

**OPTIMIZING BED TURNOVER: A DISCHARGE TURNAROUND TIME STUDY
FROM NO DUES TO PHYSICAL VACANCY AT MAX SUPER SPECIALITY
HOSPITAL, VAISHALI**

Dissertation Submitted to



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Master of Business Administration (MBA)

in

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by

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Under the Supervision and Guidance of

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2025

CERTIFICATE OF ACHIEVEMENT



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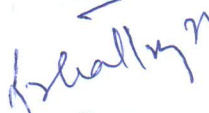
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CERTIFICATE BY FACULTY GUIDE

This is to certify that dissertation titled “Optimizing Bed Turnover: A Discharge Turnaround Time Study from No Dues to Physical Vacancy at Max Super Speciality Hospital, Vaishali” is a record of the research work undertaken by Shrey Mahajan in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

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Date: 31/05/2025

DECLARATION

I hereby declare that this dissertation titled "Optimizing Bed Turnover: A Discharge Turnaround Time Study from No Dues to Physical Vacancy at Max Super Speciality Hospital, Vaishali" is the Bonafede record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. information derived from the published or unpublished work of others has been duly acknowledged in the text.



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ABSTRACT

Efficient discharge processes play a critical role in enhancing hospital bed turnover, operational efficiency, and patient satisfaction. This study, conducted at Max Super Speciality Hospital, Vaishali, aimed to analyze the turnaround time (TAT) between *No Dues Clearance* and *Physical Vacancy of Bed*, identify reasons for discharge delays and evaluate their operational impact across patient payment categories—Cash, PSU (Public Sector Undertakings), and TPA (Third Party Administrators).

Objectives

1. To measure the time taken from No Dues clearance to the physical vacancy of the bed.
2. To compare discharge process performance among Cash, PSU, and TPA patients.
3. To identify the reasons contributing to delays after No Dues clearance.
4. To assess the implications of discharge delays on subsequent admissions and bed readiness.

Methodology

A cross-sectional observational study was carried out over three months (March-May 2024) and included approx. 900 discharged patients. Patients were categorized based on their mode of payment. Discharge turnaround times were tracked from the proposed discharge to the physical vacancy of the bed. A focused analysis was conducted on patients who completed No Dues clearance before 12:01 PM but experienced a delay exceeding 1 hour in vacating the bed. Delay reasons were recorded and categorized into process-related (correctable) and patient/clinical-related (non-correctable) types.

Key Results

- Patient distribution: 52% PSU, 25% Cash, and 23% TPA.
- All categories exceeded NABH's 3-hour discharge benchmark:
 - TPA had the highest average discharge TAT (4h 52m), followed by PSU (4h 8m) and Cash (3h 33m).
- From No Dues to Physical Vacancy:
 - March: 24% of patients vacated within 1 hour

- April: 28%
 - May: 34%
- 75% of delays were due to correctable operational issues, such as pending summaries, billing delays, and transportation wait times.
 - 25% were linked to non-correctable causes, including ongoing treatments, patient fatigue, or delays in caregiver arrival.
 - Bed reuse data showed that 56% of vacated beds were reoccupied within 2 hours. However, 7% remained unutilized for over 5 hours, indicating inefficiencies in admission planning or housekeeping response.

Conclusion

The study identified the post-no-dues phase as a critical bottleneck in the hospital discharge process. Despite some improvement in meeting the 1-hour benchmark across the months studied, the majority of discharges still experienced delays. A significant portion of these delays were operational and potentially avoidable, highlighting the need for enhanced discharge coordination, better interdepartmental communication, and timely patient readiness. Addressing these issues can lead to improved bed availability, faster patient turnover, and better adherence to hospital and NABH benchmarks.

Keywords: Discharge Turnaround Time, Hospital Efficiency, Bed Turnover, No Dues Clearance, Delay Analysis, Max Super Speciality Hospital, TPA Patients, PSU Patients, Cash Patients, Healthcare Operations.

Abbreviation: TAT – Turnaround Time ; IPD – Inpatient Department ;OPD – Outpatient Department; NABH – National Accreditation Board for Hospitals and Healthcare Providers; HIS – Hospital Information System ;CPRS – Clinical Patient Record System ; GDA – General Duty Assistant ;TPA – Third Party Administrator ;PSU – Public Sector Undertaking ;SOP – Standard Operating Procedure; DMS – Duty Medical Superintendent ;ANS – Assistant Nursing Superintendent ;ICU – Intensive Care Unit ; HDU – High Dependency Unit; CCU – Coronary Care Unit; OT – Operation Theatre; ER – Emergency Room

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Chapter 1: Organization Profile

1.1 : Max Super Speciality Hospital, Vaishali

Max Superspeciality Hospital, Vaishali is in association with Max Healthcare, a Max Group operated chain across India. The Max Group, established by Analjit Singh in 1985, is one of India's leading conglomerates, with businesses in life insurance, health care, real estate and senior living. The group has its origins in the pharmaceutical industry and has since repositioned itself over the decades to concentrate on consumer-facing industries, including health care and insurance in the early 2000s.

Max Healthcare, India's leading provider of world-class healthcare services was established in 2000 by India's leading super-speciality hospital, Max Medical Centre, Panchsheel Park. It grew over the years to be a large complex of both primary and secondary and tertiary care hospitals in Delhi NCR and other regions. Today, Max Healthcare is a leading hospital chain with a network of 22 healthcare facilities with over 5,000 beds, 30 super specialties 13 hospitals in North India and a combined strength of 5000+ clinicians that give services to more than 2 million patients each year. The network is known for its high-quality attention to patient satisfaction, clinical excellence and use of the most modern medical technology.

There have been several milestones in the evolution of Max Healthcare: 2000: Launch of the first Max Medcentre in Panchsheel Park, Delhi.

- 2000: The First Max Medcentre was established at Panchsheel Park, Delhi.
- In 2002–2006: Pitampura, Noida and launch of super speciality and tertiary care facilities.
- 2011A: Public-private partnerships led to new hospitals in Punjab, and expansion in Delhi NCR.
- 2015: Acquired and re-branded Pushpanjali Crosslay Hospital to Max Super Speciality Hospital, Vaishali.
- 2020: The company was listed at the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE).

Max Healthcare is now led by Abhay Soi, the entrepreneur who turned the company into India's second-biggest hospital chain measured by market value.

1.2 About Max Super Speciality Hospital, Vaishali

Max Super Speciality Hospital, Vaishali Max Super Speciality Hospital, Vaishali, is a part of the Max Healthcare chain of hospitals based in Ghaziabad, Uttar Pradesh. The hospital is a 350+ bedded NABH and NABL accredited, multi facility hospital offering tertiary care in medical and surgical disciplines of Cardiology, Cardiothoracic and vascular surgery, Gastroenterology and GI Surgery, Neurology and Neurosurgery, Orthopaedics and Joint Replacement etc. It has 128 intensive care beds, 16 HDU (High Dependency Unit) beds, and 14 state-of-the-art modular operation theatres for complex and multiple organ transplant surgeries. The hospital is equipped with state-of-the-art medical equipment – Cath Labs, LINAC for radiotherapy, MRI and CT machines and modern OTs with HEPA filters to keep infections at bay and providing the right care to its patients..

1.3 History and Acquisition

The hospital, which was established in 1985, used to be known as Pushpanjali Crosslay Hospital before it was acquired and rechristened by Max Healthcare in 2015. This shift amounted to a material upgrade to both infrastructure as well as service offerings, both of which were now at par with Max Healthcare's approach to clinical excellence, technology and patient care. The purchase enabled the facility to grow, modernize and integrate with one of India's preeminent healthcare networks, enabling it to serve a range of patients that included panel (corporate/government), TPA (Third Party Administrator), cash and international patients.

