

Summer Placement
in
Kokilaben Dhirubhai Ambani Hospital and Medical Research Center

(April 8-June 8, 2013)

A Report

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Post-graduate Programme in Hospital Management
2012-2014

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CERTIFICATE

This is to certify that Dr. Shilpa Sharma, student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from Institute of Health Management and Research, Jaipur Batch 17th has undergone summer training in Kokilaben Dhirubhai Ambani Hospital and Research Center, Mumbai and has done project on:

❖ Work Flow Analysis of Operation Theatre so as to optimize its utilization.

The candidate has successfully carried out the mentioned studies assigned to her during summer training from April 8th, 2013 to June 8th, 2013 and her approach to study has been sincere, scientific and analytical.

I wish her success in all her future endeavors.



Prof. ANOOP KHANNA
Associate Professor and Mentor
IIHMR, Jaipur



Dr. ASHOK KAUSHIK
Dean, Academics and Student affair
IIHMR, Jaipur

**WORK FLOW ANALYSIS IN THE
OPERATION THEATRE OF KOKILABEN
AND DHIRUBHAI AMBANI HOSPITAL AND
MEDICAL RESEARCH CENTER,MUMBAI**

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ACKNOWLEDGEMENT

“Nothing stops a man who desires to achieve, every obstacles is simply a course to develop his achieve muscle it’s strengthening of his powers accomplishment” Eric Butterworth.

Well my summer internship started off with a mission in my mind to be accomplished. And my mentors and guides incorporated this motivation into me. My long and extended thank you note would start with thanking few but most important people during my two months of summer internship.

I would also like to acknowledge with much appreciation the crucial role of the Dr. Ram Narain, who gave the permission to do project in Kokilaben Hospital and trusting my capabilities.

Ms. Urvashi Bhasker for inspiring me towards a meaning full learning and directing my thoughts goals and objectives towards the attitude that drives to achieve, exploring profundity about operation theatre functioning and other aspects that one as a novice needs to be acquainted with.

My sincere thanks to my mentor Prof. Anoop Khanna for his helpful attitude and valuable suggestions.

I am highly grateful to the staff of the hospital for giving me time in spite of their hectic schedule. Without their active cooperation and participation it would not have been possible to accomplish my task.

ABBREVIATIONS

CSSD	Centralized sterile supply department
ENT	Ear Nose Throat
HCA	Health Care Assistant
IPD	In patient department
KH	Kokilaben Hospital
OC	Operation Complex
OPD	Outpatient department
OR	Operating Room
OT	Operation Theatre
RR	Recovery Room
TAT	Turn Around Time
UHID	Unique Hospital ID

EXECUTIVE SUMMARY

Background and Aim:

As operation theatres are considered to be the high cost as well as maximum revenue generating areas within a hospital. Therefore hospitals take keen interest in increasing their utilization without wasting the considerable resources.

The project was to study the work flow analysis of operation theatres complexes in Kokilaben Dhirubhai Ambani Hospital and to optimize their utilization.

Methodology:

An observational study was conducted in OT complexes of Kokilaben Dhirubhai Ambani Hospital. 717 surgeries were observed involving only the scheduled cases. Approximately 15000 minutes of observations were conducted in total. The primary outcomes of the study Median Case Duration, Percentage of OT Utilization, Median Operating Time, Percentage of Surgery Operating Time, Turn Around Time, Percentage of Additional Cases, Percentage of Case Cancellations, Percentage of Delayed Cases(>30minutes), Waiting time in RR, Under booking and Overbooking.

Conclusion and Result:

Under utilization of Operation Theatres, Limited Scheduled hours of OT, Performing same nurse duties continuously leading to stressing out of sisters with decrease in work efficiency, OT getting delayed due to non availability of HCA and Technician on time, Cancellation and delaying of the cases due to non admission or diagnostic issues, Delaying due to surgeons inaccessibility.

INTRODUCTION

Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute, inaugurated in January 2009, a FULL TIME SPECIALIST SYSTEM, that ensures the availability and access to the best medical talent around-the-clock. The 750-bed hospital has over 103 full-time doctors, 520 nurses and about 200 paramedics, and growing.

Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute is India's one of the most advanced tertiary care facilities. As the flagship social initiative of the Reliance Group headed by Anil Dhirubhai Ambani, the hospital is designed to raise India's global standing as a healthcare hub, with emphasis on excellence in clinical services, diagnostic facilities and research.

VISION

" We aim to be a global healthcare institution that combines the best in medical treatment with strong ethical principles and a culture of care and compassion. "

- Late Shri. Dhirubhai Ambani

VALUES

Integrity

To deal with all stakeholders - patients,partners,employees,vendors and the community - in a spirit of fairness and integrity

Transparency

To respect the patient's right to know at every touch point by providing information that is clear, concise, relevant and easy to understand.

Maximum Care

To re-evaluate every hospital system, process and procedure to ensure that patients and their loved ones receive maximum care and comfort.

Self-Improvement

To instil a process of learning and self-improvement at every level through continuous training,focused research and peer review.

Patient Dignity

To safeguard the dignity of patients by protecting their individuality and privacy at all times.

THE HOSPITAL HAS VARIOUS DEPARTMENTS AND SERVICES

1. Centre of Excellence:

- Centre for Bone and Joint
- Centre for Brain and Nervous System
- Centre for Cancer
- Centre for Cardiac Sciences
- Children's Heart Centre
- Centre for Critical Care
- Centre for Physical Medicine and Rehabilitation
- Centre for Robotic Surgery
- Centre for Sports Medicine
- Centre for Transplant

2. Clinical Departments:

- Anaesthesiology
- Bariatrics
- Clinical Haematology
- Dental Surgery
- Dermatology
- Emergency Medicine
- Endocrinology and Diabetes
- ENT
- Fetal Medicine
- Gastroenterology
- General Surgery
- Gynaecology & Obstetrics
- Hepato Pancreato Biliary
- Internal Medicine
- Interventional Radiology
- Laboratory Medicine

- Nephrology
- Nuclear Medicine
- Ophthalmology
- Pain Management & Palliative Care
- Plastic Surgery
- Psychiatry
- Pulmonary Medicine
- Radiology
- Reproductive Endocrinology and Fertility
- Transfusion Medicine
- Urology
- Vascular Surgery

3. Clinics At KH

- Alzheimer's Clinic
- Autism Clinic
- Breast Clinic
- Cerebral Palsy Clinic
- De-addiction Clinic
- Diabetic Foot Clinic
- Heart Failure Clinic
- Incontinence Clinic
- Kidney Stone Clinic
- Osteoporosis Clinic
- Pain Clinic
- Parkinson's Clinic
- Sleep Apnoea Clinic
- Stress Incontinence Clinic
- Thalassaemia
- Travel Clinic

- Varicose Vein Clinic
- Voice Clinic
- Wilson's Disease Clinic

4. Support Group

- Cancer Patients
- Epilepsy Patients
- Stroke and Paralysis

5. Executive Health Checkups:

Health Check is part of Kokilaben Hospital 's pursuance of excellence in healthcare and belief that preventative care is a wise investment. The Health Check program is a thorough determination of your health status with a customized wellness program for your continued good health.

