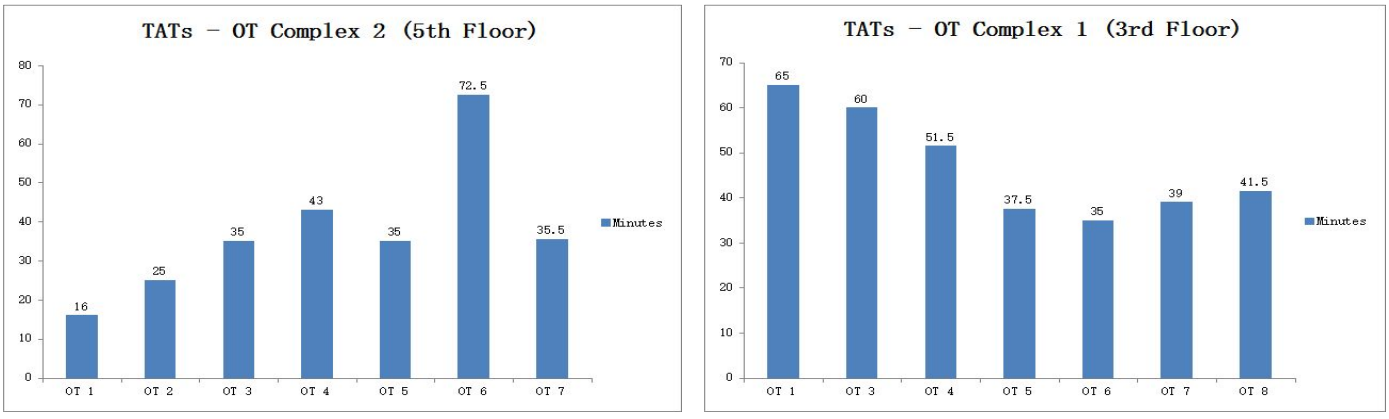


Fig 1: Comparative Analysis of the Turn Around times of Operation Theatres

Utilization Rates:

Table 4 – Average URs in OT Complex 2 (5th Floor)

OT 1	69.15%	Small cases, schedulling of cases less as compared to the no of working hours.
OT 2	86.68%	More no of cases schedulled under same surgeon
OT 3	82.75%	More urology and general cases schedulled
OT 4	86.15%	More no of cases schedulled
OT 5	84.38%	Robotic cases fixed time and fixed no of cases
OT 6	76.57%	Ortho and transplant cases variable time duration
OT 7	83.69%	Single cases long duration most of the days

Table 5 – Average URs in OT Complex 1 (3rd Floor)

OT 1	57.16%
OT 2	49.30%
OT 3	72.54%
OT 4	78.01%
OT 5	78.55%
OT 6	64.90%
OT 7	63.94%
OT 8	83.64%

Note: Utilization rates of all the OT's on the third floor are comparatively low due to the length and no of cases schedulled. Generally 1- 2 cases are scchedulled per day with variable duration of surgery usually ending much before the alotted time duration ,thereby reducing the utilization . OT 8 on the 3rd floor is utilized better as compared to the rest of the OT's due to more no of cases schedulled under the same surgeon.

Table 3 – Average URs in Cathlab Complex

Cathlab 2	48.63%
Cathlab 3	55.71%

Note: The utilization rates of the CATH-labs are relatively low due to less no of cases available and the working duration being higher than required.

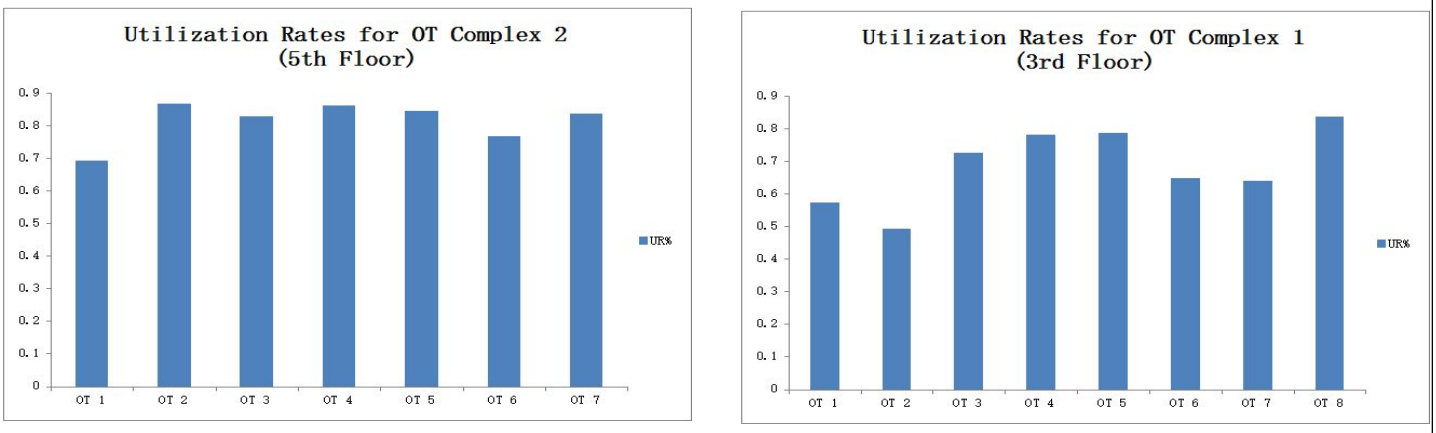


Fig 2: Comparative Analysis of Utilization Rate of Operation Theatres

Recommendations:

Operation Theatres

- As cases on 5th floor are shorter and less complex, some cases could be shifted to the 3rd floor OT complex to improve utilization by scheduling these cases after the long case.
- Both floors have some cases which are very short (less than an hour long) such as dental procedures, pain management, plaster and dressing change, bed sore removal etc. These cases could be performed in a minor OT or a procedure room instead of taking up time in the main OTs. Delays in clearances and investigations for these procedures lead to delays in the major cases as well.
- Patients must be instructed to get admitted the previous day (after 12 noon) or risk losing the OT booking. This must be enforced to eliminate delays due to pending investigations, anaesthetist clearance, cardiac clearance, consent etc.
- OT Booking amount should be made mandatory and should be a substantial amount (20-25% of clearance amount). This would act as an economic disincentive for cancelling the booking due to non-medical reasons.
- Patients must be provided a checklist of things to be done before they can undergo surgery (investigations to be done, clearances from other consultants, forms to be signed etc). This would make the patient/attendants focus and co-operate with the staff to prepare themselves for the surgery on time.
- Pending investigations could be done on an OPD basis for non TPA patients.

Cath-Labs

- In order to reduce the delays in Cathlabs, walk-in patients must be provided with a checklist of tests to be brought on the day of procedure. This must be provided at the time of booking the appointment. This will help ensure that patients bring up-to-date test-reports or get the investigations done before they arrive at the day care. Alternately, appointments should not be given unless the patient has had a consultation with a cardiologist at KDAH.