

# **OPERATION THEATER**

# **UTILISATION AND EFFECIENCY**

A dissertation submitted in partial fulfillment of the requirements for the  
award of

**Post Graduate Diploma in Health and Hospital Management**

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**OPERATION THEATER  
UTILISATION AND EFFECIENCY  
IN VENKATESHWAR HOSPITAL  
NEW DELHI**

**Post-Graduate Diploma in Health and Hospital Management**

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## **EXECUTIVE SUMMARY**

The Operation Theater, of any level of health care, hospital, is considered to be the main source for the generation of revenue. It's contribution towards the total revenue is about 50-60 per cent. Whereas there are other departments like IPD, OPD, Pharmacy and Pathology etc which also generate the revenue for the hospital having lesser contribution. This factor of revenue generation becomes more pronounced specially for the hospitals having multi surgical specialties. Operation Theater Complex of any hospital requires heavy expenditure of the hospital budget for creation as well as for day to day running of OT. Therefore it is very important for the management of any hospital to ensure that a cost intensive facility like OT has to be utilized up to the optimum efficiency so that maximum revenue is generated for the hospital. It has been seen in the various studies that the hospitals, considered best in this field, are also not able to utilize the OT to full capacity about 30% to 35% of the weekdays. But the things are changing, maybe in a slow pace. Now a days the hospitals are changing fast for the better they are eager for better and efficient use of OTs and are streamlining their key areas like designing, layout, scheduling of surgery and utilization of manpower etc.

OT utilization and efficiency is an important factor to find out how the hospital is functioning. In other word it can be a performance measure for any hospital since it generates the maximum revenue compared to OPD, IPD,

Diagnostics and Pharmacy etc put altogether. Hence for any hospital it is important to have an efficient OT which is utilized to the optimum capacity. OT utilization and efficiency have taken central stage for revenue generation and for measuring the performance of any health care delivery system. To evaluate the OT in terms of utilization and efficiency of Venkateshwar Hospital we have taken cross-sectional study, the surgery cases which were scheduled in the OT department of Venkateshwar Hospital, Delhi over a period of three months. The data for research has been taken from the hospital records i.e. OT Register of Venkateshwar Hospital, Delhi. The study is retrospective and prospective and the secondary data of three months from Jan 2019 to Mar 2019 has been utilized. Systematic Random Sampling has been conducted with a sample size of 180 cases (2 cases per day) to establish the relationship between Time Taken and Time Allotted for the surgery. However, to establish the relationship between Cancelled/Postponed surgeries and the Total Case, all the cases of Jan-Mar 2019 have been considered. For analysis of the data, MS Excel has been used.

The OT utilization and efficiency of Venkateshwar Hospital is of highest level. Scheduling of surgery cases is done judiciously and the schedule is strictly followed. This is evident as only 3% of the total surgery have been cancelled/rescheduled and its affect in utilization and efficiency of OT is minimal. When it comes to time allotted and time taken for the surgeries there is a difference of just 4% from Jan to Mar 2109. Staffing of operation rooms in like anesthetists and other supporting staff is at par with medical activity and is not normally subjected to multitasking as it can affect efficiency, performance satisfaction of specific task. The work flow of the OT is streamlined and

standardization of surgical procedure equipment is in place. Although there is no separate formal training was scheduled for the OT Staff in these three months for improving the utilization and efficiency of OT. However, it is adequately emphasized during the orientation training and in their work culture.

The last part of this study is to report the findings and analyze the results. The basic objective of this project is to come up with different recommendations for Venkateshwar hospital for improvement in their OT utilization and efficiency.

# **INTRODUCTION**

Utilization and efficiency of OT of the hospital is a multi-dimensional construct just like satisfaction and quality. The utilization and efficiency of OT of any multi healthcare facility hospital is premised on multiple aspects of that hospital. It is capitalized on the other factors like marketing, HR, finance, IPD, OPD, pharmacy and PR etc. of the hospital. That is why it can also be called as measure for overall hospital performance.

In any hospital, creating OT facility requires sizeable funds. Hence, optimum utilization and efficient use is must for a hospital. The important factors for an efficient OT are like rules and regulations regarding the establishment of an operating room, proper adherence and correct enforcement of all policies and procedures and also monitoring of the same. In any OT the Operating time is considered as money and that is why the management emphasize about the effective use of room. Therefore effective operation theater utilization for each hospital must be found out all out efforts be made to decrease the idle operation theater hours.

