MetaOPT

Making the uncertain more certain

Surgical Block Optimization

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Embracing Efficiency and Precision in Surgical Block Optimization

In the realm of healthcare management, the approach to scheduling surgeries has undergone a transformative shift. The focus has expanded from traditional metrics like surgery types and durations to a more holistic view incorporating a range of factors. This document delves into the nuances of this shift, exploring the implications for healthcare providers, surgeons, and patients, and introduces the advanced MetaOPT Surgical Block Optimization model, detailing its inputs and insights.

The Evolution of OR Scheduling

Integrated Resource Management:

The integration of comprehensive resource planning, including operating rooms, medical staff, and equipment, reflects a more strategic approach to healthcare management.

Technological Integration:

Advancements in AI and data analytics are now central to optimizing surgical blocks, enabling more precise and efficient scheduling.

Adaptability and Resilience:

The dynamic nature of healthcare demands flexibility in OR scheduling, adapting to changing scenarios like emergency procedures and varying surgeon availability.

The Multi-dimensional Nature of Surgical Block Optimization

Predictive Analysis:

Utilizes data-driven insights to forecast surgery demands, thereby aligning resources with anticipated needs.

Surgeon and Staff Scheduling:

Incorporates individual surgeon schedules, specialties, and preferences, ensuring optimal use of human resources.

Resource Allocation:

Balances the allocation of operating rooms, equipment, and post-operative care facilities to maximize efficiency.

Implications for Healthcare Delivery

Enhanced Operational Efficiency:

Streamlined scheduling minimizes idle time in ORs, enhancing overall healthcare delivery efficiency.

Improved Patient Care:

Reduces patient wait times for surgeries, contributing to better patient outcomes and satisfaction.

Data-Driven Decision Making:

Enables hospital administrators to make informed decisions based on comprehensive data analysis.

Conclusion:

The advancement of surgical block optimization reflects the evolving landscape in healthcare management, marked by a deeper reliance on technology and data. The MetaOPT model represents the pinnacle of this evolution, harnessing sophisticated algorithms to analyse a myriad of factors, from predictive patient influx to intricate resource dynamics. This shift epitomizes the healthcare sector's journey towards precision, efficiency, and adaptability, ensuring that operational decisions are as informed and effective as possible. The integration of such advanced models in OR scheduling is a testament to the growing emphasis on optimizing every facet of healthcare delivery, with the goal of enhancing patient care and operational excellence.

MetaOPT – Surgical Block Optimisation

Surgical block optimization refers to the strategic allocation and scheduling of operating room time and resources. A "block" is a specific period reserved in the OR schedule for surgeries, usually designated for surgeons or surgical groups. Optimizing these blocks involves efficiently planning and utilizing available OR time, staff, equipment, and post-operative care resources to meet the demand for surgical procedures.

The Model Inputs include:

Forecast Surgeries:

The model consumes the number of surgeries (service lines) forecasted to be performed on a day or days. Note that the MetaOPT model – Surgical Block Forecasting – uses AI to generate the forecasted surgeries by service line using historical numbers.

The model will then schedule the theatres and surgeons to complete these surgeries, considering:

- Theatre availability (after accounting for fixed blocks)
- Surgeon availability (after accounting for fixed blocks)
- Hospital Capacity – surgeries will not be scheduled if there is insufficient bad capacity, i.e., ICU beds, Post Op beds and beds in the General or Surgical Wards.

Surgical Groups:

Clusters of related surgical procedures. Each group might have distinct needs in terms of equipment, expertise, and resources. In this template we are simply capturing the name of the various surgical groups that you want to build your schedules for.

Service Lines (Surgery Type):

For this model Service Lines are synonymous with Surgery Types. In this template we capture each type of surgery that we want to perform in our theatres and maintain several attributes which are crucial to the optimization of the blocks.

- Priority
- No Show Frequency
- Surgical Time Minutes
- Std Deviation
- Setup Minutes
- Cleanup Minutes
- Misc Minutes

- ICU LOS
- ICU LOSSD
- Post Op LOS
- Post Op LOSSD
- Total LOS
- Total LOSSD

Surgical Group Detail

For each Surgical Group, we assign the related Service Lines. A Surgical Group is a group of Service Lines. Ensure that when adding your service lines that you separate each by a comma.

