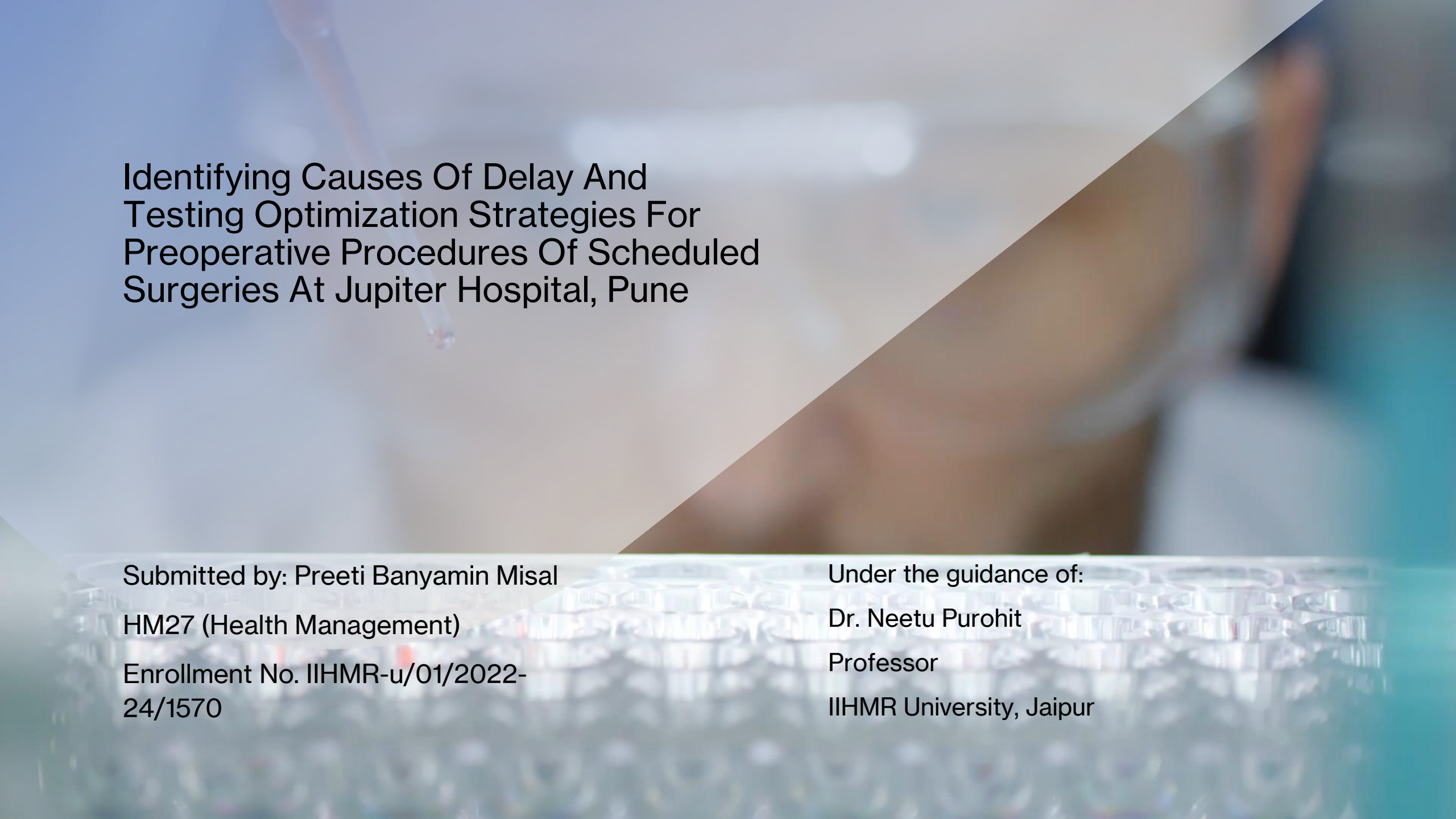




Identifying Causes Of Delay And Testing Optimization Strategies For Preoperative Procedures Of Scheduled Surgeries At Jupiter Hospital, Pune

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Introduction:

- The operation theatre (OT) is crucial for surgical care, requiring coordination among surgeons, anaesthesiologists, nurses, and support staff to ensure patient safety and successful outcomes. Efficient preoperative procedures, such as patient preparation, surgical site marking, financial clearances, and logistical arrangements, are vital for the optimal functioning of the OT.
- Key tasks include obtaining informed consent, conducting pre-surgical assessments, ensuring patients follow preoperative instructions, preventing wrong-site surgeries, resolving billing and insurance issues, and ensuring the availability of necessary surgical instruments and sterile supplies.
- Delays in these processes can disrupt workflow, prolong hospital stays, increase stress for patients and families, and lead to higher operational costs and diminished healthcare quality.
- This study aims to identify causes of preoperative delays and test optimization strategies to enhance OT efficiency at Jupiter Hospital, Pune.
- By analyzing current processes and implementing targeted strategies, the study seeks to provide evidence-based recommendations for improving OT utilization and overall patient care.

Literature review

Sr. No	Title	Author(s) and year	Study Location	Sample size & Sampling Techniques	Salient Features
1.	A Prospective Study on Operation Theater Utilization Time and Most Common Causes of Delays and Cancellations of Scheduled Surgeries in a 1000-Bedded Tertiary Care Rural Hospital with a View to Optimize the Utilization of Operation Theater	Naik SV, Dhulkhed VK, and Shinde RH 2018	A 1000-bedded tertiary care rural hospital.	This study analyzed operation theater (OT) utilization over a two-month period. The study utilized a prospective analysis approach.	The study found the most common causes of surgery postponements were surgical factors (70.51%), particularly due to unrealistic scheduling or earlier surgeries running long, followed by anesthesia issues (12.18%), patient factors (10.90%), and hospital factors (6.41%). It concluded that most delays and cancellations were avoidable with proper preoperative planning and patient optimization. Recommended strategies included timely starts for the first case, better communication between stakeholders, and realistic scheduling. The authors suggested prospective audits and targeted interventions to improve OT efficiency, aiming for utilization rates of 70-80%.
2.	Analysis of Operation Theatre Utilisation and Case Cancellation in a Tertiary Care Teaching Hospital	Geeta Karki, Dheeraj Saxena, Alankrita Agarwal, Sanchi Jain 2022	Sri Ram Murti Smarak Institute of Medical Sciences, Bhojipura, Bareilly, Uttar Pradesh, India.	Data collected over three months (October 2019 to December 2019) with a total of 1,612 scheduled cases. Prospective analysis of scheduled elective surgeries' OT utilization and case cancellations.	The study calculated OT utilization by comparing hours occupied versus total available hours and categorized cancellations into surgical, anesthesia, patient, and hospital factors. Results showed OT utilization rates of 57.08% in October, 71.48% in November, and 67.68% in December, with cancellation rates of 12.6%, 7.55%, and 8.96%, respectively. The most common cancellation reasons were surgical factors (70.51%), anesthesia factors (17.30%), patient factors (7.69%), and hospital factors (4.48%). Conclusions indicated high cancellation rates due to surgical factors, primarily lack of time. Recommendations for improvement included better scheduling, enhanced communication, efficient resource management, and periodic audits to improve OT efficiency and patient care quality.

Literature review	Sr. No	Title	Author(s) and year	Study Location	Sample size & Sampling Techniques	Salient Features
	3.	Modelling and Analysing Hospital Surgery Operations Management	Marie Persson 2009	Sweden		Focus on using computer-based modeling for hospital operating theatre management. Emphasis on patient scheduling and resource allocation. Analysis of the impact of new healthcare laws on patient wait times. Use of optimization and simulation techniques. Recommendations to reduce surgery cancellations and overtime.
	4.	An analysis of time utilization and cancellations of scheduled cases in the main operation theater complex of a tertiary care teaching institute of North India	S Talati, AK Gupta, A Kumar, SK Malhotra,and A Jain 2015	India	325 surgeries Prospective study model was implemented	Analyzing the utilization of operating theater resources is crucial for understanding efficiency and addressing challenges. Out of 325 scheduled cases, 252 proceeded while 73 were cancelled, primarily due to insufficient operating time. Delays in starting procedures were noted on 15 out of the scheduled days. The total resource hours amounted to 46,080 minutes, with a raw utilization rate of 81.54% and an adjusted utilization rate of 86.09%. Supportive services accounted for 12.02% of the time, while actual surgery took up 61.37%, and room turnover occupied 5.39%. These findings underscore the need for optimizing scheduling and resource allocation to enhance operational effectiveness in the operating theater.