The Operation Theater, of any level of health care, hospital, is considered to be the main source for the generation of revenue. It's contribution towards the total revenue is about 50-60 per cent. Whereas there are other departments like IPD, OPD, Pharmacy and Pathology etc which also generate the revenue for the hospital having lesser contribution. This factor of revenue generation becomes more pronounced specially for the hospitals having multi surgical specialties. Operation Theater Complex of any hospital requires heavy expenditure of the hospital budget for creation as well as for day to day running of OT. Therefore it is very important for the management of any hospital to ensure that a cost intensive facility like OT has to be utilized up to the optimum efficiency so that maximum revenue is generated for the hospital. It has been seen in the various studies that the hospitals, considered best in this field, are also not able to utilize the OT to full capacity about 30% to 35% of the weekdays. But the things are changing, maybe in a slow pace.

These days the hospitals are changing fast for the better they are eager for better and efficient use of OTs and are streamlining their key areas like designing, layout, scheduling of surgery and utilization of manpower etc.

In the present day of capitalism, earning profits by any organization is must and is a universal truth. The importance of profit is directly related to the satisfaction of its customers, employees and all other stakeholders. It also ensures the smooth running of the organization thereby providing best facilities and reliable services. The utilization and efficiency of OT plays a vital role in fulfilling this factor of a hospital.

Although, demand for surgical services maybe growing but its margins are not growing in the same proportion. On the surface, it may appear that OT suits are fully utilized and that processes are running smoothly but when organizations dig deeper, they may see substantial rifts and 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. So what is causing these inefficiencies? Most can be tied directly to the lack of an enterprise wide care delivery system that integrates the data and the process of many functional areas that feed into the OT.

To successfully achieve system integration with the OT it is necessary to explore the need for integration, define its components, and ultimately show its benefits. The integration of resource management activities within and across the enterprise follows organization to gain many advantages.

#### **KEY ELEMENTS FOR EFFICIENT USE OF OT:**

1. Operational layout and equipment of the operation theater.
2. Well trained OT staff.
3. Use of good OT management system, proper communication and appropriate facilities.
4. Good utilization of available OT staff and resources.
5. Responsive behavior, positive attitude and ethical practice OT staff.

6. Capacity of CSSD/TSSU, planning before the surgery and staffing level of OT.
7. Proper planning and scheduling system of surgeries in the OT including emergency cases, be carried out at a reasonable time.
8. Improve profits through better decision making, reduced costs.
9. Performance management improvement based on excess to real time, enterprise wide data.
10. Maximized resource utilization through reduction of scheduling gaps and delays.
11. Stream lined workflow by elimination of redundant and manual processes.
12. Supply cost reduction through standardizing product use and choices, increasing contract compliance and taking advantage rebate opportunities.
13. Enhanced care delivery to better integration of and access to patient care data.

# **HOSPITAL PROFILE**

Venkateshwar Hospital, Dwarka, New Delhi, is an establishment of Venkateshwara Group, located in the heart of Dwarka in New Delhi. To ensure ethical and quality medical care, state-of-the-art technology and dedicated medical practitioners have been brought together under one roof at this hospital. Equipped with the most modern equipment and cutting-edge technology, Venkateshwar Hospital serves patients across 32 specialties. It is 325 bedded hospital with 100 Critical Care beds and 10 Modular Operation Theatres. To achieve global excellence in healthcare, this multi-speciality hospital has a team of highly skilled professionals who are focused on delivering uncompromised medical services to everyone. Highly experienced specialist doctors and skilled support staff work together as a team, to deliver world-class health care to all the patients. Venkateshwar Hospital provides general medical services as well as the specialized centre of excellence with an expert level of competence with a personalized caring touch.

With the aim to provide best personalized services to International patients, Venkateshwar Hospital has also introduced the Department of International Service. This department's aim is to support international patients 24x7 and be the single point of contact for accessing the highest quality care. In collaboration with top medical insurance providers, the hospital has made provision of cashless treatment for insurance patients.

**VISION:** To position ourselves in the lead role on the global healthcare map.

**MISION:** To achieve global excellence in healthcare with evidence based ethical clinical practises by the team of highly skilled professionals by using cutting edge technology.

**COMMITMENT:** To constantly upgrade our human and technological resources in order to keep pace with the best global development in medical science.

**OBJECTIVES OF VENKATESHWAR HOSPITAL:** Top management has established the following objectives, which are measurable and consistent with the quality policy. The objectives are as follows:

1. To provide efficient, effective, timely care with a human touch to our patients.
2. To provide effective quality systems through feedback mechanism for continual improvement.
3. To create a congenial work environment, provide on the job training and quality concepts or systems to all concerned.
4. To provide facilities for proper disposal of waste as per the prevailing statutory and regulatory requirements.

