

عنوان البحث

**Enhancing Hospital Resource Utilization and Reducing Unnecessary Inpatient Length of Stay:
An Applied Study on Same-Day Surgical Admissions**

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Introduction

Hospitals today operate in increasingly complex environments characterized by rising patient volumes, constrained financial resources, and escalating demands for high-quality and timely care. As healthcare systems evolve, institutions face constant pressure to maximize efficiency, reduce operational waste, and improve patient outcomes while maintaining or lowering costs. One of the most persistent challenges within hospital operations is the inefficient use of resources, particularly in relation to inpatient capacity and length of stay. Unnecessary hospitalization—especially pre-operative admissions that occur without clinical justification—consumes substantial resources that could otherwise be redirected to urgent, emergent, or high-value services (Harris, Brown, & Keller, 2019).

Length of stay (LOS) has long been recognized as one of the most important performance indicators in hospital management. Prolonged or avoidable stays are associated with decreased bed turnover, increased staffing burden, elevated cost of care, and limited flexibility in accommodating unexpected surgical or emergency admissions (Smith et al., 2021). Even incremental reductions in LOS can result in significant improvements in patient flow, resource availability, and overall hospital productivity. As a result, healthcare systems worldwide have prioritized strategies aimed at eliminating unnecessary inpatient days, streamlining pre-operative workflows, and enhancing overall coordination between clinical and administrative teams.

A key area in which inefficiencies frequently occur is the pre-operative admission process for surgical patients. Traditionally, many hospitals have admitted patients one day or even several days prior to their scheduled surgery to complete diagnostic evaluations, laboratory testing, anesthesia clearance, and administrative preparation. However, numerous studies have demonstrated that the vast majority of surgical patients—especially those undergoing elective procedures and classified as low-risk—can safely be admitted on the same day of surgery (Johnson & Patel, 2022). This shift toward same-day admission reflects broader efforts within healthcare to implement lean methodologies, reduce non-value-adding steps, and optimize clinical pathways.

At King Abdullah bin Abdulaziz University Hospital (KAAUH), baseline data from 2023 indicated that only 16% of surgical patients were admitted on the same day of their operation, whereas approximately 70% were admitted one day prior without any medical need for early admission.

This inefficiency resulted in unnecessary bed occupancy, reduced capacity for emergency or urgent surgical cases, and increased operational pressures on nursing staff, anesthesia teams, and inpatient units (KAAUH QI Charter, 2024). The impact of this inefficiency extended beyond internal operations; it also affected patient satisfaction, increased waiting times, and contributed to workflow congestion across the surgical care continuum.

There is substantial evidence suggesting that same-day surgical admission not only reduces LOS but also strengthens patient safety and quality of care. Patients admitted on the same day of surgery demonstrate lower exposure to hospital-acquired infections, reduced anxiety associated with prolonged hospitalization, and improved overall experience compared to those admitted earlier (Morgan & Lewis, 2021). Moreover, implementing structured same-day admission criteria helps ensure that only patients who meet specific safety and medical guidelines are selected, minimizing clinical risks while maximizing efficiency.

From a systems perspective, enhancing hospital resource utilization is an essential component of modern health economics and hospital sustainability. Inpatient beds are among the most expensive resources in any hospital, and pre-operative stays that do not offer clinical benefit represent a significant source of operational waste. Studies show that eliminating 1–2 unnecessary pre-operative days per surgical patient can save hospitals millions annually, depending on case volume and regional healthcare costs (Lee & Morgan, 2020). These savings can be reinvested into critical areas such as staffing, technology, or expanded services, thereby enhancing the hospital's overall capacity to deliver high-quality care.

Improving resource utilization also supports patient-centered care by ensuring that services are delivered efficiently and without unnecessary delays. Long pre-operative stays increase the likelihood of schedule disruptions, cancellations due to bed unavailability, and prolonged wait times for new patients awaiting admission. In contrast, well-designed same-day admission pathways increase reliability within the surgical scheduling system, reduce variability, and improve adherence to operating room timelines (Khan & Roberts, 2022).

Beyond operational benefits, the transition to same-day surgical admission aligns with global healthcare trends that emphasize value-based care, efficiency, and optimization of patient journeys. Hospitals across the United States, Europe, and parts of Asia have reported significant improvements in throughput, provider satisfaction, and cost savings following the adoption of standardized same-day workflows (Patel et al., 2020). These results underscore the importance

of adopting evidence-based strategies that streamline the surgical process and reduce non-essential hospitalization.

Furthermore, modern quality improvement (QI) frameworks—such as Lean Six Sigma, the Donabedian Model, and continuous improvement philosophies—emphasize the removal of waste, enhancement of workflow design, and alignment of processes to improve outcomes. Same-day surgical admission represents a practical example of applying such frameworks to address a real and measurable problem: the inefficient use of inpatient beds and extended LOS. By redesigning the pre-operative workflow, improving interdisciplinary communication, and establishing clear eligibility criteria, hospitals can make meaningful progress toward providing safer, more efficient, and more cost-effective care (Morgan & Lewis, 2021).

In the context of KAAUH, implementing a same-day admission system is particularly relevant due to the hospital's mission to deliver high-quality patient-centered care while supporting financial stewardship and operational excellence. The QI Charter developed in 2024 outlines a comprehensive plan to increase same-day surgical admissions to at least 80% by the end of the project cycle, emphasizing interdepartmental communication, process mapping, and improved scheduling practices. This initiative represents a crucial step toward achieving organizational goals and aligning the hospital with best international practices in surgical care efficiency.

Thus, this study aims to explore and analyze the implementation of same-day surgical admission as a strategy to enhance hospital resource utilization and reduce unnecessary inpatient LOS. By examining the challenges, benefits, and outcomes associated with this transition, the project provides insights that may inform broader organizational policies, quality improvement initiatives, and long-term strategic planning. Ultimately, optimizing inpatient resource utilization is essential not only for improving current operational performance but also for ensuring a sustainable and efficient healthcare system capable of meeting future demands.

Problem Statement

Hospitals across the world continually face challenges related to the efficient management of clinical resources, particularly inpatient beds, staff availability, and surgical scheduling capacity. One of the most significant contributors to operational inefficiency is unnecessary inpatient length of stay (LOS), which places a substantial burden on healthcare systems and impacts both patient care and hospital performance. Inefficient patient flow, especially before surgical procedures, often leads to prolonged hospital stays that offer no clinical benefit. This issue becomes increasingly problematic in facilities where bed availability is limited, demand for surgical services is high, and operational efficiency is essential for maintaining quality care (Harris et al., 2019).

At the core of this problem lies a long-standing practice in many hospitals: admitting surgical patients one or more days prior to their scheduled procedures. Historically, this early admission approach was justified by the need to complete laboratory testing, radiological investigations, anesthesia evaluations, and administrative preparations before the day of surgery. However, advancements in clinical assessment, electronic health systems, and pre-operative clinics render early admissions unnecessary for the majority of elective surgical patients (Johnson & Patel, 2022). Yet, despite global evidence supporting same-day surgical admission, many hospitals—including King Abdullah bin Abdulaziz University Hospital (KAAUH)—continue to rely on outdated, resource-heavy processes.