Objectives:

To identify and categorise the causes of delays in preoperative procedures of the scheduled surgeries.

A light blue downward-pointing arrow indicating the flow from the first objective to the second.

To develop and propose strategies for minimising these delays based on identified causes and contributing factors.

A light purple downward-pointing arrow indicating the flow from the second objective to the third.

To implement the proposed strategies and compare the effectiveness in reducing delays.

Methodology



STUDY DESIGN

THE STUDY WAS DONE IN TWO PHASES: THE STUDY INITIALLY USED AN OBSERVATIONAL DESIGN TO IDENTIFY CAUSES OF THE DELAYS, AN INTERVENTION WAS PROPOSED TO COMBAT THE SAME, FOLLOWED BY AN EXPERIMENTAL DESIGN TO IMPLEMENT AND EVALUATE THE PROPOSED INTERVENTION.



SETTING

JUPITER HOSPITAL,
PUNE
A 400 BEDDED MULTI-SPECIALITY HOSPITAL.



DURATION OF THE STUDY

2 MONTHS
8TH APRIL 2024 – 15TH
JUNE 2024



STUDY POPULATION

PATIENTS SCHEDULED FOR ELECTIVE SURGICAL PROCEDURES WITHIN THE DURATION OF THE STUDY.

Methodology (Continued)



SAMPLE SIZE

600 ELECTIVE SURGERIES:
300 ELECTIVE SURGERIES IN
THE PRE-IMPLEMENTATION
PHASE
AND
300 ELECTIVE SURGERIES IN
THE POST-IMPLEMENTATION
PHASE.