Hospital Bed Capacity:

To ensure patients have adequate care post-surgery, we account for:

- ICU Beds: Number of Intensive Care Unit beds available.
- Post Op Beds: Number of beds in the post-operative care unit.
- General Beds: Number of general ward beds available for patients' post-surgery.

The model will not schedule any operations if there are not sufficient beds to accommodate them post the surgery.

Surgical Blocks Constraints:

The Surgical Blocks provide the model with the priority of a particular Surgical Group, and a minimum and maximum number of blocks that can be performed on a given day. You need to think of a block as a group of surgeries.

Min Blocks Per Day: The minimum number of blocks required to accommodate the surgeries.

Max Blocks Per Day: The maximum number of blocks the surgical group can handle.

Theatre Groups:

For each operating theatre, the following details are captured:

Surgical Group Compatibility: Which surgical groups' blocks can be accommodated.

This provides for the situation where specific theatres are better resourced or set up to perform surgeries related to specific Surgical Groups.

Theatre Times:

For each day of the week, we capture the start and end times the theatre is open. You can use this to also exclude certain theatres from allocation. For example, you may be allocating specific theatres to cover any acute emergency related procedures. Typically, it would be expected that we would be predicting emergency requirements based on historical evidence. That is the subject of another MetaOPT model.

Surgeons:

The purpose of this template is to capture the details of the available surgeons, when they are available and what Service Lines, they are qualified to operate in.

Fixed Blocks:

The Fixed Block option provides for Surgeons having pre-set Theatre allocation as well as providing for unknown – acute or emergency requirements.

MetaOPT

Key Features:

Considers Capacity Post Surgery - Ensuring There Are Sufficient Beds in ICU/Post OP/General:

The model intricately assesses post-surgical bed availability across ICU, Post-Op, and General wards, guaranteeing that each patient has a dedicated recovery space. This feature is vital for patient care, as it prevents overbooking surgeries and ensures optimal post-operative recovery. By dynamically aligning surgical schedules with bed availability, the model significantly reduces the risk of resource shortages and enhances patient safety.

User-Defined Surgical Groups and Service Lines:

This feature allows customization of surgical groups and service lines based on the hospital's specialties and case mix. It facilitates the categorization of surgeries into coherent groups, considering similarities in resource requirements and clinical expertise. This personalized approach ensures that surgeries with common characteristics are grouped, promoting an efficient allocation of resources, including staff, equipment, and operating rooms.

Considers Surgeon Skills and Availability:

The model meticulously incorporates each surgeon's specific skill set and availability, ensuring that surgeries are scheduled with the most appropriate and available surgical staff. This not only maximizes surgeon utilization and efficiency but also plays a crucial role in ensuring high-quality patient care. By matching surgeon skills with patient needs, the model helps in maintaining exacting standards of surgical care.

Account for Theatre Availability - Including Fixed Blocks and Fixed Surgeon Allocation:

This aspect of the model addresses the availability of operating theatres, including pre-allocated or fixed blocks, and aligns them with surgeon schedules. It allows for the integration of fixed blocks, often reserved for specific procedures or surgeons, ensuring that these preferences and necessities are accommodated. This feature ensures optimal usage of operating rooms while respecting fixed commitments and surgeon-specific allocations.

Beautiful Dashboard Representing Theatre Usage and Efficiency:

The model boasts a visually appealing and intuitive dashboard that provides real-time insights into theatre usage and efficiency metrics. This dashboard is a powerful tool for administrators and managers, offering an instant overview of operating room utilization, scheduling efficiency, and resource allocation. By presenting complex data in an easily digestible format, the dashboard aids in quick decision-making and continuous improvement of OR operations.