**SOME OF THE SERVICES AVAILABLE: -**

1. OT services six days a week from 8:30 a.m. to 5:00 p.m. for normally scheduled cases and 7 days a week 24 hrs for emergency cases.
2. 6 days a week OPD clinic open from 8:00 a.m to 4:00p.m.
3. Regular Specialty clinic for medicine & surgery.
4. Gastroenterology, Ophthalmology, ENT, Dental and Maxillofacial

5. Surgery, Plastic Surgery, Orthopedics, and Joint replacement Surgery, Neuron Sciences, Gynecology, Laparoscopic, & Endoscopic Surgery and many other departments.
6. Day care procedures carried out regularly.
7. Critical care at Venkateshwar Hospital has been scientifically designed and equipped with state of the art facilities.
8. 24 hours emergency services.
9. Round the clock NABL accredited highly modernized Pathological Laboratory with latest equipment.
10. Health checkup facilities.
11. Eye care at its best in association with LV Prasad Eye institute, Hyderabad.
12. Liver clinic, Diabetes clinic, Arthritis clinic, Pediatric immunization clinic.
13. Plastic, Cosmetic and Hand reconstructive surgery.
14. One of the most advanced Joint replacement center in Eastern India, offering the latest method of Computer Assisted Surgery (CAS) for painful joints.
15. 24 x 7 state of art ambulance services.
16. Pharmacy with competitive rates.

**Other specialties of Venkateshwar Hospital: -**

1. Cardiology.
2. Cardio Thoracic Surgery.
3. Plastic Surgery.
4. General medicine.
5. Ophthalmic.
6. Emergency and Trauma care.
7. Gastroenterology.
8. Nephrology.
9. Neurosciences.
10. Oncology.
11. Orthopedics.
12. Orth dentistry.
13. Pediatrics & Surgery.
14. Dermatology.
15. Clinical pathology.
16. Endocrinology.
17. Family Medicine.

## **LITERATURE REVIEW**

The paper published journal of medical systems June 1988, vol. 12, issue 3 written by Toby Gordon, Sharon Paul, Alan Lyles and John Fountain about Surgical unit time utilization review: Resource utilization and management implications, says that the health care providers seek ways to reduce the cost of health care services, hospital operating rooms (ORs) have been identified as potential areas for cost reduction efforts. Cost containment efforts which have shifted significant portions of the inpatient population to ambulatory areas have resulted in an inpatient population which is sicker and more procedure-intensive. Efficient management of operating rooms has assumed even greater importance in this environment. Inefficient or inaccurate scheduling of OR time often results in delays of surgery or cancellations of procedures, which are costly to the patient and the hospital. Approaches to efficient use of ORs include computerized scheduling, utilization monitoring, and refinement of scheduling policies and procedures. In the absence of commercially available software to meet operating room management information needs, Johns Hopkins developed its own system in 1983. This software provides detailed information for daily OR management and long-term planning. The computerized operating room scheduling and monitoring system is described in this article and an operational measure of scheduling accuracy is proposed. Suggestions are made for incorporating this measure into planning and allocation decisions.

The study about operating room planning and scheduling written by Bretcht Cardoen which was published in European Journal of Operational

Research provides a review of recent operational research on operating room planning and scheduling. We evaluate the literature on multiple fields that are related to either the problem setting (e.g., performance measures or patient classes) or the technical features (e.g., solution technique or uncertainty incorporation). Since papers are pooled and evaluated in various ways, a diversified and detailed overview is obtained that facilitates the identification of manuscripts related to the reader's specific interests. Throughout the literature review, we summarize the significant trends in research on operating room planning and scheduling, and we identify areas that need to be addressed in the future.

The paper published in IIE Transactions on Health Care Systems Engineering, vol. 4, 2014 regarding managing operating room efficiency and responsiveness for emergency and elective surgeries written by Yann B. Ferrand, Michael j. and Uday S. Rao provides a review and classification of the state of research on the question of how a hospital can best utilize its operating rooms (ORs) to balance efficiency and responsiveness when performing surgeries on scheduled electives and high-priority emergencies. We first provide an overview of the specific research questions and conclusions in the literature, as well as a synthesis of the different types of approaches. Then we classify these approaches by methodology and performance measures considered. We also extend the review to other application domains that face a similar question, and highlight similarities and differences to identify potential learning points that apply to the surgery setting. We anticipate this survey highlights the need for future quantitative research that improves the balance of efficiency and responsiveness in the OR.

# **OPERATION THEATER**

An **operating theater** (also known as an **operating room (OR)**, **operating suite**, or **operation suite**) is a facility within a hospital where surgical operations are carried out in an aseptic environment.

Operating rooms are spacious, easy to clean and well-lit, typically with overhead surgical lights, and may have viewing screens and monitors. Operating rooms are generally windowless and feature controlled temperature and humidity. Special air handlers filter the air and maintain a slightly elevated pressure. Electricity support has backup systems in case of a black-out. Rooms are supplied with wall suction, oxygen, and possibly other anaesthetic gases. Key equipment consists of the operating table and the anaesthesia cart. In addition, there are tables to set up instruments. There is storage space for common surgical supplies. There are containers for disposables. Outside the operating room is a dedicated scrubbing area that is used by surgeons, anaesthetists, ODPs (operating department practitioners), and nurses prior to surgery. An operating room will have a map to enable the terminal cleaner to realign the operating table and equipment to the desired layout during cleaning.