1.4 Specialities and Services

Max Super Speciality Hospital, Vaishali provides comprehensive care covering more than 30 specialities, such as:

<i>Department / Specialty</i>	<i>Scope of Services</i>
<i>General Surgery</i>	Surgical treatment of abdominal organs, hernias, breast, soft tissue, and trauma-related conditions.
<i>Oncology</i>	Diagnosis and treatment of cancer through chemotherapy, radiation, surgery, and bone marrow transplants.

<i>Urology</i>	Treatment of urinary tract and male reproductive system diseases; includes endoscopy, lithotripsy, etc.
<i>Pediatrics</i>	Comprehensive care for infants, children, and adolescents including immunizations and developmental care.
<i>Internal Medicine</i>	Diagnosis and nonsurgical treatment of adult illnesses; chronic disease management and preventive care.
<i>Medical Gastroenterology</i>	Diagnosis and treatment of digestive tract disorders including endoscopy, colonoscopy, and liver care.
<i>Orthopedics</i>	Management of bone, joint, and musculoskeletal disorders; trauma, joint replacements, and spine care.
<i>Obstetrics & Gynecology</i>	Women's health includes pregnancy, childbirth, infertility, and reproductive system disorders.
<i>Neurology</i>	Diagnosis and treatment of brain, spinal cord, and nerve disorders like epilepsy, stroke, and MS.
<i>Minimal Access Surgery</i>	Laparoscopic and robotic surgeries with minimal incisions for faster recovery and less pain.
<i>Nephrology</i>	Diagnosis and management of kidney diseases, dialysis, and transplant coordination.
<i>Neurosurgery</i>	Surgical treatment of brain, spinal cord, and nerve system conditions including tumours and trauma.
<i>ENT (Ear, Nose, Throat)</i>	Treatment of disorders related to the ear, nose, throat, and related structures of the head and neck.
<i>Plastic Surgery</i>	Reconstructive and cosmetic surgeries including trauma, burns, congenital defects, and aesthetic surgery.
<i>Pulmonology</i>	Diagnosis and management of lung conditions such as asthma, COPD, tuberculosis, and sleep apnea.
<i>Vascular Surgery</i>	Treatment of arterial, venous, and lymphatic system disorders including bypass and endovascular surgery.
<i>Thoracic Surgery</i>	Surgical treatment of chest organs including lungs, esophagus, and mediastinum.
<i>Metabolic and Bariatric Medicine</i>	Treatment of obesity and related metabolic disorders; includes surgical and nonsurgical options.
<i>Spine</i>	Specialized spine surgeries and treatments for deformities, injuries, or degenerative spine conditions.
<i>Liver and Biliary Sciences</i>	Management of liver diseases, bile duct disorders, and hepatobiliary surgeries.

Cardiology	Diagnosis and treatment of heart conditions such as heart failure, arrhythmia, and ischemic disease.
Hemato-Oncology & BMT	Specialized care for blood cancers and stem cell/bone marrow transplants.
Ophthalmology	Diagnosis and surgical/non-surgical treatment of eye diseases and vision disorders.

It is manned by 259 of the finest doctors and has capabilities to manage the care of over 610 patients on 24/7 basis.

1.5 Facilities and Patient Amenities

The hospital prioritizes patient comfort and convenience by providing amenities such as a 24/7 pharmacy, cafeteria, prayer room, waiting lounge, ATM, and an in-house blood bank. Its commitment to continuous improvement is evident in ongoing expansions, including plans to add approximately 140 more beds in the coming years to meet rising demand.

1.6 Mission of Max Healthcare

“To deliver quality healthcare services with compassion, integrity, and excellence. We strive to be a trusted healthcare provider, dedicated to improving the health and well-being of our patients. At the core of our values are integrity, teamwork, and innovation, ensuring that we provide the best possible care to our community.”

Vision of Max Healthcare

“To be the most well-regarded healthcare provider in India, committed to the highest standards of clinical excellence and patient care, supported by the latest technology and cutting-edge research.”

1.7 Floor Plan

Tower 1

Floor	IPD Services	OPD Services	Other Services
Seventh Floor	• Rooms 3701 to 3714 • Bone Marrow Transplant Unit • Medical ICU – 7 • Respiratory ICU	NA	NA

	Kidney Transplantation ICU		
Sixth Floor	- Rooms 3601 to 3619 - Economy Ward (3609–3612) - Medical ICU - 6	OPD - Nephrology	- Dialysis Unit 1 & 2 - Nursing Training Hall
Fifth Floor	- Rooms 3501 to 3518 & 3542 to 3549 - General Ward - Men (10 to 20) - General Ward - Women (1 to 17)	- Internal Medicine - Pulmonology - Endocrinology & Diabetes - Rheumatology - Neurology & Neurosurgery - Psychiatry & Psychology - Neuro Diagnostic Lab	Max Pharmacy
Fourth Floor	Rooms 3401 to 3427	Minimal Access, Bariatric & Robotic Surgery	- Chemo Day Care I & II - Gastro & Liver ICU
Third Floor	- Rooms 3300 to 3328 - Birthing Centre & Neonatal ICU	- Obstetrics & Gynaecology - Homeopathy - IVF & Infertility - Paediatric - Orthopaedics	International Lounge
Second Floor	- Coronary Care Unit (CCU) - Paediatric ICU - Day Care Surgical Ward - Surgical ICU - CTVS ICU	NA	- Cath Lab - Lithotripsy Procedure Room - Operation Theatre Complex - Pre & Post-Operative Ward
First Floor	- Rooms 3101 to 3133 - Neuro ICU - Day Care Surgical Ward	- Dental - Dermatology - GI Surgery - Cardiology & CTVS	IVF Lab

		• Urodynamic Suite • Ophthalmology Orthopaedics & Joint Replacement • Speech Therapy • Urology • Aesthetic & Plastic Surgery • General & Laparoscopic Surgery • Spine Surgery Thoracic Surgery	
Service Floor	• IPD Pharmacy Store	NA	• Administrative Block • Physiotherapy & Rehabilitation Conference Hall - 1 • Library • Nursing Office • Doctors' Lounge • Console Room / IT Room
Ground Floor	NA	• Preventive Health Programme	• Emergency • Blood Bank • MRI, CT, X-Ray, USG ECG, ECHO, TMT, PFT Stress ECHO, Holter • Billing & TPA Desk • ATM & Cafeteria • Report Collection Counter
Basement (-1)	NA	NA	• Car Parking • Billing • Medical Records

			• Linen Room • Gas Manifold Dept • Bio-medical Waste Room • Mortuary
Lower Basement (-2)	NA	NA	• Radiation Oncology • TomoTherapy • Nuclear Medicine & • PET-Scan • CSSD • AC Plant • Main LT Panel Room • Boiler Room

TOWER 2

Floor	IPD Services	OPD Services	Other Services
Ground Floor (GF)	NA	• Oncology Physiotherapy (Breast & Gynaecological Cancer)	• Max Pharmacy • Women Wellness Centre • Bronchoscopy / EBUS / EUS, Oral Oncology & Dental Rehab, Tobacco Cessation
First Floor	NA(Parking)	NA(Parking)	NA(Parking)
Second Floor	NA(Parking)	NA(Parking)	NA(Parking)
Third Floor	NA(Parking)	NA(Parking)	NA(Parking)
Fourth Floor	NA(Parking)	NA(Parking)	NA(Parking)
Fifth Floor	NA(Parking)	NA(Parking)	NA(Parking)