Kokilaben Hospital's physician team highly recommends this annual series of tests and examinations.

The Health Check program assures you an experienced physician team of world-renowned specialists, cutting-edge technology, personal services and confidentiality.

COMFORT TO THE PATIENT

- The hospital was constructed keeping in mind the patient and staff comfort and accessibility.
- There are different elevators for staff, OPD and IPD patients and their visitors. OPD and IPD elevators opened on the specific floors only and are provided with an lift operator.
- An effective color coded direction system is provided on the floors which made it very convenient for the patient to look for the departments.
- Different entry and exit for the patient and the staff which make it less cumbersome and small queues.
- Safety of all is taken into consideration by provision of efficient security checks.
- Patient can make an appointment well in advance by calling their call centre's or by sms or through their website.
- Different rooms are available keeping in mind the affordability and comfortable stay of the patient and relatives in the hospital.
 1. Deluxe Suite
 2. Suite
 3. Single
 4. Twin
 5. General
 6. Isolation
- Every patient who wishes to avail of the various services in Kokilaben Hospital has to get registered. This is a one-time event which gives you a permanent UHID number. Registration and billing counters are present on the first and second floors near the OPD. The patient needs to pay for appointments and all other services prior to availing the same.
- Three fully equipped ambulances available for transporting patients to and from the hospital.
- Apart from comprehensive healthcare services, the hospital offers patients and visitors world-class amenities amid unparalleled comfort.

1. Food Court
2. Fine Dining Restaurant
3. Java Green
4. Business Centre
5. Pharmacy
6. ATM
7. WiFi
8. House Phones
9. Prayer Room
10. The Gift Shop
11. Salon

WORK FLOW ANALYSIS OF OPERATION THEATRE

Background and Need for Study

This study was done at the Kokilaben Dhirubhai Ambani Hospital and Medical Research Institute which was inaugurated in January 2009. The main focus of the study is on Operation Theatre (OT) Department. The OT was chosen as the focus of the study because of considerable expenditure in a hospital budget and of its interdependence with other departments and hospital systems therefore requires maximal utilization to ensure optimum cost-benefit¹. Moreover, surgical operations are an important part of acute hospital activity. By increasing use of operating room, patient flow improves leading to better utilization.

Although demand for surgical services may be growing, its margins are not. On the surface, it may appear that

OR suites are fully utilized and that processes are running smoothly, but when organizations dig deeper, they may see substantial rifts—gaps in organizational data, lack of consistent standards in care and resource use, and ineffective use of personnel and other resources due to poor scheduling and sequencing of events—all of which negatively affect the bottom line.

It is therefore desirable to optimise the efficiency of these assets. The efficiency of operating theatres can be measured in a variety of ways. Essentially it tends to be defined in terms of ability to translate available time into earnings.

The hospital has two OT complexes built on third and fifth floor with 8 and 7 Operating Rooms (OR) respectively. This study was only done on the third floor OT complex.

OR	SURGERY
3-1	Neurology (IMRIS suite)
3-2	Neurology (IMRIS suite)
3-3	Pediatric Cardiac
3-4	Adult Cardiac
3-5	Orthopaedic Surgeries
3-6	Spine Surgeries/Cardiac Surgeries
3-7	Buffer OR
3-8	Arthroscopy

This study investigated the efficiency of an operating theatre complexes in Kokilaben Dhirubhai Ambani Hospital, Mumbai by measuring various utilization levels.

LITERATURE REVIEW

The operating theatre (OPT) or operating room is a high cost department within hospitals. Considerable resources are wasted if operating room is not used effectively. Effective management of operating room is paramount when operating room is a “bottleneck”. By increasing use of operating room, patient flow improves and waiting list can be reduced.²

Review of the health sector in many countries suggests that these large expenditures on hospital involve a great waste of resources because of the technical and managerial inefficiency, management and role of hospitals in health sector, there is a need to introduce professionalization in hospital management. Operating theatres use a significant proportion of the total resources of the hospital. It costs around £0.8 million to build and equip one operating theatre. Annual budgets for the main theatre departments in acute trusts in England and Wales total well over £1 billion (between £1 and £16 million in each trust).³

Because waiting lists are generally long and hospital resources are scarce, consultants are expected to make full use of their scheduled operating hours. They therefore have to select patients so that the actual operating time matches the scheduled time for the session. This is not easy because the amount of time it takes to perform even the same operation varies depending on the exact pathology found during surgery and on the characteristics of individual patients⁴.

Experience from a theatre in one of the pilot schemes (ref) has shown that achieving a target turnaround time of 10 minutes during a two week period saved 251 minutes of ‘wasted’ theatre time, when staff were waiting between the end and start of procedures. Over a year, the increased productivity is worth about £85,000 (approx €95,500).⁵

SPECIFIC OBJECTIVES

- To access the productivity of operation theatre.
- To find out the delaying of cases from their scheduled time.
- To find out the turnaround time.
- To access the deviation from normal schedule time (under booking and overbooking).