SAMPLING TECHNIQUE

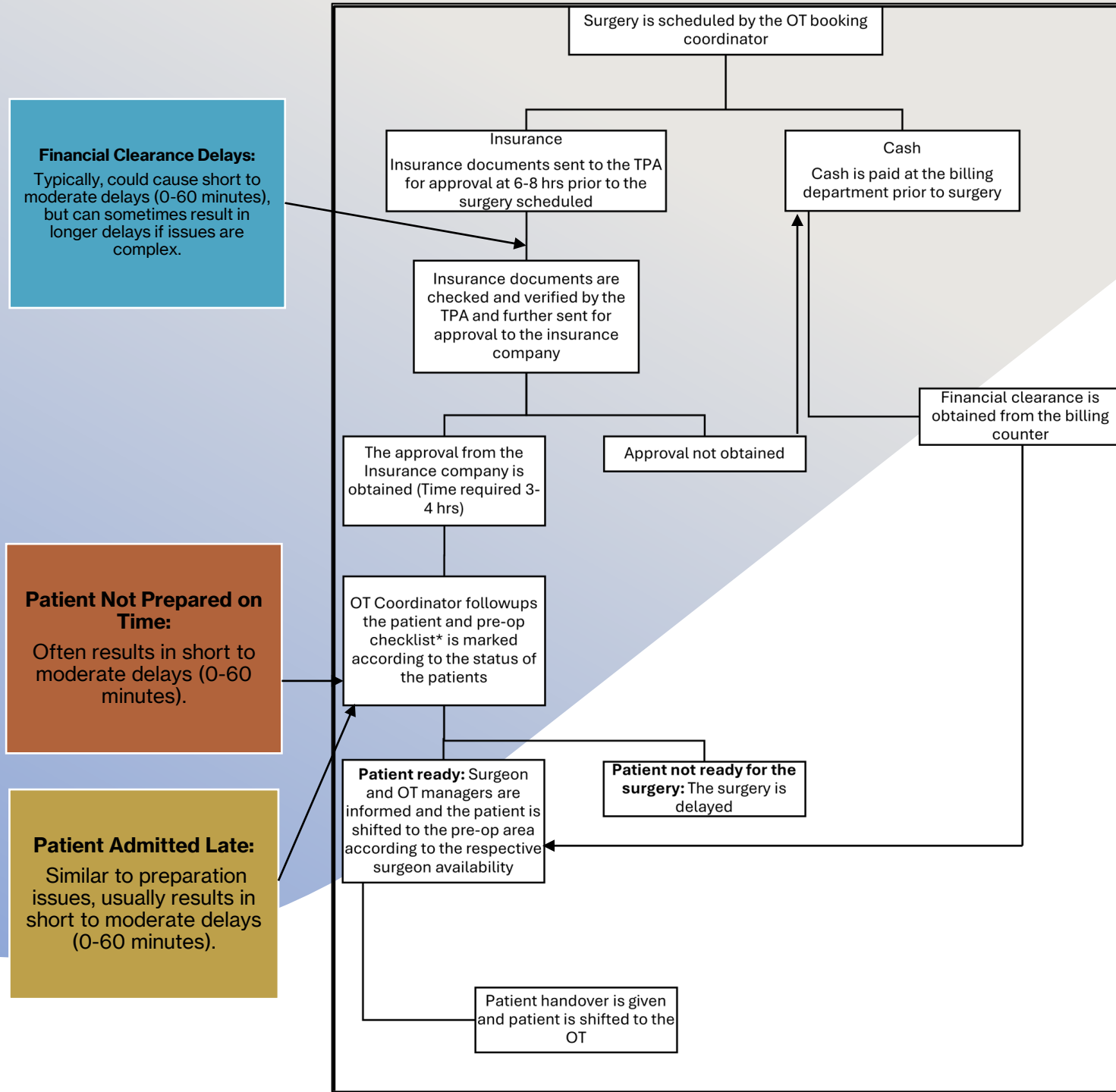
CONVENIENCE SAMPLING



DATA COLLECTION PROCEDURE

DIRECT OBSERVATION VIA.
OBSERVATION CHECKLIST

Pre-Operative procedures: “Pathway”