Sixth Floor (6F)	NA	• OPD: Head & Neck Cancer • OPD: Thoracic Cancer • OPD: Gastroenterology • OPD: Liver Transplant & Biliary Sciences • OPD: Haematology, Haemato-Oncology & BMT • OPD: Paediatric Cancer • OPD: Urogenital Cancer • OPD: Musculoskeletal Cancer	• Tumour Board Room • Oncology Physiotherapy (Head & Neck) • Ultrasound • Mammography • Endoscopy / ERCP
Seventh Floor (7F)	• - Bed No. 2701–2729 • General Ward (Women) • General Ward (Men) • HUD	None	None
Eighth Floor (8F)	• Bed No. 2801–2804 • VIP Suite 2805–2806 • Bed No. 2807–2826 • General Ward	NA	NA
Ninth Floor (9F)	• Post-Operative Ward • Pre-Operative Ward	NA	NA

Chapter 2: Introduction

2.1 Background

This cross-sectional study evaluated the turnover time in the discharge process at Max Super Speciality Hospital, Vaishali with a sample size of 910 patients (covering all modes of payment). The study found significant chokepoints in the discharge processes, mainly in the TPA/ insurance consenting process, with an average delay of 3-4 hours. The main findings indicated that the efficiency of bed clearance differed significantly between payment channels, cash patients were discharged faster than panel patients and TPA patients. The introduction of the bed tracking system and daily monitoring led to a compliance rate of 90% with the hospital's target of post-billing discharge within an hour. The analysis shows that with systematic monitoring, constant interdepartmental information sharing, and focused process interventions, the discharge turnaround time can be substantially reduced with a resultant increase in the hospital turnover rate and a better patient environment.

2.2 Overview

Efficient hospital discharge is an important attribute in healthcare delivery, relating to bed utilization, patient satisfaction and hospital revenues. Turnaround Time (TAT) within the healthcare environment refers to the time from a specific start point and ending point of a process. Regarding hospital discharges, the TAT is referred to as the time from the start of the discharge process to the moment when the bed is physically available again. Extended discharge TAT introduces choke points in patient flow, resulting in new admissions being held up and inevitably affecting hospital KPIs.

Discharge efficiency across varying payment streams (cash, panel/PSU, TPA/insurance and international patients) is a challenge that afflicts Max Super Speciality Hospital, Vaishali, as it does most other tertiary care hospitals. Each one has a different protocol for payment channels, which induces different complexities in the DIS workflow. The hospital has developed an objective to complete post-billing discharges within one hour, but the hospital has not consistently been meeting this objective.

The impact of this work is not only in the improvement of operational efficiency but also in the quality of care for patients. Over-extended discharges waste beds and result in patient dissatisfaction and delays of patients waiting in the emergency room and requiring

urgent admission. The discharge process is complex and can involve many health professionals and the effective use of communication systems.

The objectives of this study were to assess the discharge TAT through various payment pathways and the bottlenecks within and introduce tracking systems to rectify inefficient discharge processes. This paper by examining each stage of the discharge process, from notification to bed reallocation, yields important information to those responsible for managing the operations of a hospital.

2.3 Types of Hospital Discharges:

- **Routine discharge to home:**

This is the common and clinically expected discharge status. It happens when the clinical treating team decides that the patient is “clinically stable” (ie, recovered or stabilised functionally or symptomatically to monitor/recover in a home environment without active inpatient-level oversight). This includes providing a thorough handover with the production and explanation of a detailed discharge summary which details the hospital stay, diagnoses and procedures performed. Patients also receive clear instructions regarding new or adjusted drug treatments (e.g.; dose, frequency, side effects). Activity and dietary restrictions, wound care if relevant, and when and how to check vitals are reviewed in detail. More importantly, discharge management will transition as a continuum of care where all needed follow-up appointments with PCPs, specialists, or outpatient therapy are scheduled and established to provide post-discharge oversight and follow-up monitoring of progress to demonstrate a successful transition from acute inpatient care management to established outpatient or self-care.

- **Discharge against medical advice (DAMA), also known as leave against medical advice (LAMA):**

This discharge category results when a patient, with a capacity for decision-making or his/her LAR makes an explicit decision to leave the hospital against the wishes of the attending physician before it is medically safe or appropriate. Decisions to leave against medical advice (AMA) are commonly multifactorial, however, they usually involve extenuating personal or familial circumstances such as having pressing personal or family responsibilities at home, financial or insurance challenges, dissatisfaction with the treatment plan or perceived lack of progress, cultural or religious considerations regarding care, or frustration with the hospital environment. The discharge under this scenario

requires strenuous documentation—namely, the patient (or guardian) needs to sign to confirm understanding (“Against Medical Advice” [AMA] form). This legal definition specifically outlines health risks, risk of complications, and risk of acceleration of a health decline if a person leaves early. By signature, the patient indicates that understanding of these risks, and many times, the healthcare institution and staff, are relieved of liability in any adverse event that occurs as a result of their premature discharge.

- **Discharge to other healthcare facilities:**

Initiation of this path occurs when a patient's continuing medical, therapeutic, or custodial requirements are beyond the capabilities or provided services within the patient's current hospital. It consists of the expected transport to another centre with adequate resources for care. Trending destinations include inpatient rehabilitation facilities (with a high degree of therapy, either physical, occupational or speech), long-term acute care hospitals (LTACHs) for medically complicated care that requires a longer hospital stay, skilled nursing facilities (SNFs) for rehabilitation or custodial care, dedicated psychiatric hospitals or units for more intense mental health care, and hospice facilities for comfort care at the end-of-life. Performing this transition entails collaboration between the discharging hospital's clinical team (MD, RN, case manager, social worker) and the receiving site. In this manner, the continuum of care becomes seamless including the secure conveyance of complete health records, summaries of treatment, lists of medications, and specific care plans with the added possibility of being facilitated by specialized patient transfer services.

- **Discharge on request:**

This is unlike discharge which is initiated by the patient or their family to have the patient leave the hospital, even though discharge might not be recommended by the medical team. While conceptually somewhat similar to DAMA, a discharge on request may still go forward with some degree of agreement or facilitation from the medical team (as the magnitude of each of these factors is potentially small), especially if the risks of discharge are relatively low (or the reasons for transfer are good), and if it's relatively straightforward to transfer (logistically speaking). These can just be a strong preference for ongoing care at a different, frequently preferred or closer-to-home hospital, severe financial pressures or dissatisfaction prompting a switch in provider. Unlike a strict DAMA scenario, this discharge often does not take providers by surprise and may involve active facilitation of care at the next hospital that may include scheduling acceptance and

follow-up, transfer of pertinent records, interim medications, and amelioration of risk, despite the suboptimal timing based on strict clinical considerations.

- **Mortality discharge:**

This categorization then applies in the tragic event that a patient dies while in the hospital. It prompts a specific, lawfully backed protective, moral, and administrative chain of responses quite separate from those in the discharges of living patients. Key actions are an official death declaration (by a licensed healthcare worker), documentation of the death (cause and mode of death) as required by law, and sensitive notification of the next of kin. The hospital has to treat the dead in a respectful and dignified manner, following institutional protocols and local laws. This includes the protection of the body and safe transfer of the body from the place of death to the funeral home. The family of the deceased may be provided with other types of grief support.