To fulfill the above objectives following indicators were used:

- **Median case duration(in minutes)** = Time Patient moved out of OT-Time patient taken inside the OT
- **Median of OT Utilization**= $(\text{Total case duration} / \text{Total OT Scheduled Hours Available}) * 100$
- **Median Surgery Operating Time**= Time Of Closure Completed-Time of Incision Started
- **Percentage of Surgery Operating Time**= $(\text{Total Surgery Operating Time} / \text{Total Case Duration}) * 100$
- **Turn Around Time**= Time second patient taken inside the OT-Time first patient taken out of the OT
- **Under booking And Overbooking**= OT Scheduled Hours-Total Case Duration
- **Percentage of Additional Cases**= $[\text{Number of New Cases} / (\text{Total number of Scheduled Cases} + \text{Total of New cases})] * 100$
- **Percentage of Case Cancellations**= $(\text{Number of Cancelled cases} / \text{Total number of Scheduled cases}) * 100$
- **Percentage of Delayed cases(>30minutes)**= $[\text{Number of cases delayed}(>30\text{minutes}) / \text{Total Number of Cases}] * 100$

METHODOLOGY

Study Design and Study Area:

Non Interventional Descriptive Study was conducted which included direct collection of data during the working hours of Operation Theatre Complexes of Kokilaben Dhirubhai Ambani Hospital from April 12th,2013 to May 15th,2013. Working hours taken were 8:00-18:00 hours.

Sample Size:

295 cases (Include both day care and inpatient surgeries)

Labour OT and Emergency OT were not included in the study.

Tools and Technique:

Direct Observation Method was used to collect the data. A proforma was developed, pretested and standardized to record following observations of each operating room.- annexure 1

DATA ANALYSIS

TABLE: 1- OT scheduling data for each theatre

	Total OT Hour Scheduled (in minutes)	Percentage of OT scheduling(%)	Median Case Duration(minutes)	Median Surgery Operating Time (minutes)
3-1	1440	9.6	135	79
3-2	7065	47.1	330	260
3-3	10590	70.6	285	217.5
3-4	7860	52.4	282	215
3-5	9390	62.6	180	125
3-6	9150	61	270	192
3-7	8520	56.8	223	195
3-8	9930	66.2	163	85

Inferences:

Maximum OT time was scheduled for 3-3 which was 70.6% and minimum was for 3-1 which was 9.6%.

TABLE 2: Utilization data for each operation theatre

	Percentage of OT Utilization of the Total OT Hours Available(in %)	Percentage Of OT Utilization of the Total OT Scheduled(in %)	Percentage of Surgery Operating Time(%)
3-1	7.97	83.06	58.02
3-2	38.13	80.96	77.48
3-3	56.23	79.64	74.85
3-4	49.01	93.52	72.27
3-5	39.50	63.10	71.71
3-6	48.78	79.97	75.03
3-7	35.11	61.82	77.79
3-8	40.85	61.70	61.04

Inferences:

Theatres had varying utilization levels. OT Utilization was calculated from both OT hours Available and the OT hours scheduled. It was noted that the OT utilization was much less when calculated from OT hours available than from OT hours scheduled. Interpreting the under scheduling of the OT.

Here we can notice that in 3-1, there was a major difference in the OT utilization, out of total OT hours available and total scheduled hours because of very less OT scheduling.

Percentage of Surgery operating time indicate time utilized for the actual surgical procedure out of the total used hours which was maximum for 3-7 i.e. 77.79% and minimum for 3-1 i.e. just

58.02% which means more than 42% time was wasted in non-surgical procedures in neurosurgeries.

Table 3: Percentage of Delayed and Preponed cases (>30minutes)

Column1	Percentage of Delayed Cases	Percentage of Preponed Cases	Percentage of Cases starting ontime	Percentage of Delayed Cases (> 30 minutes)
3-1	75.00	12.50	12.50	50
3-2	61.11	0.00	38.89	22.22
3-3	43.59	15.38	41.03	64.10
3-4	64.71	5.88	29.41	23.53
3-5	52.00	16.00	32.00	24
3-6	72.22	11.11	16.67	38.88
3-7	58.82	14.71	26.47	47.05
3-8	64.81	12.96	22.22	25.93

Inferences:

Maximum cases were delayed by greater than 30minutes in 3-3 i.e. **64.10%**.

Overall 57.14% cases start late.

Only 11.22% cases start before time and 31.64% start on time scheduled.

Table 4: TAT, waiting time in Recovery room by the patient

Column1	Turn Around Time (in minutes)	Range(in minutes)	Waiting Time in RR (in minutes)	Range(in minutes)2
3-1	65	65	65.5	15-95
3-2	18	18	30	2-150
3-3	45	25-58	27.5	8-80
3-4	38	17-120	40	15-220
3-5	62	15-158	50	25-175
3-6	45	11-218	40	5-130
3-7	45	10-100	75	10-320
3-8	30	5-62	47.5	7-372

Inference:

Minimum TAT was seen in 3-2 because of long surgeries and less number of scheduled surgeries.

Higher value of TAT was seen because of delay in the preparation of the OR for the next patient or due to delay in the pre-operative procedures and clearances of the patient.

TAT ranges from few min like 5 to 218 min in different ORs. The higher values are attributed to delay in the shifting of patient from ward to RR due to any of the pre-operative procedure.

The huge range indicates great variation in the process.

Waiting time was in the acceptable range between 50-65 minutes. But we can see huge variation in that too. It was seen as high as 372 min (6.2 hrs) which may be more than the actual surgery time.

Table 5: Time for which OR was booked for extra time or for less time than required for the whole surgery.

	Under booking (in minutes)	Overbooking (in minutes)	Percentage of cases with Under booking (>30minutes)	Percentage of cases with Over booking (>30minutes)
3-1	27.5	32	12.5	50
3-2	50	75	16.66	50
3-3	87	80	17.94	35.89
3-4	85	10	32.35	5.88
3-5	53.5	67.5	8	40
3-6	35	61	13.89	30.56
3-7	57.5	68	5.88	41.18
3-8	28	56	7.4	35.19

Inferences:

Under booking i.e. OR's were booked for less time than actually required for the case, leading to late finishing of the case than the scheduled time which further delayed the start of the next case. This was seen maximum for 3-3.

Overbooking i.e., the OR is booked for more time than required for the surgery. This was also maximum for 3-3 and 3-2. Due to overbooking OR remain vacant as case get finished before time which implies under utilization of the available resources.

Percentage of cases with under booking greater than 30minutes was maximum in 3-4 which was 32.35%.