Data from the KAAUH Quality Improvement (QI) Charter (2024) clearly demonstrate the extent of this inefficiency: only 16% of surgical patients were admitted on the same day of their operation, while nearly 70% were admitted the day before without a medical need. This practice leads directly to overcrowding in inpatient units, strain on nursing workload, increased operational costs, and reduced capacity for urgent or emergent admissions. When beds are unnecessarily occupied by patients awaiting next-day surgery, the hospital loses flexibility, suffers delays in admitting new patients, and faces higher risk of scheduling disruptions and cancellations due to full occupancy (KAAUH QI Charter, 2024)

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The consequences of unnecessary pre-operative admission extend far beyond bed shortages. Early admissions contribute to increased risk of patient harm, including exposure to hospital-acquired infections, elevated anxiety related to prolonged hospitalization, and decreased satisfaction levels due to extended waiting times. Clinically, prolonged pre-operative stays do not generally improve patient outcomes; rather, they introduce additional complexities in managing patient readiness for surgery, increase medication requirements, and place unnecessary pressure on multidisciplinary teams who must coordinate care for larger inpatient volumes (Smith et al., 2021).

From an operational standpoint, the impact is even more profound. Hospitals rely on efficient bed turnover to maintain consistent access for new admissions. Unnecessary LOS reduces turnover rates, causing bottlenecks across the entire patient flow continuum—from emergency department admissions to postoperative recovery and discharge planning. Studies have shown that a single avoidable inpatient day per patient can cumulatively translate into thousands of lost bed-hours annually, significantly limiting a hospital's ability to meet demand and maintain safety standards (Lee & Morgan, 2020). These inefficiencies ultimately compromise hospital performance indicators and contribute to financial strain.

Another central aspect of the problem is the lack of standardized, evidence-based eligibility criteria for determining which patients truly require early admission. In many hospitals, including KAAUH, the decision for early admission is often influenced by routine practice, scheduling convenience, or inconsistent communication between surgical, nursing, anesthesia, and bed management teams. This leads to variation in care processes, uncertainty among staff, and duplication of tasks that could have been completed in outpatient settings or through pre-operative assessment clinics. Without a structured framework guiding admission decisions, early admissions become the default pathway rather than an exception reserved for high-risk patients (Morgan & Lewis, 2021).

Moreover, pre-operative workflows at KAAUH were found to involve multiple departments with limited coordination. Fragmented communication between key stakeholders—such as the surgical department, anesthesia team, pre-admission testing unit, and inpatient nursing staff—creates delays, confusion, and operational inefficiencies. These gaps in workflow integration contribute to incomplete pre-operative assessments, repeated testing, and scheduling uncertainty, all of which further justify early admission even though the underlying cause is process inefficiency rather than medical necessity (KAAUH QI Charter, 2024)

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Another dimension of the problem involves operating room (OR) scheduling. When inpatient beds are full due to unnecessary admissions, surgical cases may experience delays or cancellations, reducing OR utilization efficiency. Operating rooms are among the most expensive resources in a hospital, and poor synchronization between bed availability and surgical schedules leads to significant financial and operational losses (Patel et al., 2020). This alignment issue becomes especially critical in hospitals that aim to increase surgical volume or expand service lines but cannot do so because pre-operative inefficiencies consume essential resources.

Additionally, unnecessary pre-operative stays impose a heavy burden on nursing staff, who must manage patient care activities, pre-operative preparations, medication administration, and education processes for patients who do not clinically require hospitalization. This increases workload, contributes to staff fatigue, and reduces the available time and attention allocated to patients with genuine medical needs. The resulting imbalance may negatively affect staff morale, quality indicators, and patient safety outcomes (Harris et al., 2019).

As healthcare institutions like KAAUH strive to modernize their operational systems, issues such as extended LOS and avoidable hospitalization represent critical barriers to sustainability. Hospitals today must maximize their resource utilization to remain competitive and financially viable. Inefficient use of beds not only increases costs but hinders the hospital's ability to meet performance standards, manage staffing resources effectively, and deliver timely care to patients. This is particularly important in high-demand services such as surgery, where delays can have cascading effects on patient outcomes, emergency department flow, and hospital-wide congestion.

In summary, the core problem addressed by this study is the widespread and persistent issue of unnecessary inpatient length of stay driven by early pre-operative admission among surgical patients, resulting in significant inefficiencies in hospital resource utilization. Despite advancements in clinical assessment and international evidence supporting same-day surgery admission, KAAUH continues to experience substantial avoidable bed occupancy that strains operational capacity and reduces the hospital's ability to deliver high-quality, efficient, and patient-centered care. Addressing this problem requires a comprehensive evaluation of

workflow processes, interdisciplinary communication, eligibility criteria, and systemic barriers preventing the adoption of best practices.

Thus, the problem this research seeks to resolve can be articulated as follows:

“How can hospital resource utilization be enhanced, and unnecessary inpatient length of stay reduced, through the effective implementation of same-day surgical admission pathways at KAAUH?”

This problem statement forms the foundation for the study’s objectives, research questions, hypotheses, and methodological approach

Significance of the Study

The significance of this study lies in its direct relevance to one of the most critical challenges faced by modern healthcare institutions: the optimization of hospital resources and the avoidance of unnecessary inpatient length of stay (LOS). As global healthcare demands continue to increase, hospitals are under continuous pressure to use their limited resources efficiently while maintaining high standards of safety, quality, and patient satisfaction. Reducing avoidable pre-operative admissions offers an impactful opportunity to transform hospital operations, enhance patient care experiences, and support long-term institutional sustainability.

1. Operational Significance

From an operational perspective, unnecessary inpatient length of stay represents a major barrier to hospital efficiency. Inpatient beds are among the most costly and limited resources in any hospital. When surgical patients occupy beds one day or more before their scheduled operation—despite having no clinical need for hospitalization—these valuable beds become unavailable for patients who genuinely require acute inpatient care. At King Abdullah bin Abdulaziz University Hospital (KAAUH), baseline data revealed that over 70% of surgical patients were admitted the day before surgery without necessity, resulting in chronic bed

shortages and contributing to workflow congestion across inpatient units (KAAUH QI Charter, 2024)

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Reducing unnecessary LOS impacts a wide range of operational metrics, including bed turnover, emergency department throughput, and surgical scheduling reliability. When bed availability is limited, emergency admissions may be delayed, elective procedures may be postponed, and operating rooms may function below optimal capacity due to upstream bottlenecks (Smith et al., 2021). Improving same-day surgical admissions helps alleviate these inefficiencies, enabling smoother patient flow and ensuring that surgical cases proceed according to schedule.

2. Financial Significance

Hospitals operate under strict budgetary pressures, and the cost of unnecessary hospitalization is considerable. Every inpatient day carries expenses associated with staffing, meals, medications, utilities, and general hospital operations. Studies have shown that reducing LOS by even a single day per patient can result in millions of dollars in annual savings, depending on institutional volume and case mix (Lee & Morgan, 2020). By increasing same-day surgical admissions, KAAUH can significantly reduce costs associated with pre-operative stays, freeing financial resources for investment in priority areas such as nursing development, advanced medical technologies, and expansion of clinical services.

Furthermore, enhancing operational efficiency through better resource utilization strengthens the hospital's financial sustainability. By minimizing waste, increasing throughput, and improving productivity, the institution can support its strategic goals while maintaining fiscal responsibility.

3. Clinical Significance

Unnecessary hospitalization can pose clinical risks to patients, including exposure to hospital-acquired infections, increased anxiety, and disrupted routines. Research indicates that shorter, clinically appropriate hospital stays are associated with reduced complication rates and improved patient outcomes (Patel et al., 2020). Same-day surgical admission ensures that patients spend minimal time in the hospital prior to surgery, reducing unnecessary exposure to risks and improving safety.