- **Daycare or day surgery discharge:**

This category relates to elective surgery, diagnostic procedures, or other treatments intended for those patients who are admitted to the hospital with a planned process of care which is to be completed within, and because it is not expected to require a stay overnight. It's all done on the same day – from same-day admission to pre-operative preparation and the surgery to recovery from the anaesthesia and discharge. After the intervention, and a monitored observation period depending on stable vital signs, sufficient pain control, and the absence of any immediate complications, patients are sent home. Includes comprehensive written and verbal post-operative instructions surrounding items of importance related to wound care, pain medication usage, activity limitations outside of the home including driving and lifting precautions, dietary considerations, identification of signs and symptoms that require attention to detail and medical illness requiring medical assessment and information about the timing of their follow-up appointment with the surgeon or respective primary-care provider.

2.4 Discharge Delays:

Delayed transfer has always been one of the most stubborn problems in today's hospitals, especially at the level of tertiary care hospitals with high bed occupancy. It has a direct impact on the availability of hospital beds, leads to longer patient waiting times for admission, and disrupts the effectiveness of the system. It can lead to frustration and less than positive experiences for patients and their families.” When discharge is slow, patients

and their relatives become unhappy which can result in damage to the hospital's reputation and perception of care.

The hospital discharge process is a multifaceted activity which requires cooperation across departments like billing, pharmacy, nursing, TPA, medical documentation, and others. Delays and inefficiencies at each or any part of this chain can cause considerable delays in the length of stay of the patient once a clinical decision for discharge has been reached. Accordingly, discharge should be as efficient as possible, not only from the point of view of the clinical services but also from the operational and QA ones.

This study aims to evaluate and explore time lag in key components of the discharge process at Max Super Specialty Hospital, Vaishali. The study focuses on turnaround time (TAT) starting from closed bed intimation to the final exit of the patient to determine some of the bottlenecks and department-wise delays. The pharmacy, billing, TPA desk (for insured patients), nursing and discharge summary preparation unit are monitored by the concerned departments.

This study is aimed at both cash-paying and insured patients who were inpatient department (IPD). Dead cases, LAMA/DAMA and OPD patients will not be included to keep the data uniform. The focus of the analysis is the identification of major causes of discharge delays and a set of actionable recommendations to improve discharge processes, patient satisfaction with the discharge process, and bed turn-over rates.

In a hospital, discharge is the formal process seen in an institution, where someone is released from an inpatient visit and returned to the referring facility or community. The discharge process is a decision of the treating consultant and results in a series of administrative and clinical activities ie intimation to the ward secretary, clearance by the pharmacy and billing sections, writing of a discharge summary, and finalizing the payments. It is not until these procedures are completed that we allow our patients to leave the hospital grounds.

As discharge efficiency is an important quality of care indicator for healthcare accreditation organizations, such as the NABH (National Accreditation Board for Hospitals & Healthcare Providers), this study also compares our D-TAT with the NABH standards and detects performance gaps and processes in need of improvement.

2.5 Turnaround Time (TAT) in the Discharge Process

Turnaround Time (TAT) of hospital discharge is defined as the time from the time of initiation of the discharge process by the treating physician to the physical vacation of the hospital bed by the patient. This period comprises several tasks - notification of discharge time, discharge summary preparation, nursing and pharmacy clearance, financial settlement and patient handover. Responsive TAT is of paramount importance as delayed discharge time results in bed blockages, delays in new admissions, hospitalization costs, and unsatisfactory in-patient experiences.

It has been demonstrated that several bottlenecks often lead to high charge-discharge processes in several hours. Late start of discharge planning, long preparation and approval of discharge summary, slow billing and financial clearance time and insurance/TPA approval as well as logistic factors contribute to delays. For instance, in studies conducted in tertiary care hospitals, the mean discharge times varied from 3 to 7 hours; the time was shown to be mainly related to the time-consuming process of compiling a discharge summary (DS).

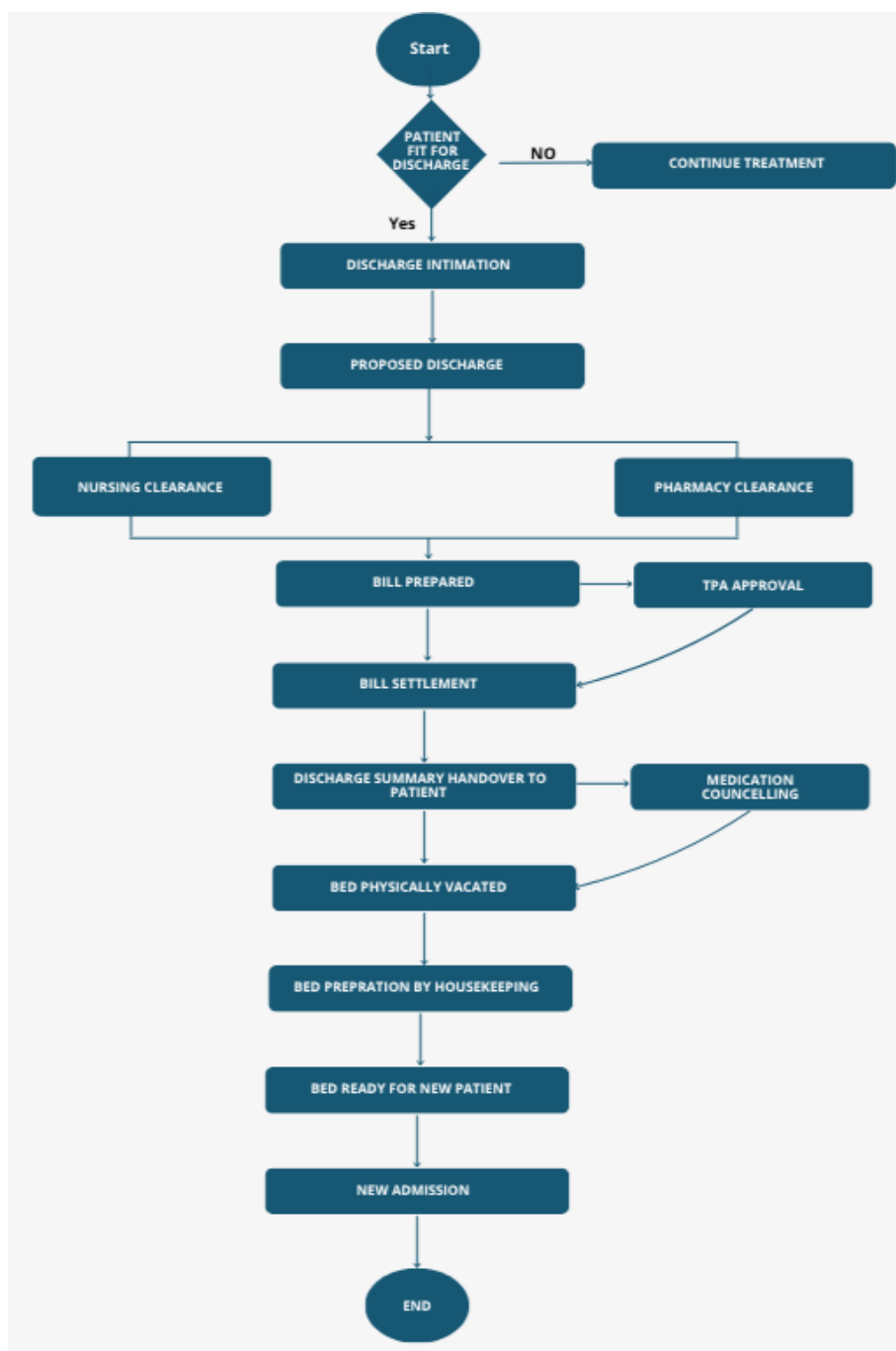
The delays in discharge not only result in reduced emergency bed capacity, but also send their patients at risk of nosocomial infections due to prolonged hospitalizations, and cause congestion in their emergency and admission wards. Thus, precise determination of TAT and pinpointing the specific root causes of delay are important to improve the efficiency of discharge processes. Reduced TAT and improved overall hospital efficiency can be achieved through early discharge planning, multidisciplinary coordination, and tracking of real-time discharge steps by hospitals.