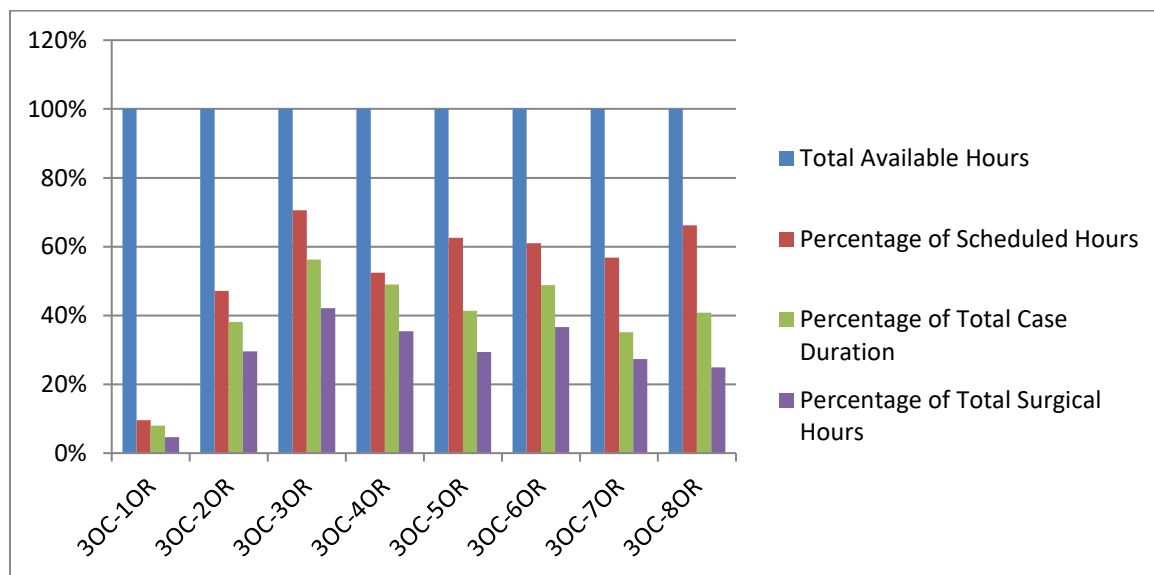
Percentage of cases with over booking greater than 30minutes was seen maximum in 3-1 and 3-2, i.e., 50%.

Percentage of Additional Cases= 3.4%

Percentage of Case Cancellations= 11.92%

Percentage of Delayed Cases(>30minutes)=26.44%

Graph 1: Percentage of scheduled, case duration and surgical hours out of total working hours available



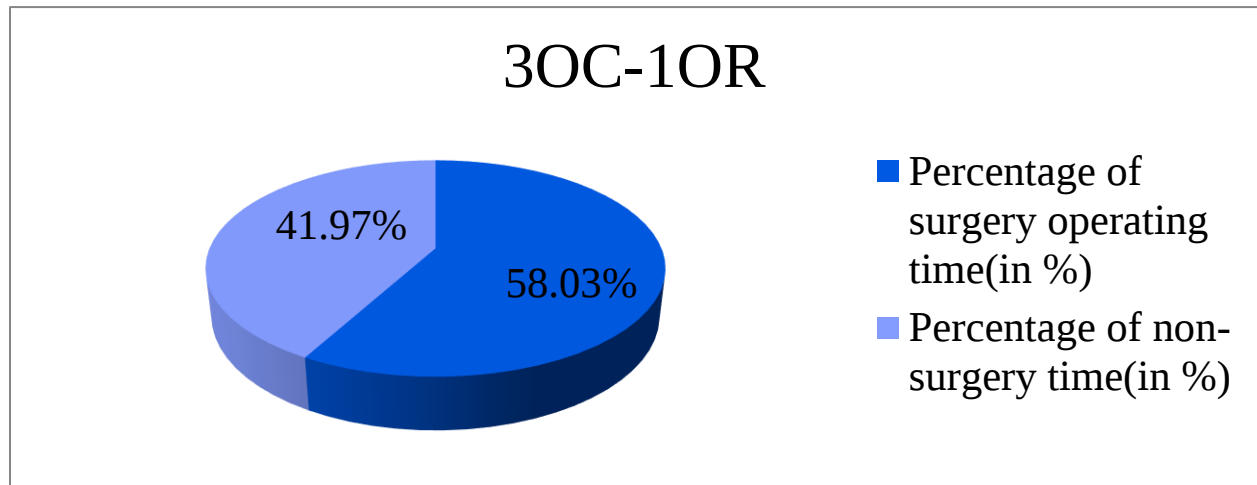
Inferences:

In 3-1 scheduling of the cases is significantly low to the time available which ultimately leads to low OT productivity.

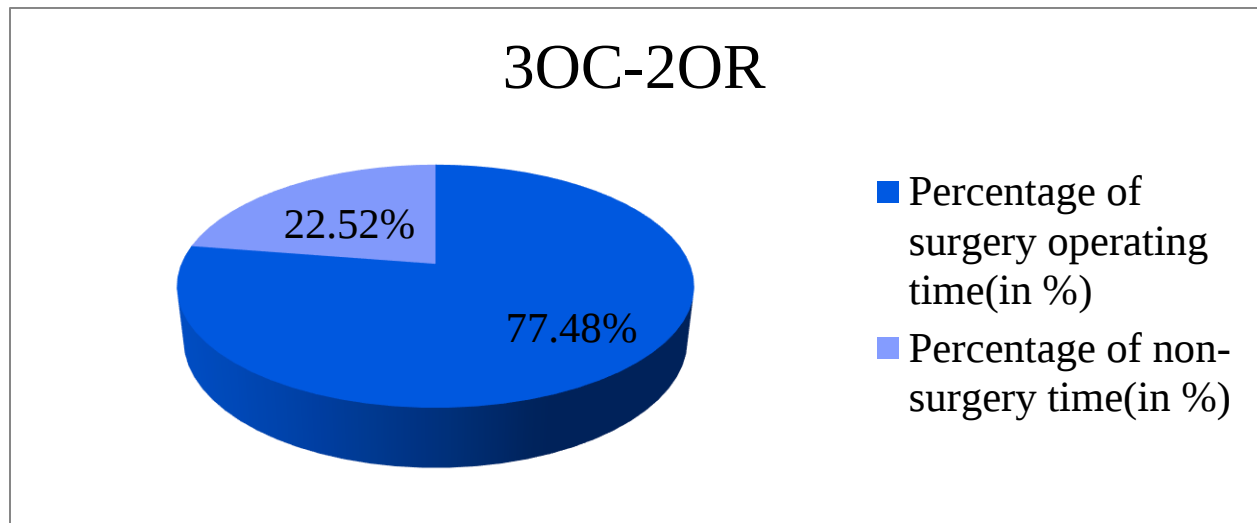
In general we can see a difference in the OT scheduling and the Case duration.