Benefits:

Enhanced Resource Utilization:

The block model maximizes the use of operating rooms and related healthcare resources, significantly reducing idle time and underutilization. By aligning surgical schedules with available resources, the model ensures that operating theatres, medical equipment, and staff are employed to their fullest potential. This leads to a more efficient healthcare system, where resources are optimally distributed according to demand, thereby maximizing the healthcare facility's operational capacity, and reducing unnecessary overhead costs.

Improved Patient Outcomes and Satisfaction:

By ensuring timely access to surgeries and minimizing wait times, the block model directly contributes to better patient outcomes. Delays in surgical procedures can lead to worsening health conditions; thus, an efficient scheduling system plays a crucial role in patient care. Furthermore, reduced wait times and a streamlined surgical process enhance patient satisfaction, as individuals experience quicker and more organized healthcare services.

Increased Surgeon and Staff Satisfaction:

The model considers surgeon and staff availability and preferences, which leads to more balanced workloads and better work-life balance. By aligning surgeries with surgeon availability and expertise, the model not only optimizes their time but also enhances job satisfaction. This careful consideration of personnel availability and skills can lead to a more motivated and efficient workforce, with decreased rates of burnout and turnover.

Data-Driven Decision Making:

Leveraging advanced data analytics, the block model enables hospital administrators to make informed decisions based on comprehensive and real-time data. This approach reduces reliance on intuition or outdated methods, allowing for more accurate and strategic planning. The data-driven insights provided by the model facilitate initiative-taking adjustments to scheduling, resource allocation, and overall operational strategies, leading to a continuously improving healthcare environment.

Adaptability to Changing Healthcare Demands:

The block model is designed to be adaptable, capable of responding to sudden changes in healthcare demands or emergencies. This flexibility is crucial in the dynamic environment of healthcare, where patient influx can be unpredictable. The model's ability to quickly adjust to latest information or changing scenarios ensures that the healthcare facility remains responsive and capable of delivering high-quality care even in the face of unforeseen challenges.