2.6 NABH Discharge Turn around Time (TAT) Guidelines

The National Accreditation Board for Hospitals and Healthcare Providers (NABH) has considered 3 hours(maximum) time taken in the discharge of the in-patients: The general in-patients, the patients which are related to the maternity and the surgery cases time frame has to be 3 hours. There are no strict time frames set out by NABH, however, the consensus is:

- Discharge Summary from 0-1, Burn: 30 minutes
- Return of Left Over Medications to Pharmacy: (30 min)
- Preparation of final charge bill: 30 minutes
- Clearing Bills and Departments: 60 minutes

Hospitals are required to document their discharge procedures and follow trail through internally auditing and corrective actions. All delays more than the 180 min cut-off should be analyzed and corrected under NABH's Quality Indicator programs.



Fig(1)- flowchart of the IPD discharge process

2.7 Significance of the Study:

Amidst a rapidly changing urban health setting in India, delayed discharges are now widely regarded as a significant problem adversely affecting hospital operating efficiency, patient satisfaction and clinical processes. Poor department intercommunication, missing protocols, late billing errors, and delayed TPA approval are common things that create unnecessary patient wait times, even after the decision for discharge has been made.

This study is important as it seeks to measure delays in discharge based on hospital data in real-time and case tracking in reality. Unlike such hypothetical models or data post-analysis, this analysis is based on measuring actual practice. By isolating the time-costly tasks, the besieging challenge and the bad actors, the research offers a data-driven account of how hospital discharge processes can be improved.

The results of this study may be of particular importance to hospital administrators, quality assurance groups and operations managers, as pragmatic strategies to enhance staff collaboration and minimize discharge-related delays are proposed. We believe we have adequately illustrated the discharge processes, which will be of use in determining the causes of delayed discharge in India.

Finally, the work provides a way to achieve cost-effective and quality-driven health care in the hospital setting – for example, bed occupancy rate, ALOS, and patient flow, which are among the most important performance metrics in the hospital. A smooth discharge not only increases operational efficiency but also builds trust from the patient's perspective and their satisfaction, reinforcing the brand and imagery of a hospital as a provider of quality care.

2.8 Research Problem

Discharge from Max Super Speciality Hospital, Vaishali is quite time-consuming particularly in the case of patients who are under TPA, panel and international payment vigil. These delays are often attributed to several administrative bottlenecks such as delays in the preparation of discharge summary, delays in billing and clearance and delays in insurance or panel approvals. These inefficiencies delay the admission of new patients and promote new hospital-acquired conditions that delay discharge from the hospital, increase length of stay, as well patient dissatisfaction and economic strain on the hospital.

Although the hospital has established manual procedures of monitoring and review, there has been insufficient quantitative analysis to systematically track and quantitate potentials underlying general information which contributes to the discharge delay of different types of patients. Workflows for cash, panel, TPA & international patients are complex and varied which makes it hard to standardize changes.

This study focuses on the crucial issue of identification and analysis of turnaround time bottlenecks in the discharge of patients for different categories of patients at Max Super Speciality Hospital, Vaishali. The study targets information that will help identify interventions and approaches that can optimize the discharge process to minimize delays and increase bed efficiency.

2.9 Aim

The objective of this study is to maximize the survey time (TAT) of cash, panel and TPA patient discharges at Max Super Speciality Hospital, Vaishali. Precisely, the paper aims to estimate the TAT from no dues settlement to the physical vacation of bed by the patient. It also aims to assess and analyze the reasons for any delay during this phase in a structured manner, which finally should lead to time-saving, waiting time reduction and optimization of computer bed usage and patient comfort.

Supporting Context:

Studies have reported that lags in discharge due to billing, insurance approval, and interdepartmental communication are common and can be resolved through the use of early discharge planning, computerized documentation, and standard protocols. Focus on the choke point between financial clearance and bed vacancy, probe the reasons for the delay and you could come out with practical solutions for faster and cleaner discharge.

2.10 Objectives

1. To analyze the distribution of discharged patients across payment categories—Cash, PSU, and TPA.
2. To evaluate and compare the turnaround time (TAT) from proposed discharge to physical vacancy across different payment categories against hospital and NABH benchmarks.
3. To identify and classify the reasons for delays in the discharge process after No Dues Clearance into correctable and non-correctable causes.

4. To assess monthly trends in discharge efficiency from No Dues Clearance to physical vacancy over three months.
5. To measure the efficiency of bed turnover by calculating the time from physical vacancy to new patient admission.

Chapter 3: Literature Review

Authors	Study Location	Sampling Techniques	Key Findings
Shirish Rao, Ankit Kumar, Niraj Pandit, Nidhi Jain, Kartik Khatri, Minnie Bodhanwala, Sumitra Venkatesh (2023)	Seth G.S. Medical College & K.E.M. Hospital, Mumbai, India	Passive observation, time-motion audit	This study of time-motion was performed in a large tertiary referral centre assessing discharges from general and private wards. Average discharge time was 153.18 ± 34.60 minutes in general ward and 165.41 ± 62.29 minutes in private ward. Private wards, in particular, experienced significantly more delays (43%) than general wards (28%). The biggest time-taker were discharge sheets and billing, both of which frequently required multiple levels of verification and signing. The lack of standardized protocols, poor communication between nursing and billing, and a general practice of starting discharge summary preparation too late were also observed to be common. The study proposed multidisciplinary discharge teams, advanced preparation of discharge summaries and enhanced documentation. Furthermore, the authors recommended the routine training of staff and the use of digital techniques for tracking in real time, which could even lower the turnaround time. Our findings demonstrate, that process efficiency can differ between wards within the same hospital so that targeted interventions adjusted by specific ward types are required.

Dr. Bharat Patil, Chaitanya Kasar (2025)	HCG Manavata Hospital, India	Retrospective analysis, process mapping	The present study aimed to evaluate the TAT for corporate and insurance patients at a multidisciplinary hospital. Here, it was found that discharge process was much longer for insurance/ corporate patients as compared with cash patients and was significantly delayed mainly on billing, documentation and insurance clearance grounds. The research mapped the complete process of discharge and identified bottlenecks (e.g. delays in starting paperwork, poor communication across clinical and administrative workforces, step-by-step rather than concurrent steps of the discharge process). To overcome these difficulties, the hospital introduced specific measures, such as advance notice to the billing and insurance divisions, discharge documents handled simultaneously, and weekly meetings with all involved. Those interventions resulted in a demonstrable decrease in TAT, better patient satisfaction and higher bed turn velocity. The authors concluded that ongoing monitoring, process-mapping and stakeholder engagement are key in maintaining improvements in discharge efficiency, particularly in a population where a high proportion are insured or corporate clients.
Saurabh Sharma, Ravi Pratap Singh, Archita Kansal Tiwari, Pawan Parashar (2024)	Tertiary Care Hospital, India	Direct observation	Time-motion The research conducted extensive time-motion analysis of discharge process and found that mean time for patient discharge was 218 min (3 h 38 min). This study found the main causes of delay were discharge summary & file clearance delays in various departments (in case of multiple signing was necessary). In addition, the study emphasized that junior residents and nurses were generally poorly trained in discharging documentation, leading to errors and delays. Recommendations incorporated briefing summaries in the lead-up to discharge, training mental health staff and employees at the facility on the discharge process, and organizing formal liaison meetings to help with communication failures. The study stressed the necessity of taking a proactive approach and implementing a multidisciplinary team and noted that participation of all necessary services can minimize workload and facilitate discharge. The results highlight the importance of a clinical pathway and real-time monitoring to reduce inefficiencies in the discharge process.