Percentage of total surgical hours is much less than the total case duration which indicates a lot time was wasted in non-surgical procedures.

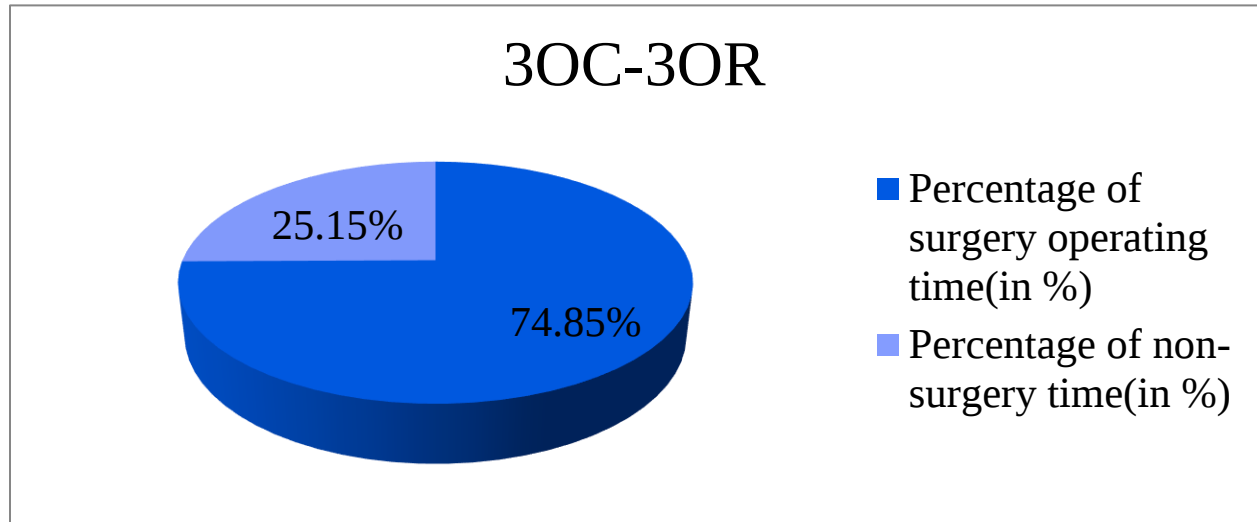
Pie Chart 1: 3-1 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



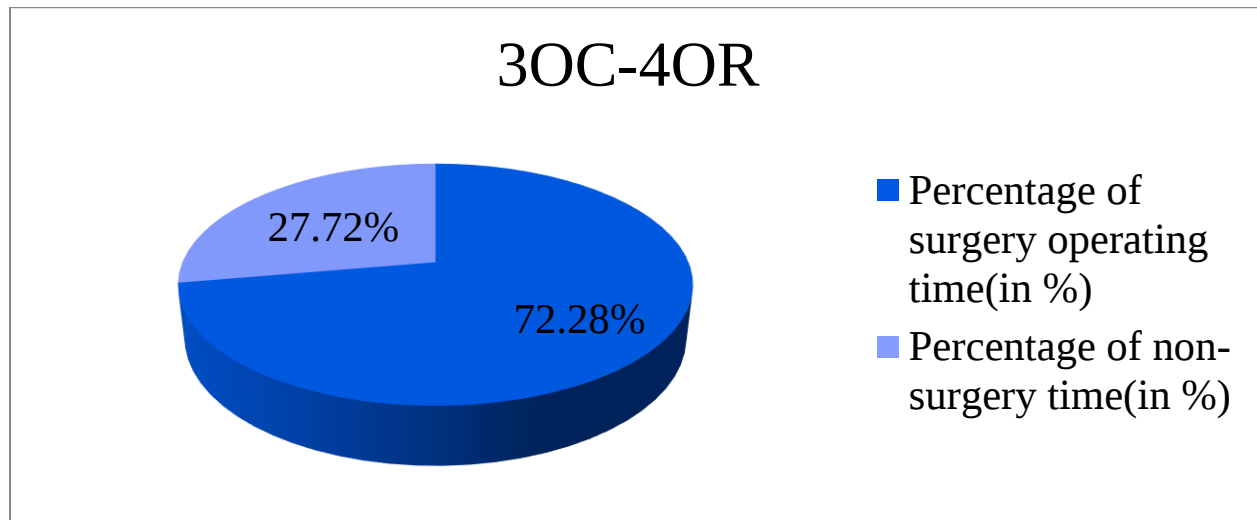
Pie Chart 2: 3-2 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



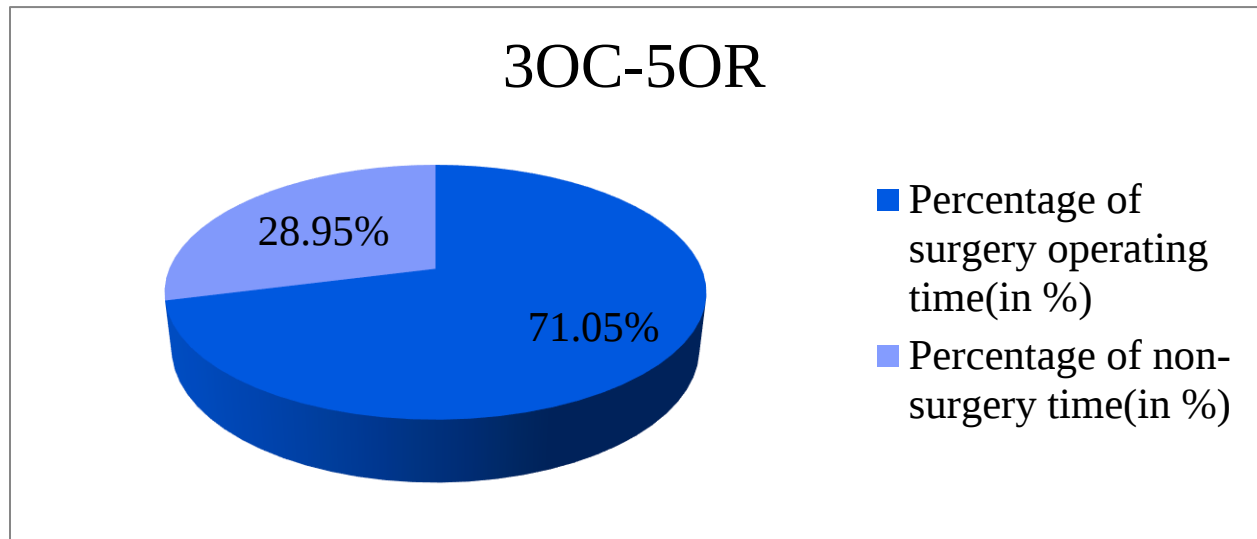
Pie Chart 3: 3-3 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