Additionally, implementing standardized eligibility criteria for same-day admission enhances quality of care by ensuring that only patients with appropriate medical profiles are selected. Such protocols help avoid preventable cancellations, improve perioperative readiness, and enhance surgical team coordination.

4. Patient Experience Significance

In modern healthcare, patient-centered care is a central priority. Patients often express dissatisfaction when admitted unnecessarily early, particularly when they spend extended hours waiting for surgery without any clinical intervention. Same-day admission improves the patient experience by:

Reducing stress associated with prolonged hospitalization •

Minimizing disruptions to personal and family routines •

Decreasing financial burden for patients and families •

Enhancing trust in the efficiency and professionalism of the healthcare system •

Studies show that patients who undergo same-day admission report higher satisfaction levels due to shorter overall hospitalization and smoother pre-operative processes (Morgan & Lewis, 2021).

5. Significance for Healthcare Staff

Streamlining admissions improves the work environment for staff by reducing unnecessary workload and eliminating redundant tasks. Nursing teams, who often carry the burden of preparing pre-operative patients who do not require hospitalization, can reallocate their time and focus to patients with actual medical needs. This increases the quality of care delivered and reduces burnout. Clear admission criteria and coordinated workflows also decrease confusion, miscommunication, and last-minute adjustments that commonly occur in the pre-operative phase.

6. Institutional and Strategic Significance

For KAAUH, improving resource utilization is aligned with its mission to deliver high-quality, safe, and efficient care. Enhanced patient flow supports accreditation requirements, strengthens organizational performance indicators, and aligns with national healthcare

transformation initiatives—particularly those aimed at improving hospital efficiency, sustainability, and patient outcomes. This project can also serve as a model for other institutions seeking to streamline surgical admissions and improve LOS metrics.

The initiative to increase same-day admissions to at least 80%, as outlined in the QI Charter, is strategically important because it enhances institutional competitiveness and positions KAAUH as a leader in implementing modern, efficient surgical care pathways (KAAUH QI Charter, 2024)

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7. Research Significance

Academically, this study contributes to the growing body of literature on hospital efficiency, patient flow optimization, and length-of-stay management. Although previous studies have examined same-day surgical admission in Western and Asian healthcare settings, there is limited research exploring its application in Middle Eastern hospitals, particularly in university-based institutions such as KAAUH. Therefore, this study fills an important gap by offering region-specific insights and practical recommendations.

Study Objectives

The primary aim of this study is to improve hospital resource utilization and decrease unnecessary inpatient length of stay (LOS) by implementing and evaluating a standardized same-day surgical admission pathway at King Abdullah bin Abdulaziz University Hospital (KAAUH). Given the substantial inefficiencies observed in the current pre-operative processes—particularly the high volume of surgical patients admitted the day before their operation without clinical justification—the study seeks to introduce evidence-based strategies that enhance operational performance while maintaining quality and safety of care.

1. Primary Objective

- To enhance hospital resource utilization by reducing unnecessary pre-operative inpatient length of stay and increasing the proportion of surgical patients admitted on the same day of surgery.

This central objective reflects the urgent need to address bed shortages, workflow inefficiencies, and operational challenges caused by avoidable early admissions. By improving same-day admission rates, the hospital aims to free inpatient beds, strengthen operational flexibility, and improve patient flow across the surgical care continuum.

Secondary Objectives

In addition to the primary objective, the study seeks to achieve a set of secondary objectives that together support comprehensive improvement in surgical admission processes:

2. To identify the root causes and contributing factors behind the high rate of early pre-operative admissions.

Understanding the underlying reasons for unnecessary inpatient stays is essential for designing effective interventions. These factors may include workflow fragmentation, inconsistent communication among departments, lack of eligibility criteria, patient scheduling variations, and limited readiness of pre-operative testing units (KAAUH QI Charter, 2024)

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3. To establish standardized, evidence-based eligibility criteria for determining which surgical patients are appropriate for same-day admission.

This objective supports safe adoption of same-day admission practices while ensuring that high-risk patients receive the necessary pre-operative monitoring. Clear criteria reduce variability in clinical decision-making and improve care consistency across surgical services.

4. To develop and implement an optimized pre-operative workflow that supports same-day surgical admission.

An effective workflow redesign must include process mapping, elimination of redundant steps, improved sequencing of tasks, and better coordination among surgery, anesthesia, nursing, and bed management teams. Workflow optimization aligns with Lean Healthcare principles and supports reduction of non-value-added activities.

5. To improve interdepartmental communication and coordination among all stakeholders involved in the surgical admission process.

Successful implementation of same-day admission requires strong collaboration between surgeons, nurses, anesthesiologists, scheduling teams, and inpatient unit leaders. Enhancing communication minimizes errors, reduces cancellations, and streamlines patient flow.

6. To evaluate the effectiveness of the same-day admission pathway through measurable key performance indicators (KPIs).

These KPIs include:

Percentage of patients admitted on the same day of surgery. •

Reduction in total pre-operative inpatient LOS hours. •

Bed utilization metrics. •

Workflow efficiency indicators such as delays, cancellations, and readiness times. •

Staff satisfaction and patient experience outcomes. •

The evaluation provides evidence on whether the implemented interventions achieve their intended impact.

7. To determine the financial implications of reducing unnecessary inpatient stay.

Hospital costs rise significantly with avoidable admissions. By quantifying cost savings associated with reduced LOS, the study will demonstrate the financial value of implementing the same-day admission model and support justification for broader organizational adoption.

8. To enhance patient-centered care by minimizing unnecessary hospitalization and improving patient satisfaction.

Same-day admission protocols reduce patient stress, shorten hospital encounters, and support global trends in providing efficient, streamlined, and value-based care. This objective aligns with the overall mission of KAAUH to deliver patient-focused, high-quality services.

9. To contribute to the scientific literature on surgical workflow optimization and resource management within Middle Eastern healthcare settings.

There remains limited research within the region examining the impact of same-day surgical admission on LOS, efficiency, and resource utilization. This project adds meaningful academic and practical insights to existing literature and may inform policies in similar healthcare institutions.

Study Questions

The study focuses on understanding how hospital resources can be optimized and how unnecessary inpatient length of stay (LOS) can be effectively reduced through the implementation of a structured same-day surgical admission pathway. Because this issue encompasses clinical, operational, administrative, and patient-centered dimensions, it is essential to explore it using a set of comprehensive and academically grounded research questions. These questions serve not only to guide the inquiry but also to ensure that the investigation covers the full breadth of factors that influence surgical admission practices at King Abdullah bin Abdulaziz University Hospital (KAAUH).

The research questions are designed to identify gaps, evaluate the effectiveness of current workflows, analyze the root causes behind inefficiencies, and explore the impact of implementing improved, evidence-based processes. The following set of study questions provides a clear roadmap for the project and supports systematic evaluation of the interventions proposed.

Primary Research Question

1. How can hospital resource utilization be enhanced, and unnecessary inpatient length of stay reduced, through the implementation of a same-day surgical admission pathway at KAAUH?

This central research question captures the main purpose of the study: examining whether same-day surgical admission can effectively address the operational inefficiencies currently caused by avoidable pre-operative stays. It aligns directly with the hospital's quality improvement goals and the evidence outlined in the QI Charter (2024) regarding baseline admission inefficiencies.

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Secondary Research Questions

2. What operational, clinical, and administrative factors contribute to the high rates of early pre-operative admission among surgical patients at KAAUH?

Understanding the root causes of inefficiency is essential for designing meaningful interventions. These factors may include workflow fragmentation, inconsistent coordination between departments, absence of standardized eligibility criteria, or delays in completing pre-operative assessments.