Mr. Raj Kumar Sharma, Dr. Nipul Kapadia, Mr. Sachin Raval, Mr. Sanket Shah, Mr. Amit Patel	Apollo Hospital International Ltd Ahemdabad Gujarat	Daily data collection, feedback	Perfomed an in-depth analysis of discharge TAT at a tertiary care centre. The longest TAT (from discharge intimation to handover of patient) reported was 8 hours, and the median TAT was 5 hours from the time of intimation for the room to ready for next patient. The bottlenecks were found in the processes of billing and patient settlement with long delays. The research underscored the need for establishing clear objectives for each stage of the discharge pathway, better integration between clinical, care and administrative staff members, and for including patient feedback in order to identify problems. A protocol driven discharge format along-with periodic review systems would decrease TAT and improve patient satisfaction, the authors recommended. They also recommended the implementation of digital technology for monitoring and tracking all the steps of discharge in real-time..
Pratiksha Suresh Chaudhari, Vitthal Shindeb and Vandana Gudhe	Acharya Vinoba Bhave Rural Hospital (AVBRH), Wardha, Maharashtra	Structured observation, staff feedback	This observational study conducted in AVBRH was retrospective and intended to identify reasons for time delay and suggest how discharge in inpatients should be improved. Data were obtained using structured observation and staff interviews. The average time interval between the time point of discharge orders were written was 4.93 hours. The billing clearance was the most lengthy process, and the discharge summary was the second longest. Feedback from staff showed that lack of staff, incomplete documentation and lack of patient counseling were contributing factors to delays. Administrative and leadership voids and lack of effect handover within departments also extended the process. The authors suggested that increasing staff numbers during peak discharge times, preparing discharges on the ward, and providing better patient education about the discharge process could help with this. Improved collaboration and communication between clinical and administrative staff and the implementation of digital systems to monitor discharge progress in real time were also recommended. These interventions significantly increased patient satisfaction, optimized bed management, and reduced the overall discharge TAT, all while having a positive impact on the patients and hospital functions.

Jatin Kumar (2022)	Tertiary Care Hospital, India	Pareto analysis, descriptive statistics, process mapping	The present study examined delays in the discharge process among cash and insured patients after being diagnosed and advised by the treating physician to leave the hospital. Cash patient discharges took on average 3 hours 57 minutes, and insurance patient discharges took 5 hours 9 minutes, both longer than the hospital's own benchmarks. The study employed a Pareto analysis to identify the most important factor of delay and found that most of the time was spent waiting for billing, which in turn depended on several inefficiencies in the laboratory, pharmacy, and radiology turnarounds. Completion of the discharge summary was another key choking point. The authors also identified systemic problems including poor multitasking, poor communication between departments, poor operation of the hospital information system, and over loading of staff. Suggested solutions were through decreased ancillary times (clearance), better hospital information system processing and distribution of work more efficiently. They concluded that focused process improvements at each stage using data-based prioritization will lead to significantly shorter discharge TAT and result in both enhanced patient satisfaction and hospital performance.
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Chapter 4: Methodology

4.1 Study Design

Methods This cross-sectional study was conducted to study the discharge process turnaround time at Max Super Specialty Hospital, Vaishali. The cross-sectional method was used, which, given the ability to simultaneously assess predictor variables and outcomes at a single point in time, is appropriate when there is no need to assess subjects repeatedly over time. This approach enabled an end-to-end analysis of the inpatient discharge process, which helped in detecting the choking points and in understanding the variance of process efficiency among the payment channels and discharge types.

The study has concentrated on monitoring time stamps of the discharge process of patients discharged in public, semi-private and private wards. The information was obtained with the help of real-time system tracing, accessing the hospital information system (HIS), and observation during clinical wards' routine rounds.

4.2 Setting and Participants

The study was carried out at Max Super Speciality Hospital, Vaishali, a tertiary care centre with a range of health care options. The hospital is a multi-speciality hospital and the inpatient department admission is done in cash, panel/PSU, TPA/insurance patients. The study population comprised all patients whose bills were settled (No dues time) before 12:01 PM, during the internship period, resulting in a sample of 900+ patients.

4.3 Exclusion Criteria

The following categories of patients will be excluded from the study to ensure uniformity and accuracy in measuring the discharge process turnaround time:

- 1. LAMA (Left Against Medical Advice) Patients**
- 2. DAMA (Discharge Against Medical Advice) Patients**
- 3. Readmission Cases**
- 4. No Dues Time After 12:01 PM**
- 5. Mortality Discharges**
- 6. OPD (Outpatient Department) Patients**

4.4 Data Collection Process

Data were recorded using a structured tracking tool designed specifically for this study. An Excel-template was devised to list standardized time-stamps regarding key steps related to discharge. For each patient discharge the following variables were collected:

1. Bed number
 2. Payment channel (Cash, Panel/PSU, TPA/Insurance, International)
 3. Discharge intimation time
 4. Proposed discharge time
 5. Nursing clearance time
 6. Pharmacy clearance time
 7. Bill preparation time
 8. TPA approval time (for applicable cases)
 9. Bill settlement time
 10. No dues time
 11. Discharge summary handover time
 12. Physical vacant time
 13. Housekeeping start and completion times
 14. New admission time
- Variables 1 to 9 and 11 were noted directly from Max Hospital Vaishali's live tracker.
 - No dues time (variable 10) was retrieved from the Hospital Information System (HIS) of Max Hospital.
 - Variables 12 to 14 were obtained through floor rounds conducted at 12:30 PM, 1:30 PM, and 3:00 PM, during which the researcher recorded the relevant timings manually.

Data collection was performed through a combination of direct observation and system-based record review during the researcher's internship period. Excel tracker in real time

was maintained, documenting each timestamp as the process milestones occurred. This methodology relies on live data capture and observational studies for workflow evaluation.

4.5 Process Mapping

Before TAT analysis, a detailed process mapping of all the payment channels was undertaken to map the standard process steps and variations. The unique pathways from the process maps were as follows:

Discharge Process Flow-

1. Discharge Intimation

- **Description:** The treating consultant provides verbal or electronic confirmation of the patient's fitness for discharge.
- **Initiated by:** Treating Consultant
- **Mode:** Manual intimation
- **Importance:** Marks the formal beginning of the discharge process and triggers subsequent clearance activities.

2. Proposed Discharge

- **Description:** The consultant enters the **proposed date and time of discharge** in the system.
- **Initiated by:** Treating Consultant or Medical Officer
- **Purpose:** Helps various departments (nursing, pharmacy, billing, TPA) to plan and initiate clearances in advance to avoid delays.

3. Nursing Clearance

- **Description:** Nurses complete final clinical documentation, return unused medications, remove IV lines, and confirm patient stability.
- **Initiated by:** Assigned Ward Nurse
- **Checklist Includes:**
 - Final vitals recorded
 - Nursing notes updated

4. Pharmacy Clearance

- **Description:** Return of unused medications and supplies to the inpatient pharmacy.
- **Initiated by:** Ward Nurse and pharmacy Personnel
- **System Update:** Inventory is updated, and unused items are credited back in the patient's bill.