Several operating rooms are part of the operating suite that forms a distinct section within a health-care facility. Besides the operating rooms and their wash rooms, it contains rooms for personnel to change, wash, and rest, preparation and recovery rooms(s), storage and cleaning facilities, offices, dedicated corridors, and possibly other supportive units. In larger facilities, the operating suite is climate- and air-controlled, and separated from other departments so that only authorized personnel have access.

## **OPERATING ROOMS**

1. The operating table in the center of the room can be raised, lowered, and tilted in any direction.

2. The operating room lights are over the table to provide bright light, without shadows, during surgery.
3. The anesthesia machine is at the head of the operating table. This machine has tubes that connect to the patient to assist them in breathing during surgery, and built-in monitors that help control the mixture of gases in the breathing circuit.
4. The anesthesia cart is next to the anesthesia machine. It contains the medications, equipment, and other supplies that the anesthesiologist may need.
5. Sterile instruments to be used during surgery are arranged on a stainless steel table.
6. An electronic monitor (which records the heart rate and respiratory rate by adhesive patches that are placed on the patient's chest).
7. The pulse oximeter machine attaches to the patient's finger with an elastic band aid. It measures the amount of oxygen contained in the blood.
8. Automated blood pressure measuring machine that automatically inflates the blood pressure cuff on patient's arm.
9. An electrocautery machine uses high frequency electrical signals to cauterize or seal off blood vessels and may also be used to cut through tissue with a minimal amount of bleeding.
10. If surgery requires, a Heart-lung machine, or other specialized equipment, may be brought into the room. Heart lung machine takes the temporary control of the heart and lung during the surgery maintaining the circulation of blood and oxygen content of the body
11. Advances in technology now support Hybrid Operating Rooms, which integrate diagnostic imaging systems such as MRI and Cardiac Catheterization into the operating room to assist surgeons in specialized Neurological and Cardiac procedures.

# **RESEARCH METHODOLOGY**

## **Methodology:**

The project is cross sectional aimed at checking the utilization and efficiency of operation theater of Venkateshwar Hospital, Dwarka, New Delhi. In this study the Systematic Random Sampling method is intended to be utilized. The summary of research methodology is as under:-

- a. **Type of Study:** Retrospective and Prospective.
- b. **Location of Study:** Venkateshwar Hospital, Dwarka, New Delhi.
- c. **Type of Data:** Secondary (from hospital records).
- d. **Study Duration:** Study will be conducted Mar-May 2019.
- e. **Data collection Method:** From hospital OT registers.
- f. **Sampling Technique:** Systematic Random Sampling.
- g. **Sample Size:** 180 cases will be analyzed.
- h. **Data Analysis:** Excel will be used for data analysis.

## **Expected Outcomes/Deliverables**

The expected outcomes/deliverables are as under: -

- a. Whether proper and judicious scheduling of cases and adhering strictly to schedule is done.
- b. Whether the time taken for the surgery is as per the time allotted.
- c. Whether staffing of the operation room, in terms of anesthetists, nurses and other supporting staff is on par with medical activity.
- d. Whether multi-tasking of OT staff affects efficiency and satisfaction in performance of the specific task.

- e. Whether the cancellation and/or postponement of surgery affects the utilization and efficiency of OT.
- g. The importance of streamlining of work flow and standardization of surgical procedure equipment.
- h. Is formal training provided to the OT staff to improve upon the utilization and efficiency of OT.

**RESEARCH OBJECTIVES:** To find out gap between allotted time and actual time taken for the surgery, utilization of OT hours of operation theatre of Venkateshwar Hospital, Dwarka, New Delhi.

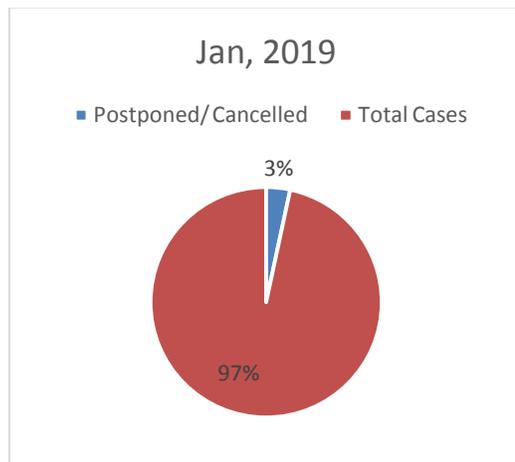
**LIMITATIONS OF THE STUDY:**

1. The time factor was a major limitation on the scope of and extensiveness of the study as the study was to be completed in a fixed limited time frame.
2. Results of the study are subjective in nature however, they show utilization and efficiency of OT in Venkateshwar Hospital.
3. The data has been taken from the hospital OT register which may have certain errors at the time of recording the facts.
4. Only two cases of surgery per day have been taken for the duration of three months for the purpose of finding out relation between allotted time and time taken for the surgery.