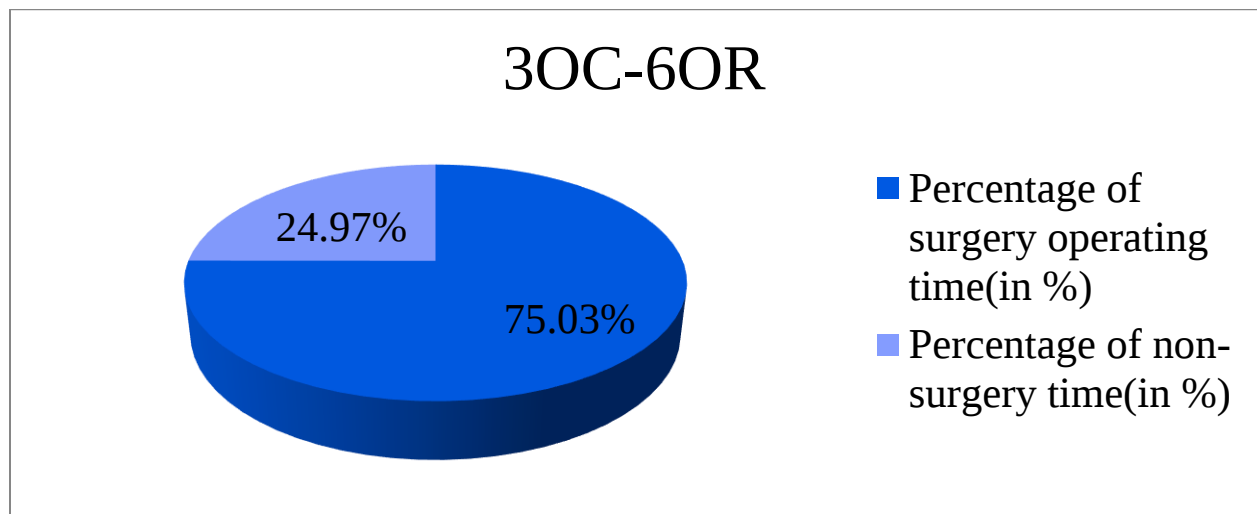
Pie Chart 4: 3-4 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



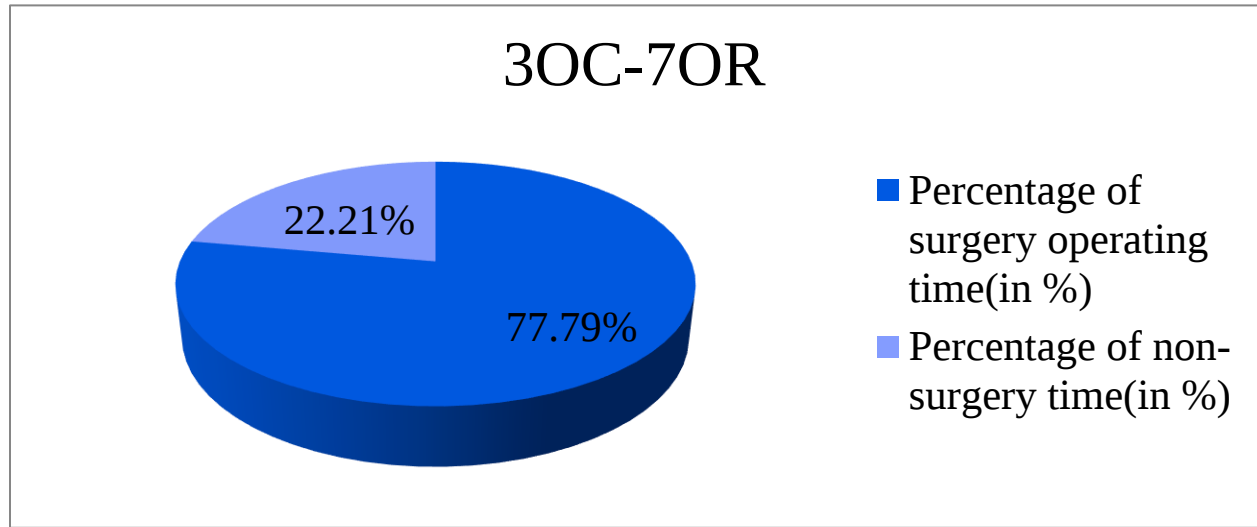
Pie Chart 5: 3-5 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



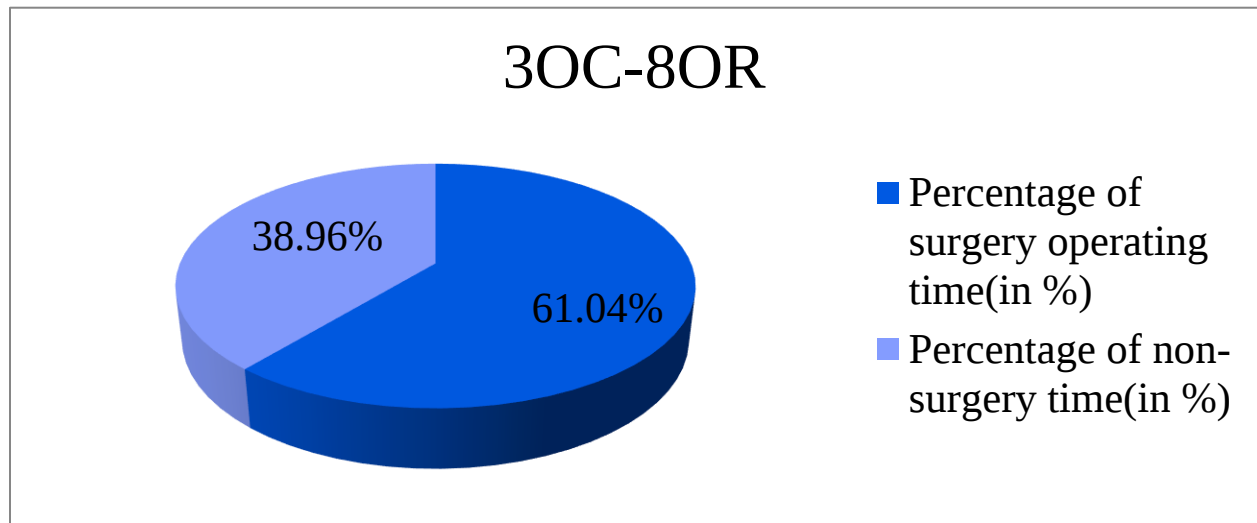
Pie Chart 6: 3-6 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



Pie Chart 7: 3-7 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



Pie Chart 8: 3-8 Percentage of Surgery operating time and percentage of Non-surgery operating time out of the total OT hours used.