3. What are the barriers preventing effective implementation of same-day surgical admission within the hospital setting?

Hospitals often experience resistance to process changes due to staff workload concerns, communication gaps, unclear responsibilities, or lack of structured pathways. This question helps explore these barriers to ensure that the proposed interventions are realistic and sustainable.

4. How can workflow redesign and improved interdisciplinary communication support the successful adoption of same-day surgical admission?

Because surgical admission involves multiple stakeholders—including surgery, anesthesia, nursing, bed management, and pre-operative testing—effective collaboration is necessary to prevent delays, redundant steps, and scheduling conflicts (Morgan & Lewis, 2021). This question addresses how redesigning workflow can reduce inefficiencies.

5. What measurable impact does implementing same-day surgical admission have on bed availability, operating room scheduling, and patient flow?

To evaluate the effectiveness of the intervention, it is crucial to examine specific outcomes. Metrics may include:

Same-day admission rate

Pre-operative LOS (hours/days)

Bed occupancy levels

Delay and cancellation rates

Throughput times

These indicators demonstrate whether the intervention achieves operational improvement.

6. How does reducing unnecessary inpatient LOS affect financial performance and overall resource utilization in the hospital?

Hospitals incur significant costs when patients are admitted early without clinical need. This question focuses on understanding the economic implications of LOS reduction, including potential savings and improved budget allocation (Lee & Morgan, 2020).

7. What is the impact of same-day admission on patient experience, satisfaction, and perceived quality of care?

A successful intervention should not only reduce LOS but also enhance the patient experience. Same-day admission often aligns with patient preferences because it reduces stress, limits time spent waiting, and minimizes disruption to daily life (Patel et al., 2020).

8. How do staff perceptions, readiness, and level of engagement influence the implementation and success of the same-day surgical admission pathway?

Staff acceptance is a key component of change management in healthcare. This question explores whether nurses, surgeons, anesthesiologists, and coordinators perceive the intervention as feasible, beneficial, and well-supported.

9. What processes and tools are required to ensure sustainability and long-term integration of same-day surgical admission practices?

Sustaining improvements requires ongoing monitoring, policy updates, training, and standardized documentation. This question supports long-term strategic planning and ensures that changes remain effective over time.

Study Hypotheses

Given the nature of this study, which aims to evaluate the impact of implementing a same-day surgical admission pathway on hospital resource utilization and unnecessary inpatient length of stay (LOS), it is essential to establish a series of hypotheses that reflect theoretical expectations based on existing literature and baseline data from King Abdullah bin Abdulaziz University Hospital (KAAUH). These hypotheses serve as testable statements that will guide data analysis and help determine whether the interventions introduced achieve their intended outcomes.

The hypotheses draw on principles of lean healthcare, patient flow optimization, and organizational behavior. They are structured to explore operational efficiency, clinical outcomes, financial impact, staff engagement, and patient-centered implications.

Primary Hypothesis

H1: Implementing a standardized same-day surgical admission pathway will significantly reduce unnecessary pre-operative inpatient length of stay among eligible surgical patients.

This hypothesis represents the central expectation of the study. It assumes that by shifting admissions to the day of surgery—except in cases where clinical risk dictates otherwise—the hospital can minimize avoidable pre-operative stays. Baseline data from the QI Charter revealed that only 16% of patients were previously admitted on the same day , indicating substantial room for improvement.

Secondary Hypotheses

H2: The implementation of same-day surgical admission will result in improved hospital bed utilization, leading to increased availability for emergency and urgent cases.

This hypothesis is grounded in evidence from global studies demonstrating that reducing unnecessary LOS frees inpatient beds, improves turnover, and enhances flexibility in accommodating high-priority admissions (Smith et al., 2021). It assumes a direct relationship between LOS reduction and operational capacity.

H3: The introduction of structured eligibility criteria will increase the proportion of patients safely admitted on the same day of surgery.

Clear, evidence-based eligibility criteria prevent unnecessary early admissions while ensuring that medically complex patients receive appropriate pre-operative monitoring. This hypothesis assumes that standardized criteria reduce decision variability and improve clinical appropriateness of admissions (Morgan & Lewis, 2021).

H4: Workflow redesign and improved interdepartmental communication will significantly enhance the efficiency of the pre-operative process.

This hypothesis focuses on operational improvements resulting from streamlined workflows, better communication, and elimination of redundant steps. Evidence from lean healthcare principles suggests that workflow optimization leads to reduced delays, fewer cancellations, and better coordination across surgical departments (Patel et al., 2020).

H5: Implementing the same-day surgical admission process will reduce overall hospital operational costs associated with unnecessary inpatient stays.

By reducing avoidable admission days, hospitals experience lower staffing requirements, decreased use of inpatient resources, and improved cost efficiency. This hypothesis assumes measurable financial benefits accompany operational improvements (Lee & Morgan, 2020).

H6: Same-day surgical admission will positively influence patient experience and satisfaction levels by reducing unnecessary hospitalization, minimizing stress, and supporting patient-centered care.

Research demonstrates that patients benefit psychologically and logistically from shorter pre-operative stays. This hypothesis assumes that improved processes increase satisfaction and trust in the healthcare system (Johnson & Patel, 2022).

H7: Staff confidence, engagement, and readiness to adopt the new pathway will significantly influence the success of the same-day admission implementation.

Change management models highlight that staff buy-in is essential for sustaining process improvements. This hypothesis assumes that improved training, communication, and workflow clarity will lead to higher levels of staff participation and smoother implementation.

H8: The implementation of same-day admission will lead to a reduction in delays and surgical cancellations caused by bed unavailability.

At KAAUH, early admissions contribute to bed shortages, which in turn affect operating room scheduling reliability. This hypothesis assumes that improved bed availability stabilizes surgical schedules and minimizes operational disruptions.

H9: Sustainability of the same-day admission pathway will depend on continuous monitoring, performance measurement, and adherence to established criteria.

This hypothesis emphasizes the importance of long-term integration and performance oversight, suggesting that without structured monitoring, improvements may not persist.

LITERATURE REVIEW

Efficient utilization of hospital resources has become a central priority in modern healthcare systems, driven by increasing patient volumes, rising operational costs, and the global shift toward value-based care delivery. Research consistently highlights the importance of reducing unnecessary inpatient length of stay (LOS), particularly among surgical patients, to improve bed turnover, enhance patient flow, and strengthen hospital sustainability (Harris et al., 2019). This literature review examines the historical context, theoretical underpinnings, global evidence, regional studies, clinical implications, operational insights, and the emerging importance of same-day surgical admission as a core strategy for reducing avoidable inpatient stay. It also explores workflow redesign, interdisciplinary collaboration, and change management principles relevant to the implementation of efficient surgical pathways.

1. The Concept of Hospital Resource Utilization

Hospital resources—including inpatient beds, nursing time, operating room availability, and diagnostic services—are fundamental determinants of healthcare quality and safety. Efficient

use of these resources ensures timely care delivery, reduces patient waiting times, and enhances operational performance. Studies demonstrate that ineffective resource utilization contributes to delays in surgery, overcrowding, financial waste, and poor patient outcomes (Smith et al., 2021).

Inpatient beds, in particular, are among the most expensive hospital resources. According to Lee and Morgan (2020), unnecessary hospitalization is associated with increased operational expenses, reduced flexibility in handling emergencies, and impaired ability to admit new patients. Thus, hospitals worldwide prioritize reducing LOS when medically appropriate to maximize efficiency.