# DATA ANALYSIS AND INTERPRETATION

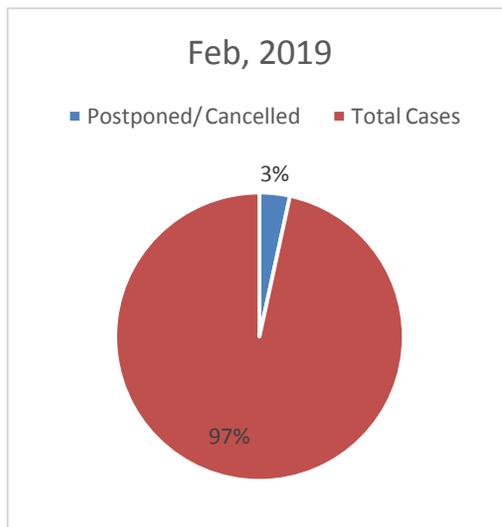
- **Postponement/ Cancellation of surgery Jan 2019**

Postponed/Cancelled	19
Total Cases	547



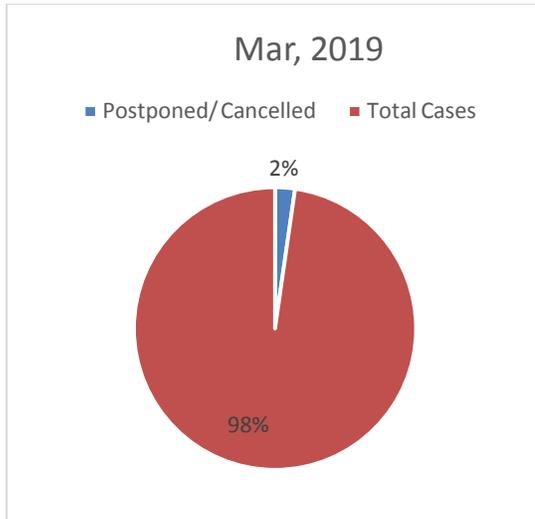
- **Postponement/ Cancellation of surgery Feb 2019**

Postponed/Cancelled	18
Total Cases	511



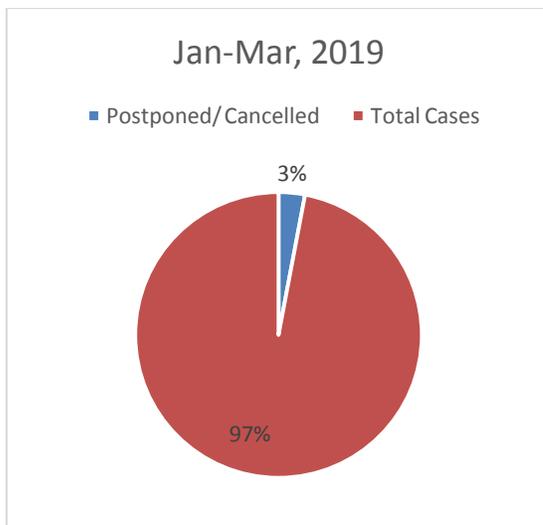
- **Postponement/ Cancellation of surgery Mar 2019**

Postponed/Cancelled	14
Total Cases	602



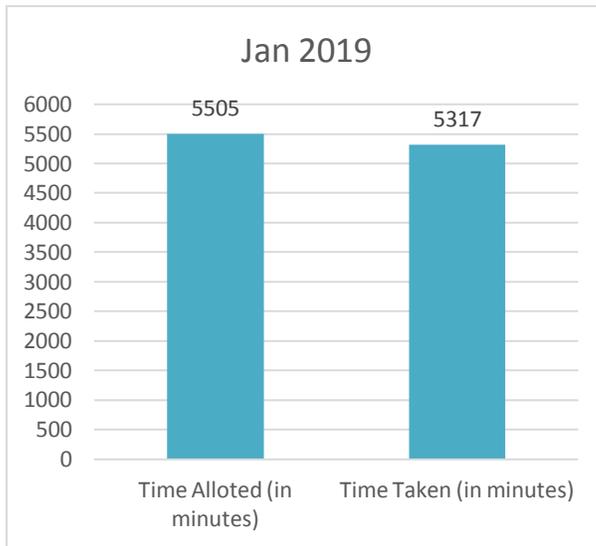
- **Postponement/ Cancellation of surgery Jan-Mar 2019**