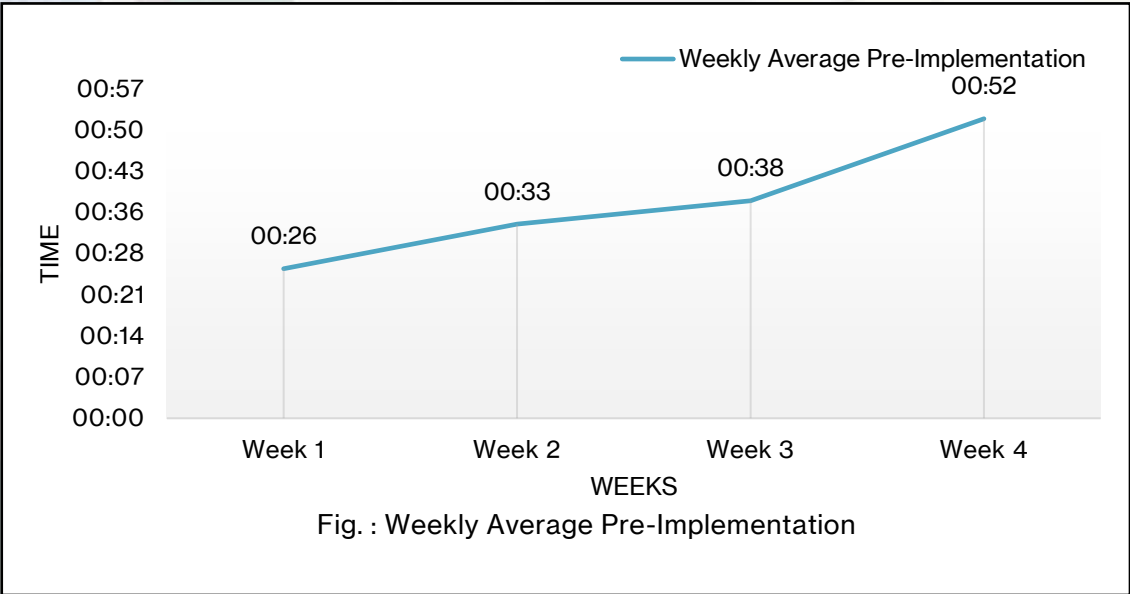
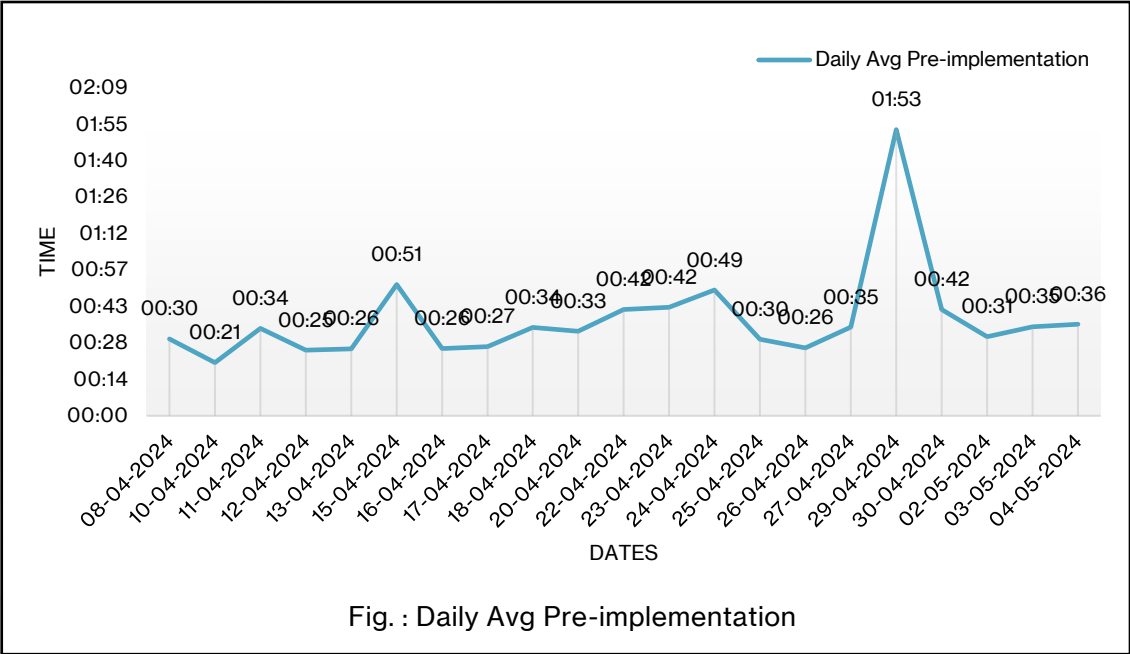


Results

Pre-implementation:

Average delay: 37 minutes
Standard deviation: 18 minutes

Major finding:
The standard deviation indicates significant variability around the mean delay, suggesting that while the average delay was 37 minutes, individual delays often deviated considerably from this average.



Results

Delay Reasons:

Financial Clearance Delays:

Typically, could cause short to moderate delays (0-60 minutes), but can sometimes result in longer delays if issues are complex.

Doctor's Delays:

Can vary but often fall within the moderate to longer range (0-120 minutes) due to scheduling and availability issues.

Patient Not Prepared on Time:

Often results in short to moderate delays (0-60 minutes).

Patient Admitted Late:

Similar to preparation issues, usually results in short to moderate delays (0-60 minutes).

Delay Due to Previous Case Delay:

This can cause cascading delays, often leading to short to moderate delays (0-60 minutes).

Other Reasons:

This can include a variety of factors and could impact any delay category.

Results: Measures taken to decrease delay

Delay Category	Typical Delay Range	Measures Taken to Decrease Delay
Financial Clearance Delays	0-60 minutes	Patients are called a day before surgery to submit insurance documents early, resulting in significant reduction of delays.
Doctor's Delays	0-120 minutes	Doctors advised to specify and adhere to appointment times to minimize delays.
Patient Not Prepared on Time	0-60 minutes	OT coordinators conduct trainings of the ward staff nurses to ensure patients are ready 1 hour before surgery time, ensuring timely preparation.
Patient Admitted Late	0-60 minutes	Same measures as patient preparation implemented to ensure patients arrive on time for admission.
Delay Due to Previous Case	0-60 minutes	Monitoring and management protocols implemented to minimize delays caused by previous cases.
Other Reasons	Variable	Continuous improvement and adaptation strategies in place to address various unforeseen delays.