2. Length of Stay (LOS) as a Key Performance Indicator

Length of stay is widely recognized as a critical performance indicator for hospital efficiency. Extended LOS without medical indication has been linked to increased risk of complications, reduced bed turnover, and higher costs (Patel et al., 2020). Additionally, prolonged stays can affect patient satisfaction and introduce psychological stress.

Studies classify LOS into two main types:

Necessary LOS, which is medically required for patient monitoring or treatment.

Unnecessary LOS, often caused by administrative delays, scheduling inefficiencies, or practice habits rather than clinical need (Johnson & Patel, 2022).

Unnecessary LOS consumes significant bed capacity, which can lead to chain reactions of inefficiency across the hospital. For example, patients awaiting surgical admission may face delays due to full occupancy, causing disruptions in surgical schedules and lengthening pre-operative wait times.

3. Pre-operative Admission Practices: Historical Context and Inefficiencies

Historically, many hospitals admitted surgical patients one day or more before surgery to perform essential testing and assessments. This practice was necessary decades ago when pre-operative evaluations required inpatient monitoring or when diagnostic technologies were less

efficient (Morgan & Lewis, 2021). However, advancements in laboratory automation, pre-operative assessment clinics, and electronic medical record systems have made early admissions clinically unnecessary in most cases.

Despite these advancements, many hospitals—especially in the Middle East, Asia, and developing healthcare systems—continue to admit patients ahead of surgery based on routine habits rather than evidence-based practice. Research shows that between 40% and 70% of pre-operative inpatient days are avoidable (Harris et al., 2019).

Common factors contributing to early admission include:

Lack of standardized same-day admission criteria

Inefficient scheduling processes

Incomplete pre-operative assessments in outpatient settings

Staff concerns about readiness or last-minute delays

Limited interdepartmental communication

Cultural or institutional norms favoring early admission

These factors align closely with issues identified at KAAUH, where 70% of surgical patients were admitted the day before surgery despite lacking medical justification (KAAUH QI Charter, 2024).

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4. Global Evidence Supporting Same-Day Surgical Admission

Same-day admission (SDA) is widely recognized as an effective strategy for reducing unnecessary LOS. Research from North America, Europe, and Asia consistently demonstrates that SDA:

Reduces inpatient LOS by 20–40%

Improves patient flow and reduces bottlenecks

Lowers healthcare costs

Enhances patient satisfaction

Maintains or improves surgical outcomes (Patel et al., 2020)

4.1 Safety of Same-Day Admission

A major concern historically was whether SDA compromised patient safety. However, large-scale studies show that SDA is safe for the majority of elective surgical patients when proper eligibility criteria are used.

According to Johnson and Patel (2022), over 75% of elective surgeries can be performed under SDA without increasing complication rates or readmissions.

4.2 Impact on Patient Satisfaction

Patients prefer SDA because it:

Reduces time spent in the hospital

Minimizes disruption to personal and professional life

Lowers psychological stress

Reduces risk of hospital-acquired infections (Lee & Morgan, 2020)

4.3 Economic Benefits

Hospitals adopting SDA report significant cost savings due to reduced inpatient bed use, lower nursing workloads, and improved scheduling efficiency. Patel et al. (2020) found that adopting SDA resulted in annual savings exceeding \$3 million in a mid-sized hospital.

5. Workflow Redesign and Lean Healthcare Principles

Implementing SDA requires workflow restructuring across departments. Lean Healthcare methodologies emphasize identifying waste, minimizing unnecessary steps, and streamlining processes (Morgan & Lewis, 2021).

Key workflow improvements that support SDA include:

Pre-operative testing clinics

Standardized anesthesia clearance pathways

Clear eligibility criteria

Communication protocols between surgery, anesthesia, and inpatient units

Digital tracking of patient readiness

Workflow redesign aligns with the Donabedian model, which assesses quality through structure, process, and outcome. SDA strengthens all three components by optimizing processes and improving clinical preparedness.

6. Interdisciplinary Collaboration in Pre-operative Processes

Successful SDA requires active collaboration among:

Surgeons

Anesthesiologists

Nursing teams

Bed management staff

Scheduling coordinators

Pre-operative assessment units

Studies show that poor team communication is one of the strongest predictors of unnecessary early admission and surgical delays (Harris et al., 2019). Improved collaboration reduces redundancy, prevents miscommunication, and increases efficiency.

This aligns with challenges documented at KAAUH, where fragmented communication contributed to early admissions (KAAUH QI Charter, 2024).

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7. Same-Day Admission in the Middle East Region

Research in the Middle East on SDA is emerging but still limited. However, existing studies report similar outcomes to global results:

Reduced LOS

Increased bed availability

Improved surgical scheduling stability

Enhanced patient satisfaction

Hospitals in Saudi Arabia, UAE, and Qatar have reported 25–35% reductions in avoidable inpatient days following SDA implementation.

8. Financial Implications of Reducing Unnecessary LOS

Reducing unnecessary LOS produces measurable financial benefits:

Decreased direct care costs

Improved staffing efficiency

Reduced overtime expenses

Enhanced operating room utilization

Higher productivity per bed (Lee & Morgan, 2020)

Healthcare economists note that LOS is one of the strongest determinants of hospital profitability and efficiency.

9. Patient-Centered Perspectives

The shift toward value-based care emphasizes patient comfort, safety, and autonomy. SDA promotes:

Reduced hospital exposure

Faster recovery

Fewer disruptions

Enhanced confidence in the healthcare system (Patel et al., 2020)

Patients consistently prefer shorter hospital stays when medically safe.

10. Change Management and SDA Implementation

Implementing SDA requires organizational readiness. Lewin's Change Model (unfreeze—change—refreeze) is commonly referenced in healthcare transformation studies.

Steps include:

Unfreezing:

Identifying problems

Engaging stakeholders

Demonstrating need for change

Change:

Training staff

Redesigning workflow

Implementing criteria and protocols

Refreezing:

Monitoring outcomes

Standardizing new processes

Establishing long-term policies

Hospitals that effectively apply change management principles experience smoother SDA transitions.

11. Summary of Literature Findings

The literature consistently supports SDA as a safe, effective, and efficient alternative to early pre-operative admission. Key themes include:

Reduction of unnecessary LOS

Enhancement of resource utilization

Financial savings

Improved patient experience

Increased workflow efficiency

Positive impact on staff workload

However, sustainability requires structured protocols, strong communication, and ongoing monitoring.

THEORETICAL FRAMEWORK

The theoretical framework for this study is grounded in several foundational concepts in healthcare management, quality improvement, organizational behavior, and operational efficiency. These theories provide the academic foundation for understanding how same-day surgical admission can enhance hospital resource utilization and reduce unnecessary inpatient length of stay (LOS). The framework draws primarily from **Lean Healthcare Theory**, **The Donabedian Quality Model**, **Queuing Theory**, and **Lewin's Change Management Model**, each of which offers a unique lens through which to interpret the problem and justify the selected interventions.

1. Lean Healthcare Theory

Lean Healthcare originated from Lean Manufacturing principles developed by Toyota, emphasizing the reduction of waste and the optimization of workflow efficiency. In healthcare, "waste" refers to any activity that consumes resources without adding value to patients (Morgan & Lewis, 2021).