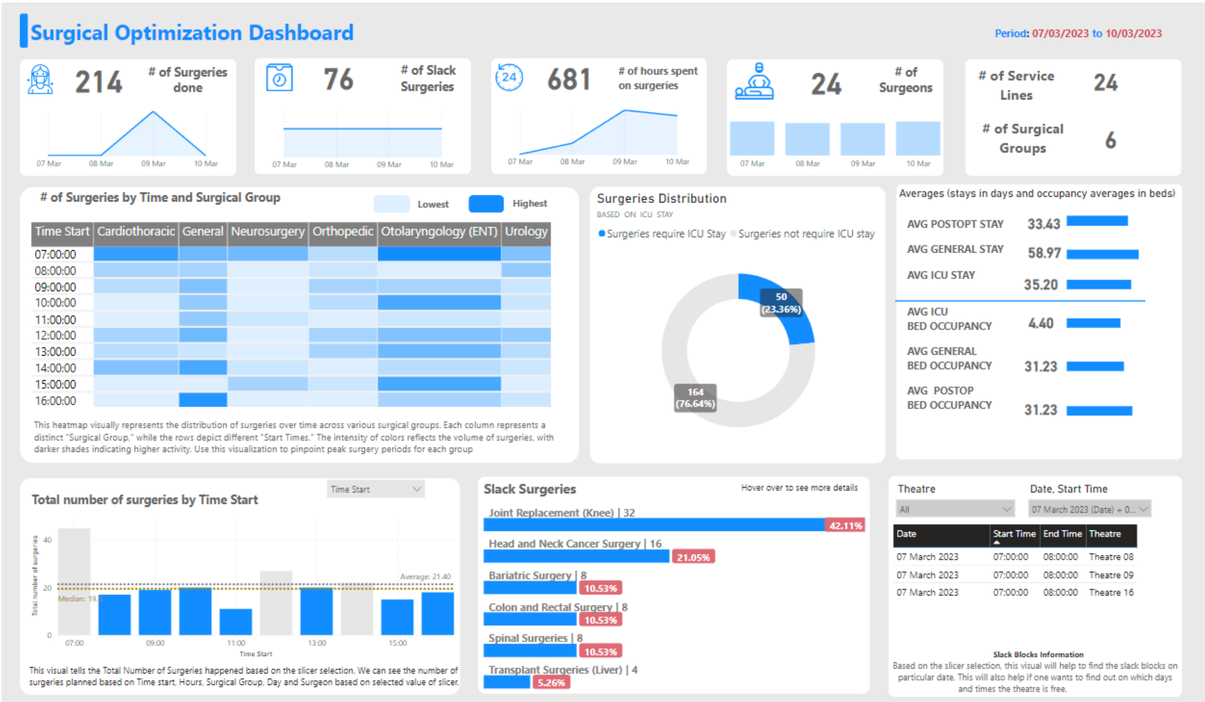
Summary

The MetaOPT Surgical Block Optimization model is an innovative solution designed to revolutionize operating room scheduling. By integrating advanced analytics and AI, it forecasts surgical demands, aligns surgeon availability with operating theatre schedules, and ensures optimal use of hospital beds post-surgery. The model's core lies in its ability to customize surgical groups and service lines, accounting for various surgical requirements and resources. A unique feature includes a dynamic dashboard that provides real-time insights into theatre usage and efficiency. This model not only enhances resource utilization and patient care but also boosts surgeon satisfaction through better workload management, making it a pivotal tool in modern healthcare.

Surgical Optimisation Dashboard

On completion of the analysis by the model, you will be able to visualize the results with the model's Microsoft Power BI dashboard.

Main



Example Analysis

This dashboard provides a comprehensive overview of surgical operations within a healthcare facility, designed to be accessible even for those without technical expertise.

At the Top:

You can see the total number of surgeries completed, the number of surgeries that were not utilized (slack surgeries), the hours spent on surgeries, and the number of surgeons involved. There are also metrics for the number of service lines, which are types of surgeries, and the number of surgical groups, which are categories of these service lines.

Surgery Distribution by Time and Group:

A heatmap (a grid with color-coded squares) displays when and how many surgeries were performed across different surgical specialties like cardiothoracic, general, and so on. Darker colours indicate busier times.

Surgeries Distribution Pie Chart:

This pie chart shows the percentage of surgeries that required an Intensive Care Unit (ICU) stay versus those that did not, providing a quick visual reference for the demand on critical post-surgical care resources.

Average Length of Stay (LOS) and Bed Occupancy:

The bar graphs represent the average time patients spend in various hospital units' post-surgery, including Post-Op, General, and ICU, along with the average bed occupancy rates for these units. These numbers are critical for understanding how long patients typically stay in the hospital after their surgeries and how this impacts bed availability.

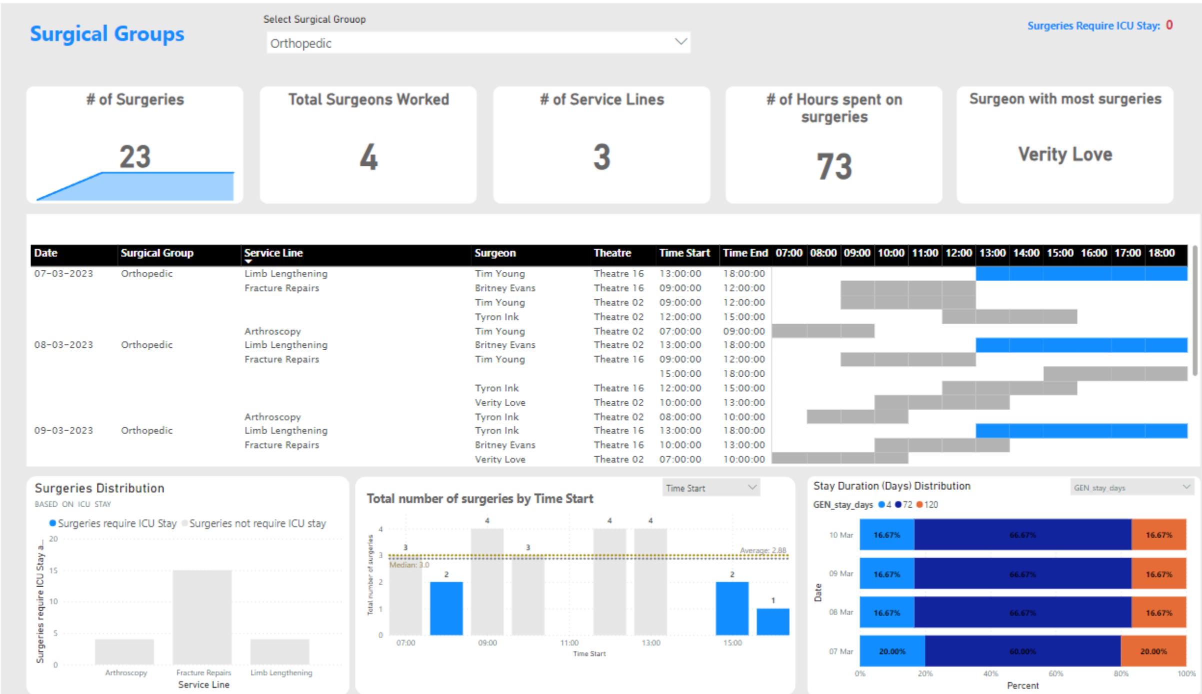
Total Number of Surgeries by Time Start:
This bar chart shows the total number of surgeries at different start times throughout the day. It provides insights into the busiest surgical times, which is useful for planning and staff allocation.