Results

Post-implementation:

Average delay: 31 minutes
Standard deviation: 15 minutes

Major finding:

The mean delay 31 minutes, reflected a reduction compared to the pre-implementation phase. Additionally, the standard deviation of the delays was calculated to be 15 minutes.

This lower standard deviation, compared to the pre-implementation phase, indicates a reduction in variability and suggests more consistent performance.

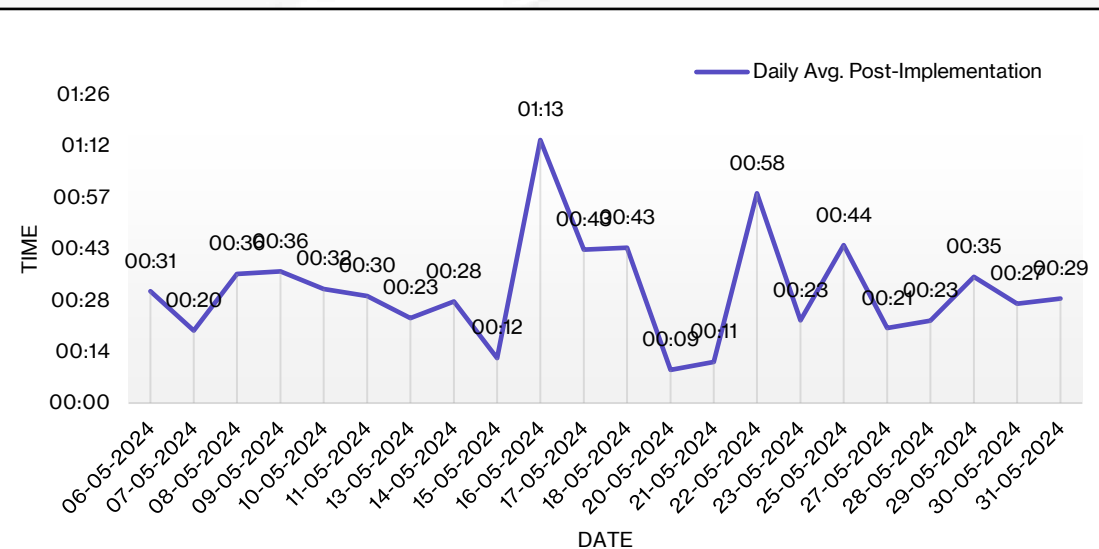


Fig. : Daily Avg. Post-Implementation

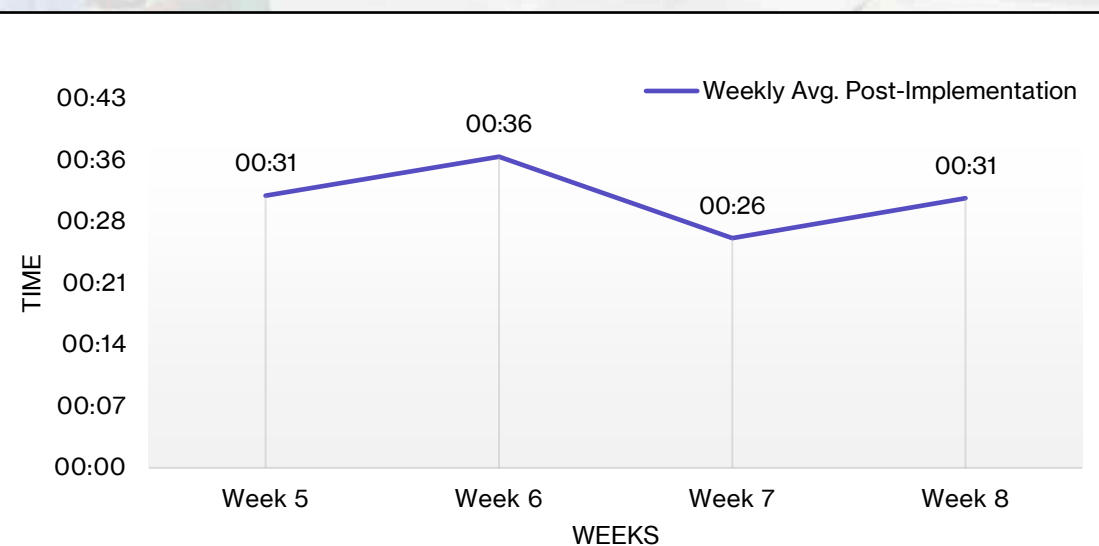
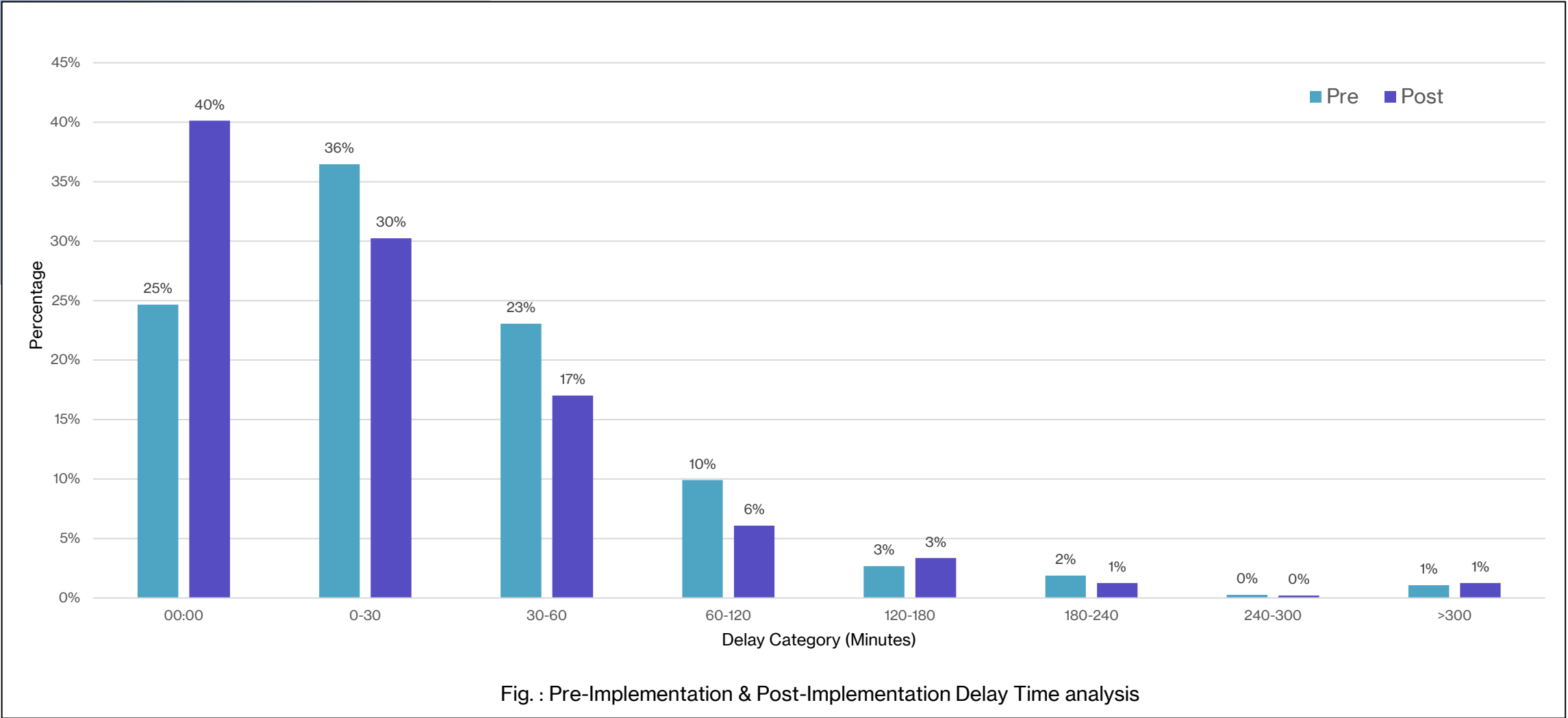