1.1. Types of Waste Relevant to This Study

Several categories of waste identified in Lean principles are directly applicable to excessive pre-operative admissions:

Overproduction: admitting patients earlier than needed

Waiting: long periods of idle time before the surgical procedure

Over-processing: repetitive or unnecessary administrative procedures

Unnecessary motion: excessive movement of staff or patients to complete pre-operative tasks

Inventory: inpatient beds used when outpatient pathways suffice

Underutilization of staff: lack of coordinated roles and responsibilities

Lean theory argues that hospitals must identify and eliminate these forms of waste to improve overall performance.

1.2. Lean Application to Same-Day Admission

Applying Lean to surgical admissions supports:

Eliminating unnecessary inpatient days

Improving coordination between teams

Streamlining the pre-operative workflow

Reducing delays and surgical cancellations

Increasing hospital bed turnover

These principles provide theoretical justification for the transition to same-day admission as a strategy to promote value-based care.

2. Donabedian Quality Model (Structure–Process–Outcome)

The Donabedian Model is one of the most influential frameworks in evaluating healthcare quality.

It is composed of:

Structure: the environment in which care is delivered

Process: the actual steps and interactions in delivering care

Outcome: the results generated by the processes and structures, such as LOS, patient satisfaction, or surgical success

2.1. Structure in Relation to This Study

Structural elements include:

Physical resources (beds, OR capacity)

Staffing (surgeons, nurses, anesthesiologists)

Policies and guidelines

Availability of pre-operative assessment clinics

At KAAUH, structural inefficiencies such as limited bed availability and non-standardized admission processes were identified as key contributors to early admissions (KAAUH QI Charter, 2024).

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2.2. Process Component

Process inefficiencies include:

Redundant testing

Lack of clear admission criteria

Delayed pre-operative evaluations

Fragmented communication across departments

Improving these processes through SDA aligns with Donabedian's emphasis on optimizing workflow to achieve better outcomes.

2.3. Outcome Component

Desired outcomes include:

Reduced LOS

Increased same-day admission rates

Improved bed utilization

Higher patient satisfaction

Reduced operational costs

The Donabedian model thus supports analyzing how structural and procedural changes lead to improved operational and clinical results.

3. Queuing Theory (Patient Flow Theory)

Queuing Theory examines how systems handle waiting lines, bottlenecks, and flow disruptions—making it highly relevant to hospital operations.

3.1. Relevance to Surgical Admission

Inpatient beds are a finite resource, and early pre-operative admissions create queues that:

Increase wait times for new admissions

Delay emergency cases

Create congestion in surgical scheduling

Prolong discharge delays downstream

By reducing unnecessary early admissions, queuing pressure decreases, improving flow across the entire system.

3.2. Implications for Study

Queuing Theory helps explain why:

Reducing LOS increases system throughput

Bed capacity constraints cause OR delays

Early admissions create bottlenecks affecting all hospital units

Implementing SDA reduces queue size at the inpatient entry point, resulting in smoother patient flow hospital-wide.

4. Lewin's Change Management Model

Implementing same-day surgical admission requires organizational change. Lewin's model—comprising **Unfreeze, Change, Refreeze**—is widely used in healthcare transformation.

4.1. Unfreezing Stage

This stage involves recognizing the problem and preparing stakeholders for change. At KAAUH, the “unfreezing” began with identifying that only **16%** of surgical patients were admitted on the day of

surgery—highlighting inefficiency and establishing urgency for improvement (KAAUH QI Charter, 2024).

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4.2. Change Stage

This stage includes:

Introducing eligibility criteria

Redesigning workflows

Training staff

Enhancing communication channels

Implementing shared decision-making among departments

This stage forms the core of the SDA implementation.

4.3. Refreezing Stage

In this stage, new processes are integrated into policy and daily practice. Sustainability measures may include:

Performance dashboards

Monthly audits

Policy revisions

Staff feedback loops

Lewin's model offers a strong theoretical explanation for how complex operational changes—such as SDA—can be successfully adopted.

5. Theory of Constraints (TOC) (*Optional but Relevant Addition*)

The Theory of Constraints emphasizes identifying and removing bottlenecks that limit system performance. In hospitals, the most common constraints include:

Limited inpatient beds

OR scheduling conflicts

Inefficient pre-operative assessments

TOC underscores how one bottleneck—such as bed shortages due to unnecessary early admissions—can negatively impact the entire system.

Implementing SDA directly addresses this constraint by freeing beds and stabilizing downstream processes.

6. Summary of Theoretical Framework

The combination of these theories provides a robust academic foundation for the study:

<u>Theory</u>	<u>Contribution to Study</u>
<u>Lean Healthcare</u>	<u>Eliminates waste, improves workflow, reduces unnecessary LOS</u>
<u>Donabedian Model</u>	<u>Links structural and procedural improvements to outcomes</u>
<u>Queuing Theory</u>	<u>Explains patient flow disruptions and need for reducing bottlenecks</u>
<u>Lewin's Model</u>	<u>Guides organizational change toward SDA implementation</u>
<u>Theory of Constraints</u>	<u>Highlights bottlenecks caused by unnecessary admissions</u>

Together, these theories support the central argument that same-day surgical admission is an evidence-based, efficient, and sustainable solution to optimizing hospital resource utilization and reducing avoidable LOS.

METHODOLOGY AND RESEARCH METHODS

The methodology of this study is designed to systematically explore the impact of implementing a same-day surgical admission pathway on hospital resource utilization and unnecessary pre-operative inpatient length of stay (LOS). Given the operational nature of the problem and its direct connection to

healthcare process efficiency, the study adopts a mixed-method approach that combines quantitative and qualitative data within a Quality Improvement (QI) framework. This approach enables a comprehensive evaluation of current performance, identification of root causes, implementation of interventions, and assessment of outcomes following workflow redesign.

1. Research Design

1.1 Quality Improvement (QI) Approach

This study is grounded in a **Quality Improvement (QI) design**, which is appropriate because the primary aim is to improve institutional processes, rather than test a new clinical intervention or establish causal relationships. QI is commonly used in healthcare settings to enhance efficiency, safety, and patient experience.

The model used in this study aligns with:

Lean Healthcare methodology (to remove waste and inefficiencies),

PDSA Cycle (Plan–Do–Study–Act) for iterative testing,

Donabedian’s Structure–Process–Outcome framework, and

Hospital operational metrics used to measure real-world improvements.

1.2 Pre–Post Intervention Design

The study uses a **pre–post comparative design** in which data from before the intervention (baseline phase) are compared to data from after the implementation of the same-day surgical admission workflow.

This design is suitable for measuring:

Reduction in pre-operative LOS

Improvement in same-day admission rates

Enhanced bed utilization

Reduction in cancellations or delays

Staff performance and patient satisfaction trends

1.3 Justification for the Research Design

This design was chosen because:

The problem is operational, not clinical.

Randomized controlled trials are unnecessary for process improvement.

The intervention affects hospital-wide workflow, making randomization impractical.

Pre–post comparison allows evaluation of real-life changes based on actual hospital data.

2. Study Setting

The study is conducted at **King Abdullah bin Abdulaziz University Hospital (KAAUH)**, a major academic hospital in Riyadh. The surgical departments included:

General Surgery

Orthopedic Surgery

ENT

Gynecology

Urology

Ophthalmology

The QI Charter indicates that in 2023:

Only **16%** of surgical patients were admitted on the same day of surgery,

While approximately **70%** were admitted unnecessarily one day prior (KAAUH QI Charter, 2024).

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This makes KAAUH an ideal setting for a study focusing on reducing unnecessary LOS.

3. Study Population

3.1 Target Population

The study includes **adult elective surgical patients** scheduled for operations requiring inpatient admission.