5. Bill Prepared

- **Description:** Consolidated billing prepared by the billing department, including:
 - Consultation charges
 - Pharmacy
 - Diagnostics
 - Room rent
- **Initiated by:** Billing Executive
- **System:** HIS auto-populates line items; manual validation done.

6. TPA Approval (if insured)

- **Description:** The final bill is submitted to the Third-Party Administrator (TPA) for approval.
- **Initiated by:** TPA Desk Executive
- **Time-sensitive:** May take 1–4 hours depending on insurer responsiveness.
- **Includes:** Final discharge summary and billing details

7. Bill Settled

- **Description:** After TPA approval (for insured) or direct payment (self-paying), the bill is settled by the patient's family.
- **Mode of Payment:** Cash/Card/Online
- **Initiated by:** Patient Attendant at Billing Counter

8. Discharge Date/Time (No Dues Time)

- **Description:** Final clearance time after bill settlement, known as “No Dues Time.”
- **Recorded in HIS.**
- **Used as a marker** for starting room turnover activities.

9. Discharge Summary

- **Description:** Document summarizing diagnosis, treatment given, medications, and follow-up instructions.
- **Prepared by:** Consultant/Medical Officer
- **Verified by:** Patient or Attendant
- **Issued before:** Physical exit of patient

10. Physical Vacant Time

- **Description:** Actual time when the patient vacates the bed/room physically.
- **Marked by:** Ward Nurse/Housekeeping
- **Difference between:** No Dues Time and Physical Vacant Time helps measure patient delay in exit.

11. Bed Under Housekeeping

- **Description:** Bed is marked for cleaning and disinfection after physical vacancy.
- **Initiated by:** Ward Nurse in HIS
- **Housekeeping TAT:** Usually 30–60 minutes

12. Bed Ready Time

- **Description:** The time when the bed is ready to accommodate a new patient post-cleaning.
- **Marked by:** Housekeeping Supervisor in HIS
- **System Update:** Room status changed to "Available"

13. New Admission

- **Description:** The bed is allocated to the next incoming patient.

- **Initiated by:** Admission Desk
- **Depends on:** Bed bed-ready status and Admission Queue

4.6 Data Analysis Plan

Data was compiled in Microsoft Excel. Data was noted daily at various times and data was compiled and analysed using Microsoft Excel.

4.7 Ethical Considerations

All data was handled with strict adherence to privacy, confidentiality, and data security protocols.

4.8 Quality Improvement Intervention

Based on preliminary findings, a quality improvement intervention was implemented. This included:

- Excel tracking sheet sharing on a daily basis to ANS & DMS.
- Weekly meetings every Monday to review non-compliant cases and identify root causes
- Targeted interventions to rectify identified bottlenecks
- Ongoing monitoring and feedback to relevant services

Chapter 5: Results And Discussion

5.1 Distribution of Patients by Payment Category

A total of **approx. 900 patients** were included in the study, categorized based on the mode of payment: CASH, PSU, and TPA. The frequency distribution is-

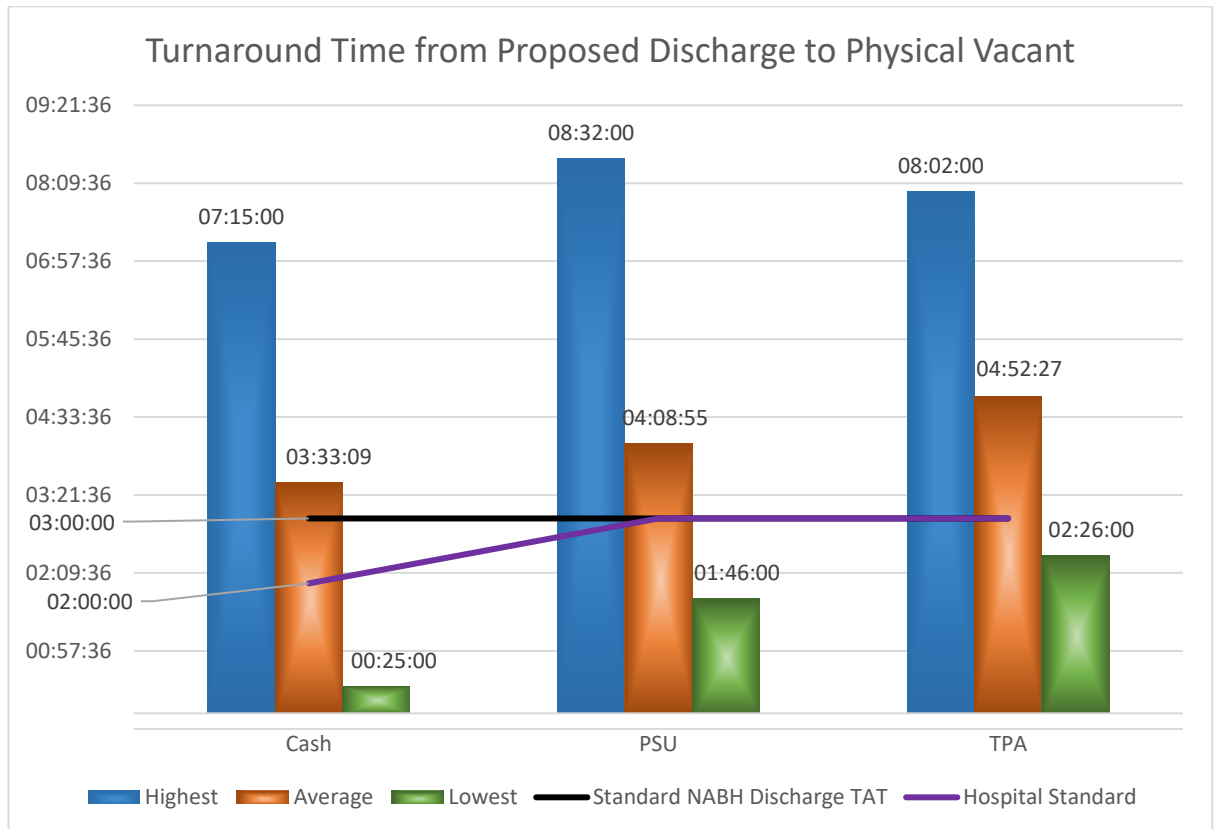
- **CASH:** 219 patients (25%)
- **PSU:** 466 patients (52%)
- **TPA:** 208 patients (23%)

Observations:

- **PSU patients** form the **largest group**, accounting for over half of the total discharges. This indicates that streamlining the discharge process for PSU patients could have the most significant overall operational impact.
- **Cash patients**, despite being second in number, are crucial as they are expected to be discharged within 2 hours according to internal hospital standards. However, previous findings show that they often exceed this target.
- **TPA patients** form the **smallest group** but tend to have the **longest average discharge TAT**, primarily due to the involvement of third-party approval processes.

5.2 Turnaround Time from Proposed Discharge to Physical Vacant

Proposed Discharge -Physical vacant time			
Column1	Cash	PSU	TPA
Highest	07:15:00	08:32:00	08:02:00
Average	03:33:09	04:08:55	04:52:27
Lowest	00:25:00	01:46:00	02:26:00
Standard NABH Discharge TAT	03:00:00	03:00:00	03:00:00
Hospital Standard	02:00:00	03:00:00	03:00:00



This graph illustrates the time elapsed between when a discharge is proposed and when the patient physically vacates the bed, segmented by payment category: Cash, PSU (Public Sector Undertakings), and TPA (Third Party Administrators). The benchmark standards used for comparison include:

NABH Standard: 3 hours

Hospital Internal Target: 2 hours for Cash, 3 hours for PSU and TPA

The data includes maximum, average, and minimum times recorded for each group, providing a nuanced view of discharge efficiency.