Slack Surgeries:
A list highlights surgeries that were scheduled but not performed, possibly due to cancellations or scheduling inefficiencies, which is important for understanding and improving operational efficiency.

Theatre Details:
At the bottom, you see a log of surgical theatre allocations with specific dates and times, which is useful for tracking when and where surgeries are scheduled.

In summary, this dashboard is a tool for visualizing and managing the intricate details of surgical scheduling, bed occupancy, and resource utilization in a hospital, all of which are crucial for efficient healthcare delivery and patient care.

Surgical Groups:



Example Analysis

This dashboard provides an overview of surgical activities scheduled within a specific Surgical Group. The user can select the required Surgical Group from the lookup at the top of the form.

Number of Surgeries (23):
Indicates the total surgeries projected for the selected Surgical Group, displaying the workload handled.

Total Surgeons Worked (4):
Shows the number of surgeons who scheduled to perform surgeries, reflecting staffing levels.

Number of Service Lines (3):
Refers to different types of orthopaedic surgeries like arthroscopy or limb lengthening, indicating the variety of procedures scheduled to be performed.

Hours Spent on Surgeries (73):
Total hours forecast in surgery, highlighting the time resource required by Surgical Group

Surgeon with Most Surgeries (Verity Love):
This surgeon is scheduled to perform the most surgeries, suggesting specialization or high demand.