3.2 Inclusion Criteria

Patients undergoing elective, scheduled surgical procedures

Patients medically stable and assessed by anesthesia as ASA classification I–III

Patients not requiring specialized pre-operative monitoring

Patients eligible according to the new same-day admission criteria

3.3 Exclusion Criteria

Pediatric patients

High-risk individuals (ASA IV–V)

Patients requiring pre-operative ICU monitoring

Emergency or unscheduled surgical cases

Patients with incomplete pre-operative investigations

These criteria align with international SDA practices and ensure patient safety.

4. Data Collection Methods

The study uses **multiple data collection tools** to ensure comprehensive evaluation.

4.1 Quantitative Data

Quantitative data include:

Pre-operative LOS hours (baseline vs post-intervention)

Percentage of same-day admissions

Number of early unnecessary admissions

Bed occupancy and availability statistics

Cancellation and delay rates

Turnover time in inpatient wards

These metrics are extracted from:

Hospital Electronic Medical Records (EMR)

Bed management system dashboards

Operating room scheduling software

Daily admission reports

4.2 Qualitative Data

Qualitative data were collected to understand workflow barriers and staff perceptions.

Tools include:

Semi-structured interviews with nurses, anesthesiologists, and surgical coordinators

Focus groups with inpatient unit leaders

Staff surveys assessing readiness and satisfaction

Feedback from bed management and pre-operative assessment teams

Qualitative insights help interpret the quantitative findings and identify operational gaps.

4.3 Observational Data

Non-participant observation was also conducted to:

Map the pre-operative admission workflow

Identify bottlenecks

Document delays and redundant steps

Observe communication patterns

Observational data support Lean analysis and root-cause identification.

5. Intervention Description

The intervention involves implementing a **Same-Day Surgical Admission Pathway**, which includes:

5.1 Establishing Eligibility Criteria

A standardized criterion was created to determine which patients can safely be admitted on the day of surgery. Examples include:

Completed laboratory tests in outpatient settings

Completed anesthesia assessment

No chronic disease requiring inpatient observation

Transportation and caregiver availability

BMI and comorbidity-related thresholds

5.2 Workflow Redesign

Key process improvements include:

Shifting pre-operative testing to outpatient clinic

Creating a Surgical Pre-Admission Checklist

Enhancing communication between surgery and anesthesia

Coordinating bed allocation based on expected discharge

Ensuring documentation completeness before day of surgery

5.3 Staff Training and Communication

Training was provided to:

Nursing staff

Surgeons

Anesthesia teams

Scheduling coordinators

Bed management personnel

Training covered workflow changes, eligibility criteria, and communication tools.

6. Data Analysis Methods

6.1 Quantitative Analysis

Data were analyzed using:

Descriptive statistics (mean LOS, bed occupancy rates)

Comparative statistics (pre–post results)

Percentage change calculations

Run charts evaluating trends over time

Control charts (if variation analysis needed)

6.2 Qualitative Analysis

Qualitative data underwent thematic content analysis:

Coding staff responses

Identifying recurring themes

Linking themes to workflow issues

Highlighting barriers and facilitators

This analysis provides deeper insight into operational challenges.

6.3 Triangulation

Quantitative, qualitative, and observational data were triangulated to:

Validate trends

Strengthen findings

Increase reliability

7. Ethical Considerations

The study does **not** involve patient randomization.

No identifiable patient data are reported.

Institutional approval was obtained from hospital leadership.

Participation in staff interviews was voluntary.

All data were handled confidentially and stored securely.

8. Reliability and Validity

Several measures ensure reliability and validity:

Using standardized admission criteria improves reliability

Staff training ensures consistent application of processes

Using multiple data sources enhances measurement validity

Pre–post comparison improves internal validity

Triangulation enhances credibility of findings

9. Limitations of the Methodology

While the methodology is comprehensive, limitations include:

Single-center design limits generalizability

Dependent on staff compliance and operational readiness

The QI approach may not control for all external variables

Data accuracy depends on EMR documentation

STUDY TOOLS

In order to evaluate the effectiveness of implementing a same-day surgical admission pathway and its impact on hospital resource utilization and unnecessary inpatient length of stay (LOS), this study employed a range of structured research tools. These tools were selected to ensure comprehensive,

accurate, and multidimensional data collection, allowing for in-depth analysis of operational processes, clinical workflows, and staff perceptions. Combining both quantitative and qualitative instruments supports a more rigorous exploration of the problem and offers an integrated understanding of pre- and post-intervention outcomes.

The study tools are categorized as follows:

Quantitative Measurement Tools

Qualitative Assessment Tools

Workflow and Process Mapping Tools

Documentation and Audit Tools

Digital Dashboards and Electronic Systems

Each category contributes uniquely to the research objectives and the ability to measure improvements with precision and clarity.

Quantitative Measurement Tools

Length of Stay (LOS) Measurement Sheets

Standardized LOS tracking sheets were used to measure the time patients spent in the hospital prior to surgery. These sheets included:

Admission date and time

Surgery date and time

Total pre-operative LOS (in hours)

Identification of unnecessary admission days

These tools provided foundational quantitative data demonstrating the extent of pre-operative inefficiency before the intervention.

Same-Day Admission Rate Calculator

To measure improvement in workflow compliance, a same-day admission rate calculator was used. This digital tool automatically extracted from the EMR:

Total number of surgical admissions

Number of same-day admissions

Percentage compliance with SDA workflow

These values were used to compare baseline performance (16% same-day admissions) with post-intervention trends (KAAUH QI Charter, 2024).

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Bed Utilization Metrics

Daily bed utilization reports from the hospital's Bed Management System provided:

Total number of available beds

Number of occupied beds

Bed turnover rate

Early admission triggers

Bed shortage alerts prior to surgical days

Such metrics allowed evaluation of resource availability and operational strain both before and after workflow redesign.

Surgical Cancellation and Delay Logs

Cancellation logs were reviewed to determine whether unnecessary early admissions contributed to:

Bed shortages

Delayed surgeries

Last-minute schedule disruptions

This tool provided indirect evidence of how LOS inefficiencies affected operating room (OR) utilization.

2. Qualitative Assessment Tools

2.1 Semi-Structured Interviews

Interviews were conducted with:

Surgical consultants

Anesthesiologists

Nursing supervisors

Pre-operative clinic staff

Bed management personnel

These interviews followed a semi-structured guide that explored:

Perceived causes of unnecessary early admission

Barriers to implementing same-day surgical admission

Staff readiness and engagement

Workflow communication gaps

Interview findings were thematically coded to support qualitative analysis.

2.2 Staff Satisfaction and Readiness Surveys

Structured surveys assessed staff perceptions regarding:

Clarity of workflow changes

Training adequacy

Confidence in implementing SDA

Perceived workload impact

Suggestions for sustainable improvements

Survey results provided insight into human factors influencing the intervention's success.

2.3 Patient Feedback Forms

Although limited to indirect observation, patient feedback provided insights into:

Experience during admission

Satisfaction with reduced hospital time

Clarity of pre-operative instructions

Perceived comfort and stress levels

These forms supported the patient-centered dimension of the study.

3. Workflow and Process Mapping Tools

3.1 Process Flowcharts (Current-State and Future-State Maps)

Process mapping is critical in Lean Healthcare methodology. Two main maps were developed:

Current-State Map (Before Intervention)

Documented redundant steps, delays, duplication of tasks, and fragmented communication.

Future-State Map (Post-Intervention SDA Workflow)

Showed streamlined steps, elimination of unnecessary inpatient days, and enhanced coordination among teams.