Postponed/Cancelled	51
Total Cases	1660



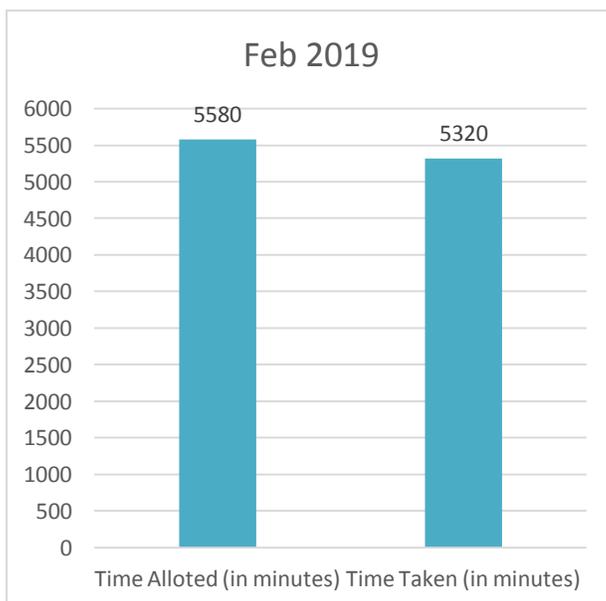
- **Time allotted-Time Taken** for the surgery Jan 2019

Time Alloted (in minutes)	5505
Time Taken (in minutes)	5317



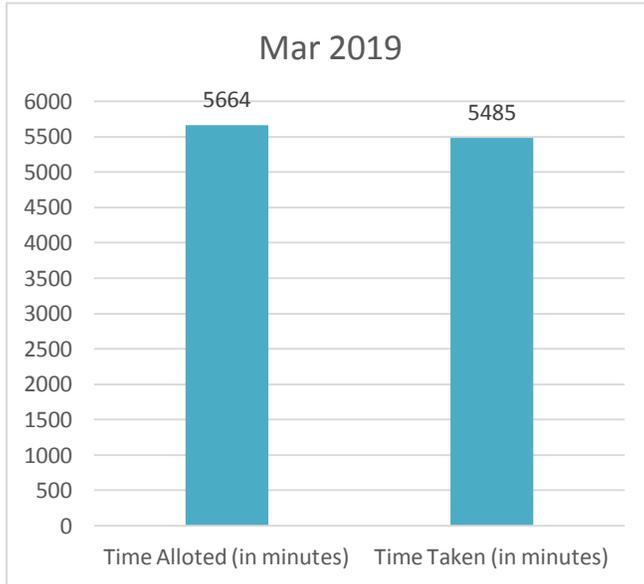
- **Time allotted-Time Taken** for the surgery Feb 2019

Time Alloted (in minutes)	5580
Time Taken (in minutes)	5320



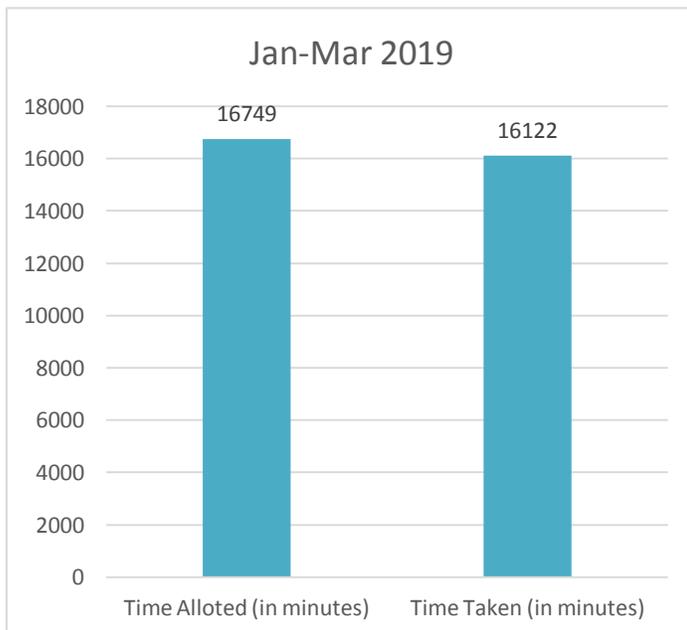
- **Time allotted-Time Taken** for the surgery Mar 2019