DISCUSSION and CONCLUSION

There was a big gap between the OT hours available and the total OT scheduling. Only 9.6% of the OT hours were scheduled i.e. per week, around 54.24 hours OT remains vacant due to non-scheduling of any case. This was the minimum scheduling in the third floor operation complex. Maximum scheduling was calculated to be 70.60%. Under scheduling leads to under utilization of the operation theatres as no case was scheduled showing inefficient utilization of the available resources.

Theatre utilization is a useful measure as it enables hospital to determine whether optimum use is being made of available theatre capacity. Low theatre utilization rates were seen and were investigated as to why optimum usage is not being achieved. Investigation revealed:

- Under scheduling
- There are large delays between cases.
- Overbooking by the surgeons.

Analysis showed that there were multiple causes of delay. Lack of proper planning, lack of team work and communication gap and limited availability of trained supporting staff were the common reasons of start time operative delay

In particular there were issues in the pre-operative pathway e.g.

- Patients arriving for surgery without specific tests/pre-anesthesia checkup been undertaken, without consent having been taken, and also issues around the admission process or the financial clearance on the day of surgery.
- OT getting delayed due to non availability of HCA and Technician on time.
- Cancellation and delaying of the cases due to non admission or diagnostic issues of the patient.
- Delaying due to surgeon's inaccessibility.
- Persistent bottlenecks elsewhere in the hospital (for example, a lack of intensive care beds or general ward beds) that were not foreseen when the list was planned.
- Delay in shifting of the patient from the ward to the recovery room due to incomplete pre-operative procedure or non-availability of the porter.

- Call for shifting of the patient for the surgery was not made on time.
- Last case not finishing on time.

The productivity in an operation theatre can be defined as surgical time divided by total case duration of the operating room. From the pie charts given above we can see the distribution of surgery time and non surgery time. The range of surgery time was between 58.03% - 77.79%, that means about 23 to 42% of time was put in non surgery time. This includes:

- Induction time
- Patient draping time
- Waiting for the technician, without the technician the anesthetist would not start the anaesthesia.
- Waiting for the surgeon, as in most of the cases surgeon was called post the patient has been fully anaesthetized.
- Delay in transfer of the patient from OR to RR post the operation due non availability of HCA.

Main causes for idle time were unplanned scheduling of operations, delayed starts and cancellation of cases.

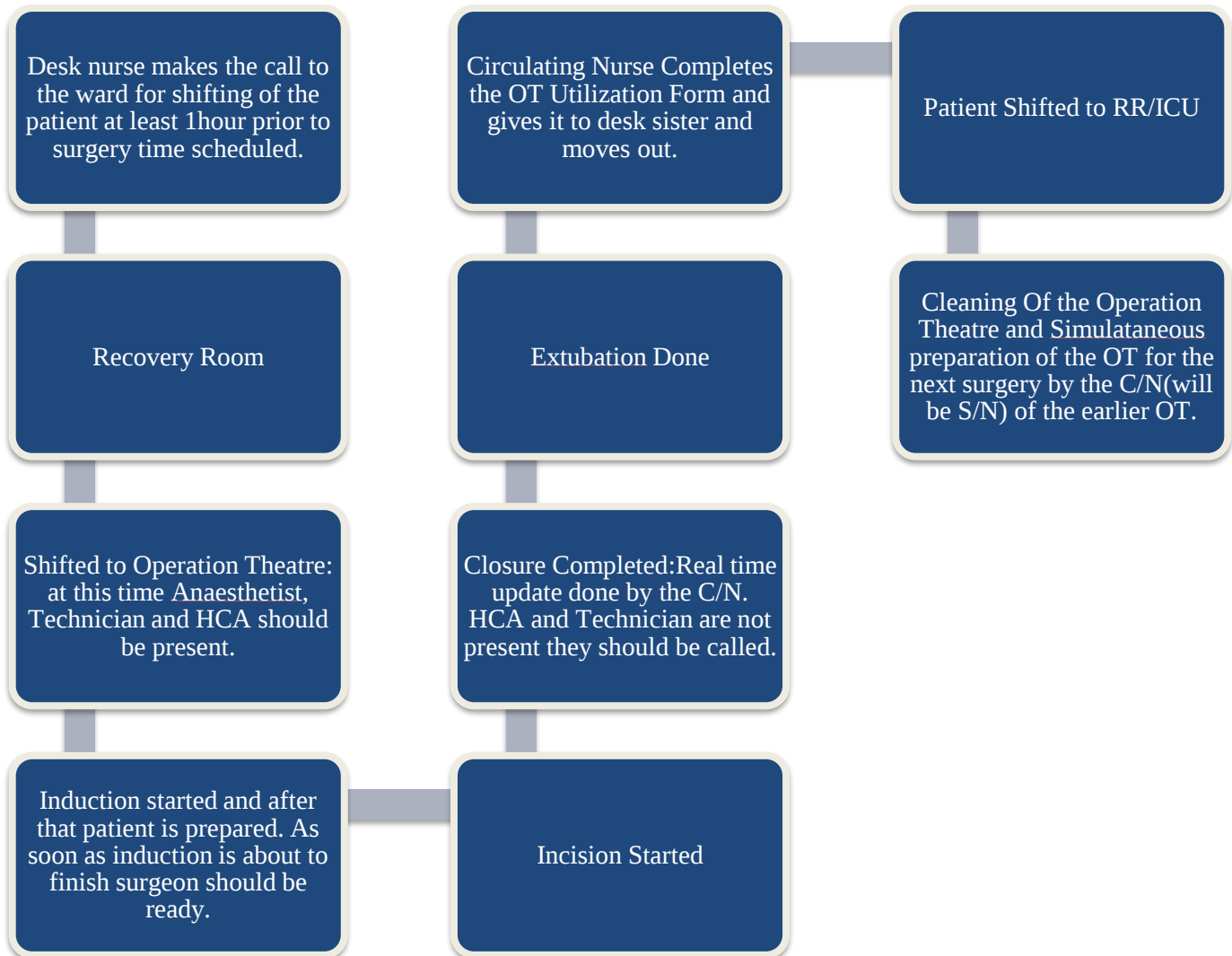
Many a times instruments are missing from the kit sent by the CSSD (10%). When the surgeon used to notice this during the case, an HCA was sent for the instrument, delaying in the finish of case. Is this kit can be pre-checked before the packing then this delay would not happen leading to shorter case duration.