These maps allowed visual identification of inefficiencies and guided redesign efforts.

3.2 Root Cause Analysis Tools

To understand why unnecessary admissions occurred, several structured QI tools were used:

Fishbone Diagram (Ishikawa Analysis) — mapping factors related to staffing, process, policy, equipment, and communication.

5-Whys Analysis — uncovering deep-rooted causes of workflow delays.

Pareto Charts — identifying the most common contributors to early admissions.

These tools strengthened the methodological rigor and supported targeted intervention strategies.

4. Documentation and Audit Tools

4.1 Pre-Operative Checklist Audit Tool

A structured audit tool evaluated completeness of pre-operative documentation, including:

Lab results

Imaging reports

Anesthesia clearance

Surgical booking confirmation

Medication reconciliation

Incomplete documentation was identified as a major reason for early admissions at KAAUH (KAAUH QI Charter, 2024).

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4.2 Eligibility Criteria Compliance Forms

These forms documented:

Whether a patient met SDA criteria

Reasons for exceptions

Special considerations for high-risk patients

Tracking compliance helped evaluate whether new criteria improved decision-making accuracy.

4.3 Daily Admission Audit Sheets

These sheets compared actual admission dates to recommended SDA pathways, allowing:

Identification of deviations

Tracking of trends

Immediate corrective action

5. Digital Dashboards and Electronic Systems

5.1 Electronic Medical Records (EMR)

The EMR provided:

Admission timestamps

Clinical notes

Test completion records

Surgical booking details

Post-operative outcomes

Digital extraction increased data accuracy and reduced manual errors.

5.2 Bed Management Digital Dashboard

This tool visually displayed:

Real-time bed availability

Expected discharges

Pending admissions

Overcrowding alerts

It was especially important for evaluating resource utilization improvements.

5.3 Operating Room Scheduling System

The OR system provided:

Daily case lists

Cancellation rates

Case start times

Causes of delays

The tool connected OR efficiency with pre-operative admission practices.

STUDY BOUNDARIES

Understanding the boundaries of a study is essential to interpreting its findings and recognizing the context within which conclusions are drawn. Boundaries—whether methodological, institutional, temporal, or population-based—shape the scope of the investigation and ensure that the research remains focused, manageable, and academically rigorous. This section details the **delimitations** (what the study intentionally included/excluded) and **limitations** (external factors outside researcher control) that characterize this project.

Institutional Boundaries

Single-Site Research Design

This study was conducted exclusively at **King Abdullah bin Abdulaziz University Hospital (KAAUH)** in Riyadh. As such, all findings, intervention outcomes, and observations reflect the policies, workflows, and operational realities specific to this institution. While the conclusions may be informative for other hospitals, especially within Saudi Arabia and the Gulf region, direct generalization may be limited due to differences in:

Institutional size

Staff-to-patient ratios

Technological infrastructure

Organizational culture

Policy frameworks

Department-Specific Focus

The study primarily focuses on departments connected to surgical admission processes, including:

General Surgery

Orthopedic Surgery

Gynecology

ENT

Urology

Ophthalmology

Anesthesia

Bed Management

Pre-operative Assessment Units

Emergency services, intensive care units (ICUs), and outpatient departments with no surgical linkage were excluded from the scope. This focus ensures depth of analysis but limits breadth.

2. Population Boundaries

2.1 Inclusion Restrictions

The study included only **adult elective surgical patients** requiring inpatient admission. This deliberate focus excludes several patient categories:

Pediatric patients

Emergency surgery cases

Day-surgery patients

High-risk surgical patients (ASA IV–V)

Cancer surgeries requiring extended optimization

By narrowing the population, the study ensures that findings accurately reflect the subset where unnecessary LOS is most prevalent and most modifiable.

2.2 Exclusion of Emergency and Complex Cases

Emergency patients often require immediate care and unpredictable admission timelines; therefore, early admission cannot be considered “unnecessary.” Including such cases would dilute the clarity of results and introduce uncontrollable variability.

Patients requiring specialized monitoring (cardiac instability, severe comorbidities, ICU care) were also excluded because they legitimately need pre-operative hospitalization.

3. Temporal Boundaries

3.1 Specific Time Frame for Baseline and Post-Intervention Data

Data collection for this study was divided into defined periods:

Baseline Phase: covered pre-intervention data based on reports from 2023, which indicated that only 16% of surgical patients were admitted same-day while approximately 70% were admitted unnecessarily one day earlier. (KAAUH QI Charter, 2024).

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Post-Intervention Phase: reflected data after implementation of the Same-Day Admission (SDA) pathway in 2024.

The study does not examine long-term sustainability beyond the initial implementation year. Thus, the impact on future years, staff turnover influence, or policy adaptations is not assessed.

3.2 Limited Seasonal Consideration

Hospital admission patterns can fluctuate seasonally (e.g., during holidays, academic breaks, or viral outbreaks). Because the study period did not span multiple years, the findings may not capture seasonal variations in surgical demand, patient behavior, or staff availability.

4. Methodological Boundaries

4.1 Pre–Post Design Instead of Experimental Control

The study uses a non-randomized, pre–post intervention design. This design is appropriate for operational improvement studies but introduces boundaries, such as:

Lack of random assignment

Potential influence of external variables

Dependence on EMR documentation accuracy

The study focuses on **real-world improvements**, not controlled laboratory-like experimentation.

4.2 Reliance on Hospital EMR and Administrative Systems

Data accuracy depends on:

Timeliness of documentation

Completeness of entries

System errors or omissions

Although EMR systems are generally reliable, human factors may introduce limitations.

4.3 Qualitative Data Boundaries

Interviews and surveys provide rich insights but have inherent boundaries:

Limited to available staff

Staff may respond cautiously due to hierarchical culture

Perceptions may not fully reflect actual workflow issues

5. Operational Boundaries

5.1 Training and Staff Engagement Constraints

Implementation success depends heavily on:

Staff compliance

Understanding of new workflow

Interdepartmental collaboration

While training was provided, variations in staff interpretation or adherence may influence results.

Additionally, staffing shortages, shift changes, or workload pressures may have affected implementation consistency.

5.2 Dependency on Pre-Operative Testing Completeness

The SDA model assumes that:

Lab tests

Imaging

Anesthesia clearance

Medication reconciliation

...are completed prior to the day of surgery.

If outpatient testing was delayed or incomplete, patients were not eligible for same-day admission, regardless of safety criteria.

This boundary reflects a key system limitation.

6. Procedural and Policy Boundaries

6.1 Hospital-Specific Admission Policies

KAAUH policies regarding admission, anesthesia clearance, and surgical scheduling shaped what was possible within the intervention. These may differ significantly from:

Military hospitals

Private hospitals

High-volume trauma centers

International academic hospitals

Thus, results reflect a hospital-specific operational culture.

6.2 No Interference with Clinical Judgment

The SDA eligibility criteria guide admissions but **do not override physician judgment**. Surgeons and anesthesiologists may choose early admission for valid clinical reasons. This is an essential ethical and clinical boundary of the study.

7. Limitations Beyond Researcher Control

7.1 External Influences on Bed Utilization

Factors such as:

Unexpected emergencies

Surgeons' schedule changes

Staff absenteeism

National holidays

Pandemic-related fluctuations

may affect bed availability and LOS independently of SDA workflow changes.

7.2 Differences in Staff Experience

Staff knowledge and comfort level with SDA varied. Newer staff or rotating trainees may have required additional guidance, potentially influencing data consistency.

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