Time Alloted (in minutes)	5664
Time Taken (in minutes)	5485



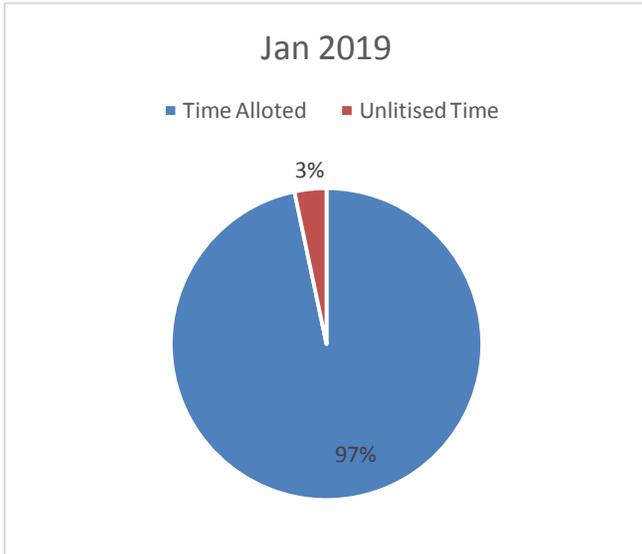
- **Time allotted-Time Taken** for the surgery Jan-Mar 2019

Time Alloted (in minutes)	16749
Time Taken (in minutes)	16122



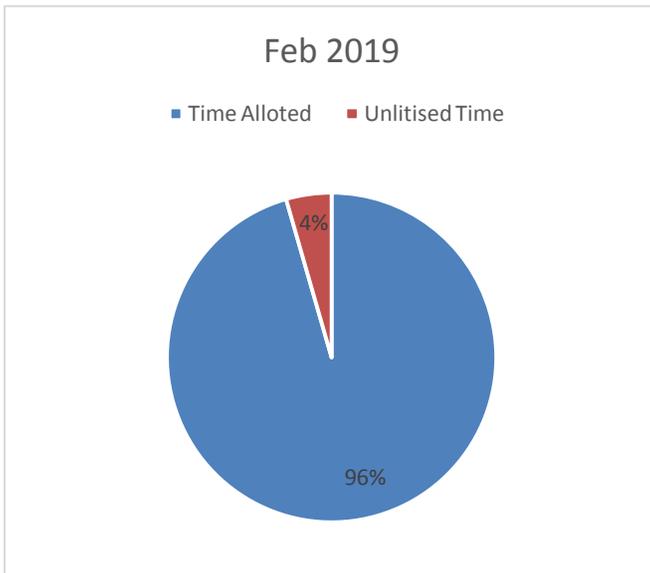
- **Unutilized OT Time Jan 2019**

Time Alloted	5505
Unlitised Time	188



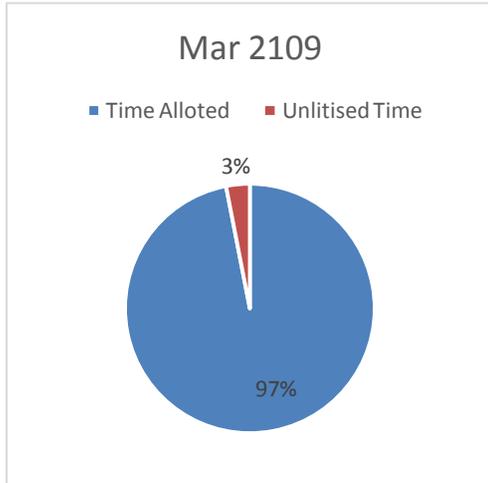
- **Unutilized OT Time Feb 2019**

Time Alloted	5580
Unlitised Time	260



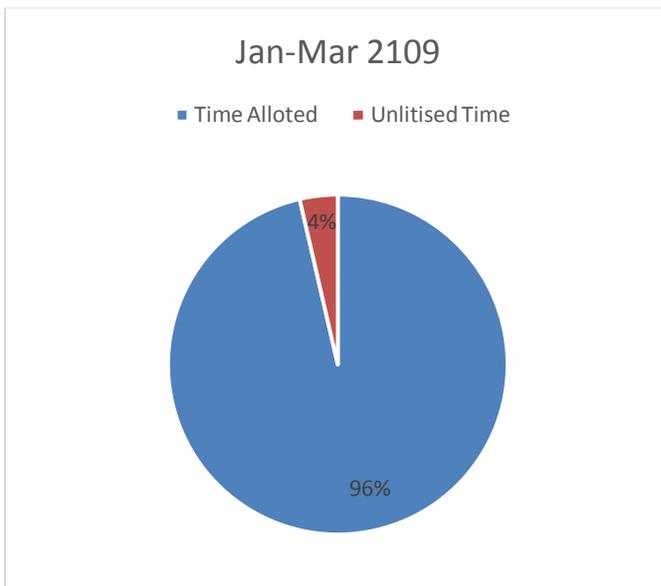
- **Unutilized OT Time Mar 2019**

Time Alloted	5664
Unliteded Time	179



- **Unutilized OT Time Jan-Mar 2019**

Time Alloted	16749
Unliteded Time	627





## **RESULTS**

1. Proper and judicious scheduling of cases and adhering strictly to the schedule is being done.
2. Time taken for the surgery is largely as per the time allotted.
3. Staffing of operation room in terms of anesthetics, nurses and other supporting staff is at par with medical activity.
4. Multi-tasking of OT staff is being done without affecting the efficiency and satisfaction in performance of specific tasks.
5. Cancellation/ postponement of surgery affects utilization and efficiency of OT.
6. Workflow is streamlined and standardization of surgical procedure equipment is in place.
7. For the purpose of improvement in utilization and efficiency of OT, no regular formal training is being provided but same is incorporated in induction training of OT staff.