Patients are called in RR well in advance which lead to increased waiting hours and anxiety to the patient and their relatives.

Same sister in specific operating room is performing scrub nurse duties continuously leading to stressing out of sisters which further leads to decrease in efficiency and delaying of the cases.

SOLUTIONS AND RECOMMENDATIONS

Proposed Streamlined Flow Of Patient In Operation Theatre



1. Best Practices in OR productivity (OR Utilization and OR Performance) should be streamlined preoperative processes and overlapping turnaround processes.
2. A disciplined approach is required to ensure on-time starts and full use of scheduled theatre time.
3. Visual screen to be displayed near the desk nurse station and recovery room. The circulating nurse in the OR will make the real time update of the proceedings the surgery so that the desk nurse can send information for the preparation of next case to the ward and RR nurse can prepare the immediate next case. And simultaneously the visual screen will display in the ward the current situation of the OR so that the ward sister prepares the next case accordingly.
4. Theatre supplies should be sorted to make the best use of available space, they should be set out on clearly labeled shelves.
5. The instrument kit should be pre-checked before the CSSD sends it for OT, can be checked by the sister concerned or CSSD staff should be efficient to do that.
6. Strictly only those cases should be scheduled whose procedure clearance has been done a day prior to surgery.
7. A call should be made a day prior to the patient , confirming his admission in the hospital for operation.
8. The sisters could be scheduled in such a manner that scrub nurse and circulating nurse could alternate each other.
9. As we have seen earlier that there is a gap between the OT hours available and the OT hours scheduled therefore there is a need to increase the OT hours, an increase in the number of cases could be done.
10. Resting time and efficiency of nursing staff could be increased if their scrub and circulating duties could be alternated.
11. Strict environment for HCA and Technician.
12. Scheduling of only those cases should be made whose mandatory diagnostic tests and financial clearance have been done before it is entered in the scheduled list.

13. Postpone the case from the scheduled time if the surgeon is not present within the time limit in the Operation Theatre Complex.
14. Desk sister should make a call to the ward sister 3 times before the surgery
- 1 night before the surgery
 - In the morning
 - 1 hour prior to the time given in scheduled list.
15. All the mandatory procedure of the patient should be completed a day prior to the surgery.
16. Improved inter-departmental coordination and compliance with preanesthetic instructions needs to be ensured. It is essential that the anesthesiologists perform their work promptly, well in time . and supervise the proceedings as the OR manager.
17. From the time a patient enters the OR, anesthesiologists, surgeons, and OR nurses work together in a well organized team in order to start surgery promptly and smoothly.
18. The supporting staff should be trained enough for the timely transfer of patient and so they can efficiently assist the anesthetist and surgeon.
19. By processing patients in a parallel fashion, operating room efficiency and patient throughput are increased while costs remain stable.
20. Happier, more motivated staff, improved patient care and greater efficiency – these are the aims of the ‘The Productive Operating Theatre’.



REFERENCES

1. Vinukondaiah.k, Ananthakrishnan.N, Ravishankar.M. Audit of operation theatre utilization in general surgery. National medical journal India 2000; 13(3):118-121.
http://www.google.co.in/url?sa=t&rct=j&q=audit%20of%20operation%20theatre%20utilization%20in%20general%20surgery.&source=web&cd=3&cad=rja&ved=0CD8QFjAC&url=http%3A%2F%2Fwww.researchgate.net%2Fpublication%2F11789999_Audit_of_operation_theatre_utilization_in_general_surgery%2Ffile%2F9fcfd508e7d14a9087.pdf&ei=wqnOUa_0BcvKrAe-o4GoAQ&usg=AFQjCNHvdbnarsuXhwZwOeDH6x0LSjp5jQ&bvm=bv.48572450,d.bmk
2. Performance Assessment Tool for Quality Improvement in Hospital(PATH): Efficiency of use of the operating theatre for elective and emergency surgery (inpatient and outpatient)- December 2009
3. Vinukondaiah.k, Ananthakrishnan.N, Ravishankar.M. Audit of operation theatre utilization in general surgery. National medical journal India 2000; 13(3):118-121.
4. Harper, PR 2002, 'A Framework for Operational Modeling of Hospital Resources', *Health Care Management Science*, vol. 5, no. 3, pp. 165-73.
5. *Efficiency of Theatre Services*, The Association of Anesthetists of Great Britain and Ireland, September 1989, www.aagbi.org

ANNEXURE

Annexure 1:

Sr.no.		Date of booking	
Patient's Name		Date of Admission	
UHID No.		Date of PAC	
Age/Sex		Date & time of Procedure clearance	
Floor & Bed No.			
OT No. Scheduled			
OT No. ultimately taken			
OT hour scheduled			
Surgery Name			
Surgeon Name			
Anaesthetist Name			
Type of Anaesthesia given			
Scrub Nurse Name			
Circulating Nurse Name			
Technician/HCA Name			
Date of Admission			
Date of PAC			
Date & Time of Procedure clearance			
Time(Pt. reached in RR)			
Time(Pt. taken inside OT)			
Time(Induction started)			
Time(Induction finished)			
Time(Incision started)			

Time(Closure completed)			
Time(Extubation started)			
Time(Extubation end)			
Time(Pt. moved out of OR/Shifting to RR)			
	Reason for delay in shifting pt. to RR		
Time(OR ready for next surgery)			
	Reason for delay		
Time(Next Pt. taken in)			
	Reason for delay in taking next case		