Fig. 5.5: Weekly Avg. Post-Implementation

Results: Percentage decrease (Pre-Post implementation data)



Results: Tests of significance

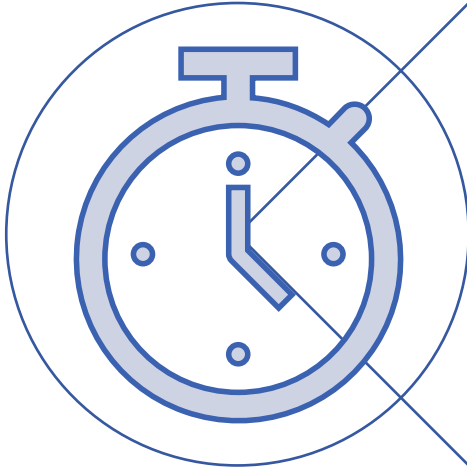
F-Test Two-Sample for Variances		
	Variable 1	Variable 2
Mean	0.026339384	0.021960046
Variance	0.000173541	0.000109088
Observations	21	22
df	20	21
F	1.590828529	
P(F<=f) one-tail	0.149414669	
F Critical one-tail	2.096032977	
Table 5.8: F-Test Two-Sample for Variances		

t-Test: Two-Sample Assuming Equal Variances		
	Variable 1	Variable 2
Mean	0.026339384	0.021960046
Variance	0.000173541	0.000109088
Observations	21	22
Pooled Variance	0.000140528	
Hypothesized Mean Difference	0	
df	41	
t Stat	1.210914104	
P(T<=t) one-tail	0.11643118	
t Critical one-tail	1.682878002	
P(T<=t) two-tail	0.232862359	
t Critical two-tail	2.01954097	
Table 5.9: t-Test: Two-Sample Assuming Equal Variances		

Interpretation:

- In the F-test for comparing the variances of two samples, we obtained an F-statistic of 1.5908 and a p-value of 0.1494. Since the p-value is greater than the common significance level of 0.05 and the F-statistic is less than the critical value of 2.0960, we do not reject the null hypothesis. This indicates that there is no significant difference between the variances of the two samples, suggesting that their variability is similar.
- In the two-sample t-test assuming equal variances, we compared the means of two samples. The t-statistic is 1.2109, and the p-values are 0.1164 (one-tail) and 0.2329 (two-tail). Both p-values are greater than the common significance level of 0.05. Additionally, the t-statistic is less than the critical values (1.6829 for one-tail, 2.0195 for two-tail). Therefore, we do not reject the null hypothesis, indicating that there is no significant difference between the means of the two samples.
- From the above tests it was clear that the average delay reduction for the pre and post implementation was not statistically significant.

Probable reasons for statistical insignificance:



Short Study Duration:

The timeframe during which the interventions were implemented and observed might have been too short to capture their full impact. Some interventions like the financial clearance delay intervention may require a longer period to show significant effects as it involved the family of the patient to respond to the submission of insurance documents beforehand so as to avoid any delay in the financial clearance for surgeries.



Complex Interventions:

The nature of a hospital is complex, with multiple interacting factors influencing the delays analysed. Isolating the impact of specific interventions can be challenging in such settings, which can potentially dilute the observable effects. There can be an inconsistency in application or partial adherence to the set implementation which can lead to an insignificant result.

Conclusions:

The study conducted at Jupiter Hospital, Pune, effectively identified and mitigated delays in preoperative procedures through targeted optimization strategies.

Spanning over two months and involving 600 elective surgeries, the research highlighted improvements in operational efficiency.

By reducing mean delay times from 37 to 31 minutes and enhancing consistency in preoperative processes, the study underscores the value of data-driven approaches in healthcare management.

These findings emphasize the potential for hospitals to streamline operations, enhance patient satisfaction, optimize resource utilization, and achieve better healthcare outcomes through systematic improvement initiatives.

Limitations and future research:



The results underscore the need for further research with extended study periods, and rigorous implementation strategies.



Future studies should also explore the impact of these interventions in emergency situations and validate findings across diverse healthcare settings to enhance the generalizability of results.





Thank you