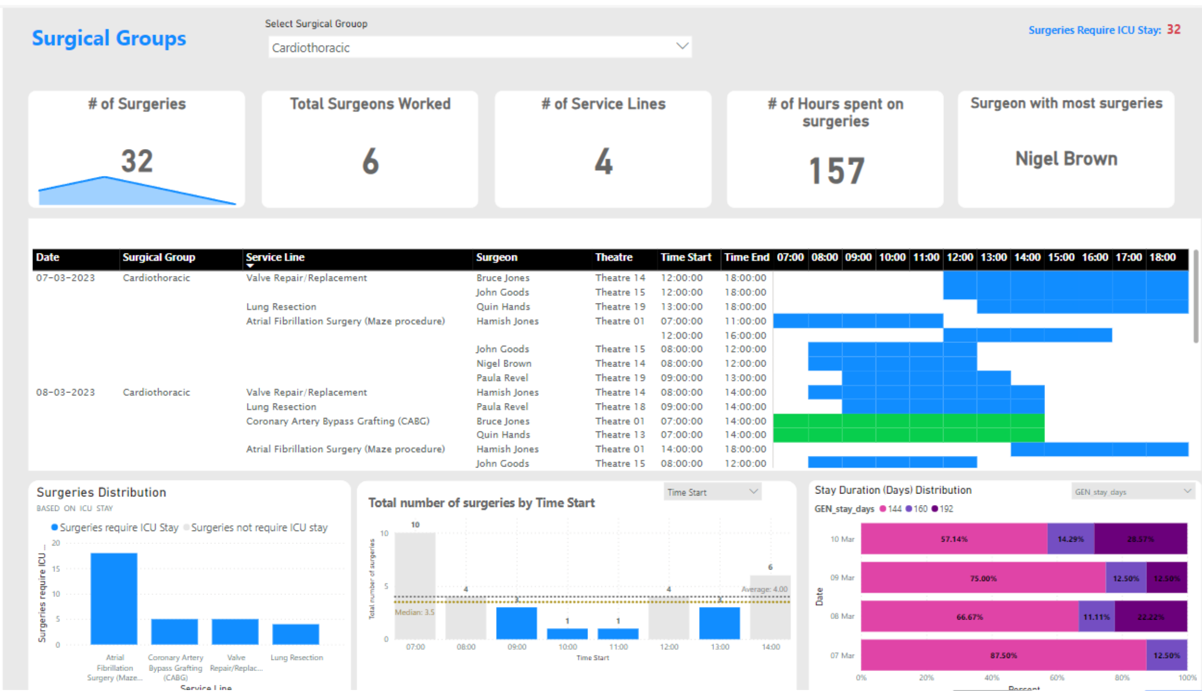
Surgery Table:
The table lists specific surgeries by date, type, and surgeon, alongside the timetable showing when each surgery starts and ends. Blue bars represent individual surgeries within the schedule, giving a visual sense of the day's flow.

Surgeries Distribution:
Shows that none are expected to require an ICU stay, indicating none of the patients are expected to have complications necessitating intensive care after their surgery.

Total Number of Surgeries by Time Start:
Displays when surgeries are scheduled to begin. Most started at 09:00, 13:00, and 15:00, which can indicate peak operating times.

Stay Duration (Days) Distribution:
Represents the length of hospital stays expected post-surgery, with the majority being one day, suggesting efficient recovery times.

Example Dashboard for Cardiothoracic Surgical Group



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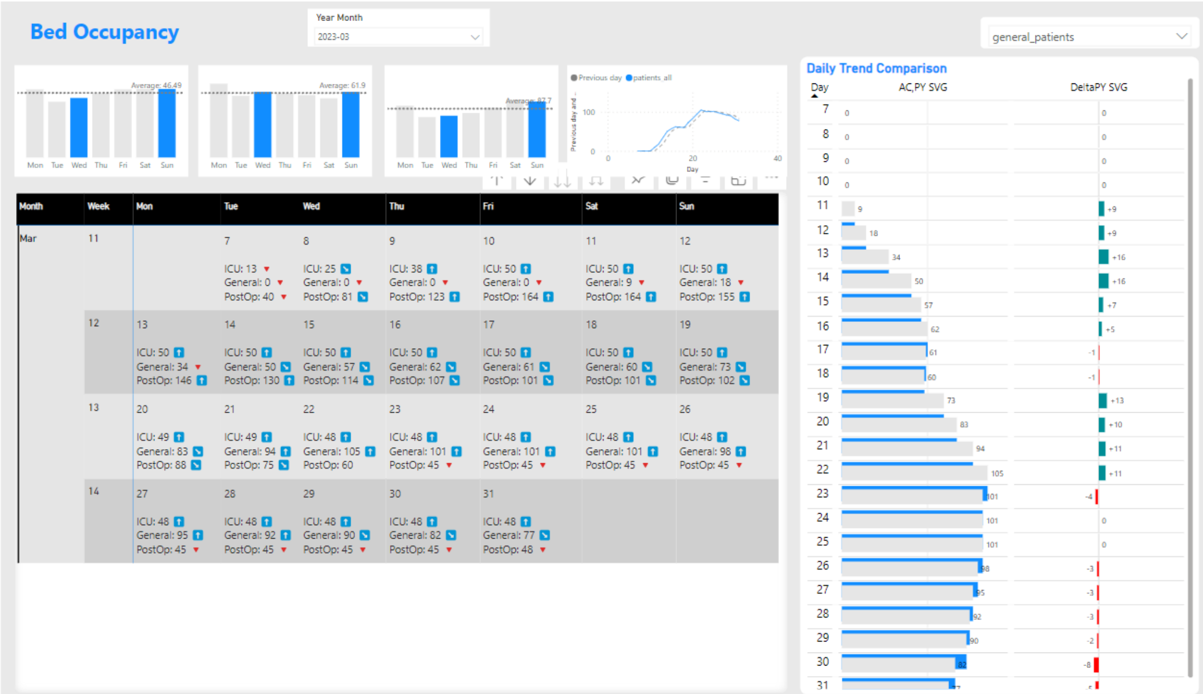
Bed Occupancy