## **RECOMMENDATIONS**

OT utilisation of Venkateshwar Hospital is of highest level. However, it can be further improved and moved towards optimum utilization and efficiency. Following are the recommendations:

1. By better counselling of the patients and their attendants, management of doctors, OT staff, timely diagnostic reports and OT support services. The cancellation/ postponement of surgeries can further be reduced from 3%. However, it can never be brought down to 0%.
2. The time allotted for the OT procedure is found to be on the higher side than utilization time by 4% which can be reduced by judicious allocation of time for the particular surgery. In this time demanded by the surgeons need to be taken care of.
3. Staffing of OT is presently sufficient. However, care should be taken by the HR Department to cater for extra OT staff in stand by mode to improve upon the utilization of OT.
4. Being economical to the hospital, multitasking of the OT staff is in practice, however, at the same time it affects efficiency and performance satisfaction. Hence, limited multitasking be resorted.
5. Although, OT staff is educated about the efficiency and utilization of the OT during induction training but it can be further improved if formal training for this specific purpose is scheduled for time to time.

## **CONCLUSION**

Considerable operating theatre time is wasted while patients are transferred from IPD to OT, patient's pre operations preparations including PA check up. This could be planned in a logical sequence, readiness of patients, smart and effective work by the hospital staff. It will reduce not only the time involved in preparation of the patient for the OT procedure but also add on to the patient satisfaction.

Within the OT the time required to prepare the OT for the next surgery also a specialised task and requires specialized trained OT staff. The role of HR Department is vital for staffing the OT adequately. The stores required from the CSSD and other support services should be provisioned, received, checked and be made available at the place of requirement that too timely.

Although, in this study only the analysis regarding time taken for the surgery visa-vis time allotted for the surgery and cancelled/postponed cases have been carried out. But when we talk of utilization and the efficiency of Operation Theatre in totality the scope of study becomes larger and does not get restricted only to the analysis carried out in this study. It involves the other departments of the hospital such as finance, Human Resource, CSSD/TSSU, security and pharmacy etc. other than IPD and OPD.

## **REFERENCES**

The following references will be used for the study:-

1. The Association of Anesthetists of Great Britain and Ireland  
Website: [www.aagbi.org](http://www.aagbi.org)
2. [sonal.shukla@expressindia.com](mailto:sonal.shukla@expressindia.com)
3. Are Your Hospital Operating Rooms “Efficient”? Anesthesiology  
2006.
4. Labor Costs Incurred by Anesthesiology Groups because of  
Operation Rooms Not Being Allocated and Cases Not Being  
Scheduled to Maximize Operating Room Efficiency. Anesth Analg  
2003; 96: 1109-13.
5. [http://en.wikipedia.org/wiki/Operating\\_room\\_management](http://en.wikipedia.org/wiki/Operating_room_management)
6. Surgical Services Reform; Executive Briefing for Clinical Leaders,  
Washington, D.C.: Clinical Advisory Board, 2001, pp 20-21.
7. McKesson Corporation, San Francisco, Calif., 2002.
8. The Operating Room Directors Study, Princeton, N.J.: The Gallup  
Organisation, 2001.
9. [https://www.credihealth.com/hospital/venkateshwar-hospital-dwarka/doctors?utm\\_campaign=Venkateshwardelhi&utm\\_source=googlecpc&utm\\_medium=%2Bvenkateshwar%20%2Bhospital&gclid=Cj0KCQjwocPnBRDFARIsAJJcf94bsj1jshug1rRqcxdp37A6l1-2sGhtL8oC0xpi8TIHbNZM-I9lEaAqo3EALw\\_wcB](https://www.credihealth.com/hospital/venkateshwar-hospital-dwarka/doctors?utm_campaign=Venkateshwardelhi&utm_source=googlecpc&utm_medium=%2Bvenkateshwar%20%2Bhospital&gclid=Cj0KCQjwocPnBRDFARIsAJJcf94bsj1jshug1rRqcxdp37A6l1-2sGhtL8oC0xpi8TIHbNZM-I9lEaAqo3EALw_wcB)
10. <https://www.sciencedirect.com/science/article/abs/pii/S0377221709002616>
11. <https://link.springer.com/article/10.1007/BF00996639>
12. <https://www.tandfonline.com/doi/abs/10.1080/19488300.2014.881440>