Example Analysis

This dashboard provides a snapshot of bed occupancy in a hospital.

Top Left - Weekly Overview:

The bar graphs show the average number of beds occupied each day of the week in different wards: ICU, General, and Post-Op. A higher bar means more beds were used on that day.

Middle Left - Calendar View:

This section details bed occupancy for each day, listed under ICU, General, and Post-Op. Days with a down arrow indicate a decrease in bed usage compared to the previous day, and a number next to it shows how many fewer beds were used.

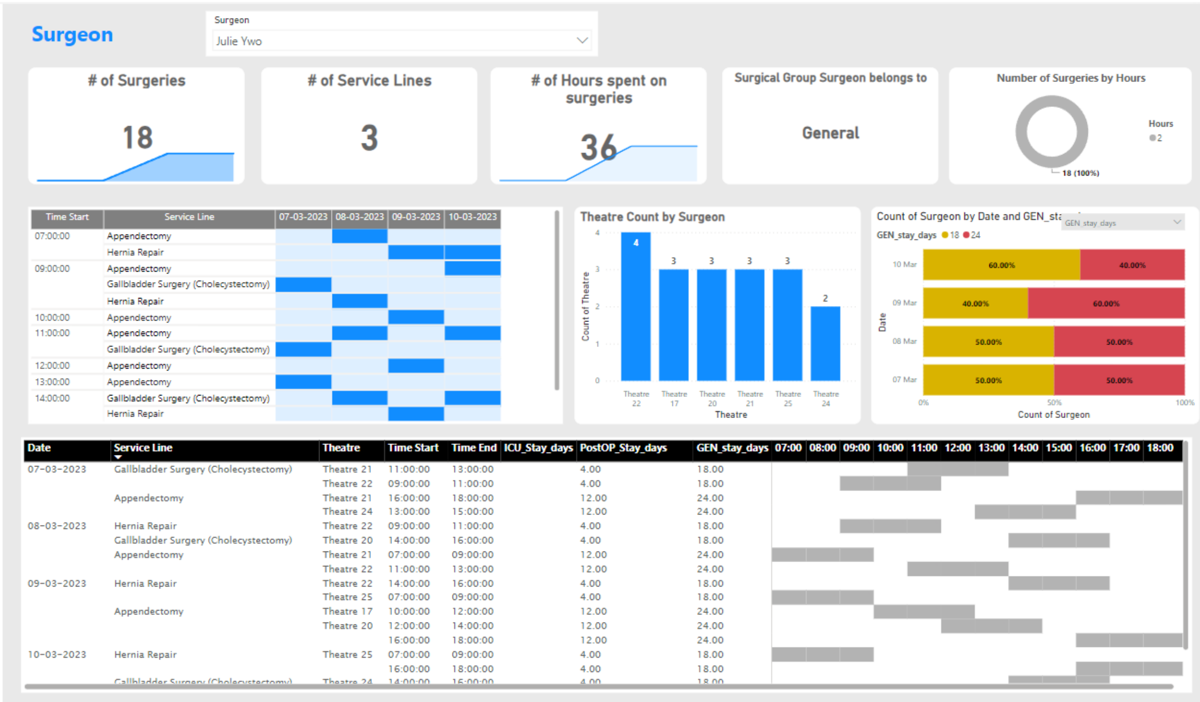
Top Right - Daily Trend Comparison:

The line graph tracks the number of patients in all beds over the month. It gives an overall trend of hospital occupancy, showing peaks and troughs over time.

Bottom Right - Daily Changes:

This part shows the day-to-day variation in the number of patients. A blue bar to the right indicates an increase in patients, while a red bar to the left shows a decrease. The numbers next to the bars quantify the change from the previous day.

Surgeon:



Example Analysis

This dashboard is a visual tool designed to track and analyse the projected surgical activities of a specific surgeon, Julie Yvo. Here's a breakdown:

Number of Surgeries (18):

Shows the total surgeries projected to be performed by the surgeon, indicating their workload.

Number of Service Lines (3):

Displays the types of surgeries the surgeon is projected to be involved in, reflecting the variety of their surgical expertise.

Hours Spent on Surgeries (36):

Represents the total time the surgeon has spent performing surgeries, which indicates their time commitment in the operating room.

Surgical Group (General):

Indicates the surgeon's specialization. Here, it's 'General', which typically includes a wide range of procedures.

Theatre Count by Surgeon:

The bar chart shows the number of times the surgeon has used different operating theatres. For example, they have used Theatre 22 four times. This helps in understanding the surgeon's operating room preferences or allocations.

Count of Surgeon by Date and General Stay Days:

The stacked bar chart to the right shows the days on which surgeries are projected to be performed (e.g., March 7, 8, 9, 10) and the proportion of patients staying in the general ward for different durations post-surgery. Yellow represents shorter stays, while red indicates longer stays.

The bottom section of the dashboard lists the schedule for each surgery, including the type, theatre used, start and end times, and the length of stay in various hospital departments post-surgery (ICU, PostOp, General).

This dashboard organizes and presents detailed information about the surgeon's activities and patient stays in a user-friendly format. It's a helpful tool for assessing the surgeon's workload, surgery types, and post-operative patient care requirements.

Summary

The MetaOPT Surgical Block Optimization model is an innovative approach to OR scheduling, harnessing AI, and data analytics to enhance surgical operations. It strategically organizes surgical blocks, ensuring effective resource allocation and scheduling that aligns with predicted patient needs. This model not only streamlines the OR process but also prioritizes patient care, surgeon efficiency, and hospital resource management.

Core Functions of OR Scheduling in MetaOPT

Forecasting and Predictive Planning:

Utilizes historical data and trends to accurately predict surgical demands and align resources accordingly.

Dynamic Scheduling:

Adapts to real-time changes in surgeon availability and emergency needs, maintaining operational fluidity.

Resource Optimization:

Allocates OR time, medical staff, and equipment to maximize utilization and reduce downtime.

Patient-Centric Approach:

Schedules surgeries to minimize patient wait times and length of hospital stay, focusing on improved outcomes and satisfaction.

Data Integration and Analysis:

Compiles comprehensive data to provide actionable insights for continuous process improvement.

Advantages of Implementing OR Scheduling in MetaOPT

Increased OR Efficiency:

Streamlines OR scheduling, reducing delays and maximizing the number of surgical procedures performed within available timeframes.

Enhanced Resource Management:

Optimizes the use of hospital resources, reducing costs and improving service delivery.

Improved Patient Throughput:

Efficient scheduling leads to more patients receiving timely surgeries, increasing the hospital's capacity to provide care.

Data-Driven Insights:

Enables informed decision-making with real-time data, leading to better outcomes and strategic planning.

Scalability and Adaptability:

The system's flexible design can easily scale to accommodate growing demands and evolving healthcare practices.

Conclusion

The MetaOPT Surgical Block Optimization model stands out as a vital tool for modern healthcare facilities. By implementing this model, hospitals can expect to see a significant transformation in their operational workflows, an enhancement in patient and staff satisfaction, and a marked improvement in their overall efficiency and effectiveness.

Register Now:

Visit https://meta-optimize.com and register to access the Candidate Assessment Model. On registration you will be provided with 30 introductory credits, enabling you to see first-hand, on us, how you will not only streamline your recruitment process but improve the outcomes for sustainable improvement.

Resources

Short Course: Surgical Block Optimization

Short Course: Prescriptive Analysis