1. Cash Patients

- Maximum TAT: 7 hours 15 minutes
- Average TAT: 3 hours 33 minutes 9 seconds
- Minimum TAT: 25 minutes

The average time taken for Cash patients to vacate the bed exceeds both the hospital's internal standard (2 hours) and the NABH benchmark (3 hours). While the minimum TAT of 25 minutes shows that timely discharge is possible under optimal conditions, the overall average suggests inconsistency in adherence to discharge protocols. Factors like

last-minute billing adjustments or uncoordinated transportation may be contributing to this delay.

2. PSU Patients

- Maximum TAT: 8 hours 32 minutes
- Average TAT: 4 hours 8 minutes 55 seconds
- Minimum TAT: 1 hour 46 minutes

Patients under PSU reimbursement schemes demonstrated a significantly higher average TAT. Although the minimum TAT (1h 46m) falls within the acceptable hospital benchmark, the average TAT exceeds both the 3-hour NABH and hospital standard, highlighting systemic delays. These may stem from additional time required for government-related clearance processes, departmental approvals, and patient-side coordination.

3. TPA Patients

- Maximum TAT: 8 hours 2 minutes
- Average TAT: 4 hours 52 minutes 27 seconds
- Minimum TAT: 2 hours 26 minutes

The TPA category shows the poorest performance across all groups. Not only does the average TAT exceed all set benchmarks, but even the minimum recorded TAT (2h 26m) fails to meet the hospital's internal target. This points toward systemic delays due to third-party involvement, such as delays in final approvals from insurance companies, patient-side coordination, and administrative clearance from TPAs. These external dependencies make TPA discharges significantly more time-consuming.

Observations

- Cash discharges show better performance relative to PSU and TPA, but still fail to meet the ideal 2-hour hospital target.
- PSU and TPA patients consistently exceed acceptable thresholds, indicating greater administrative complexity and dependence on external validation or paperwork.
- The highest average delays were observed in TPA patients, making them the most critical group for intervention and process redesign.
- All three categories breached the NABH benchmark of 3 hours, highlighting a systemic challenge in discharge planning and execution.

- The analysis underscores that none of the patient categories consistently meet either the NABH or hospital-specific discharge TAT benchmarks. Cash patients fare better, but variability still exists. PSU and TPA groups experience notable administrative lags, often driven by external documentation and coordination bottlenecks.
- These insights suggest an urgent need for Interventions.

5.3 Observation and Delay Focus

It was observed during the study that, while most steps in the discharge process were completed promptly, the primary delay consistently occurred after the No Dues clearance stage, extending up to the point when the patient physically vacated the bed. Despite satisfactory performance in earlier steps such as discharge intimation, billing, and summary handover, this final segment of the process emerged as a critical bottleneck affecting bed turnover efficiency.

To further investigate this delay, a focused analysis was carried out on patients whose Dues clearance was completed before 12:01 PM. These cases were specifically tracked to monitor the time taken for physical vacancy following administrative clearance. The objective was to determine why delays persisted despite early completion of formalities and to record the specific reasons for the lag. This enabled a more targeted understanding of non-administrative or behavioural factors contributing to inefficiencies in the final discharge phase.

5.4 Delay Analysis for TAT > 1 Hour: No Dues Clearance to Physical Vacancy

Following the monthly trend analysis of discharge turnaround time (TAT) from No Dues Clearance to Physical Vacancy, a deeper investigation was undertaken to identify the underlying causes of delays in cases where the TAT exceeded the hospital's standard of 1 hour.

Each delayed discharge was categorized into two primary groups:

- **Correctable Delays** – Delays arising from operational or process-level inefficiencies, potentially addressable through targeted interventions.
- **Non-Correctable Delays** – Delays stemming from patient-related or clinical conditions that fall outside the scope of administrative control.

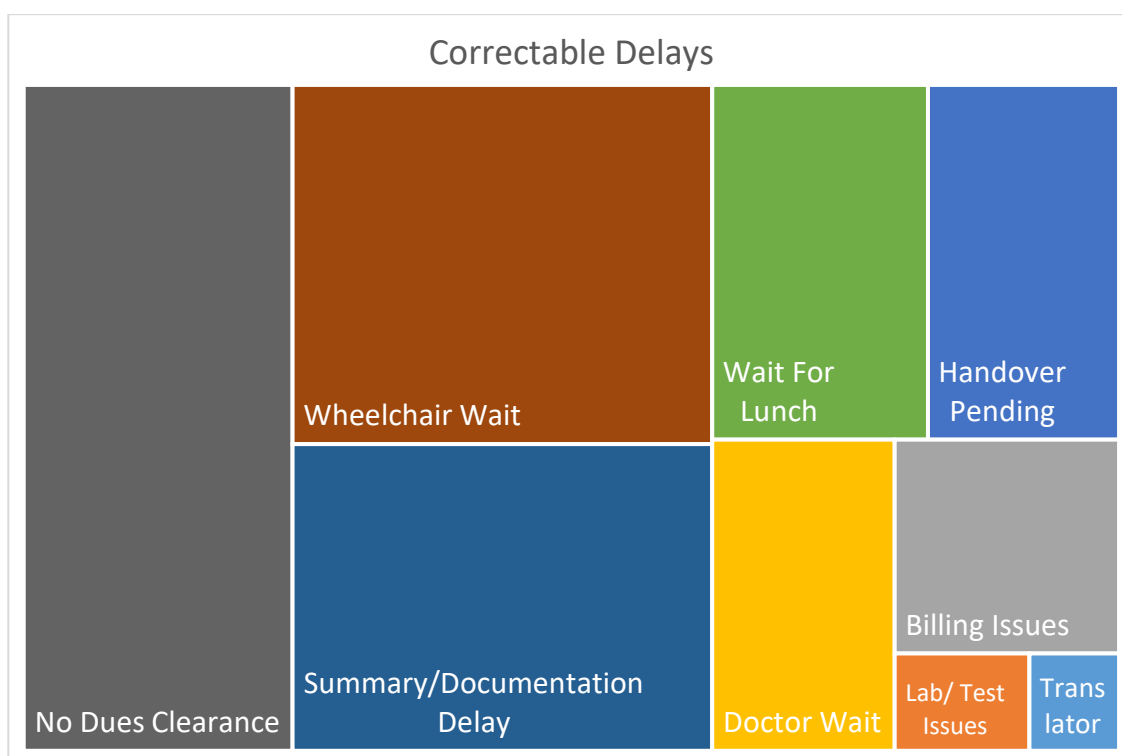
Key Findings

- 75% of all delays were correctable, pointing to considerable scope for systemic improvements.
- The remaining 25% were classified as non-correctable, highlighting the influence of clinical and patient-driven factors on discharge timing.

Correctable Delays (n = 334 | 75% of Total Delayed Cases)

Reason	Frequency	% of Correctable Delays
Translator	4	1%
Lab/ Test Issues	6	2%
Billing Issues	22	7%
Doctor Wait	26	8%
Handover Pending	31	9%
Wait For Lunch	35	10%
Summary/Documentation Delay	59	18%
Wheelchair Wait	69	21%
No Dues Clearance	82	25%

These delays are predominantly attributed to workflow inefficiencies and suboptimal coordination between departments. The most frequently occurring issues include:

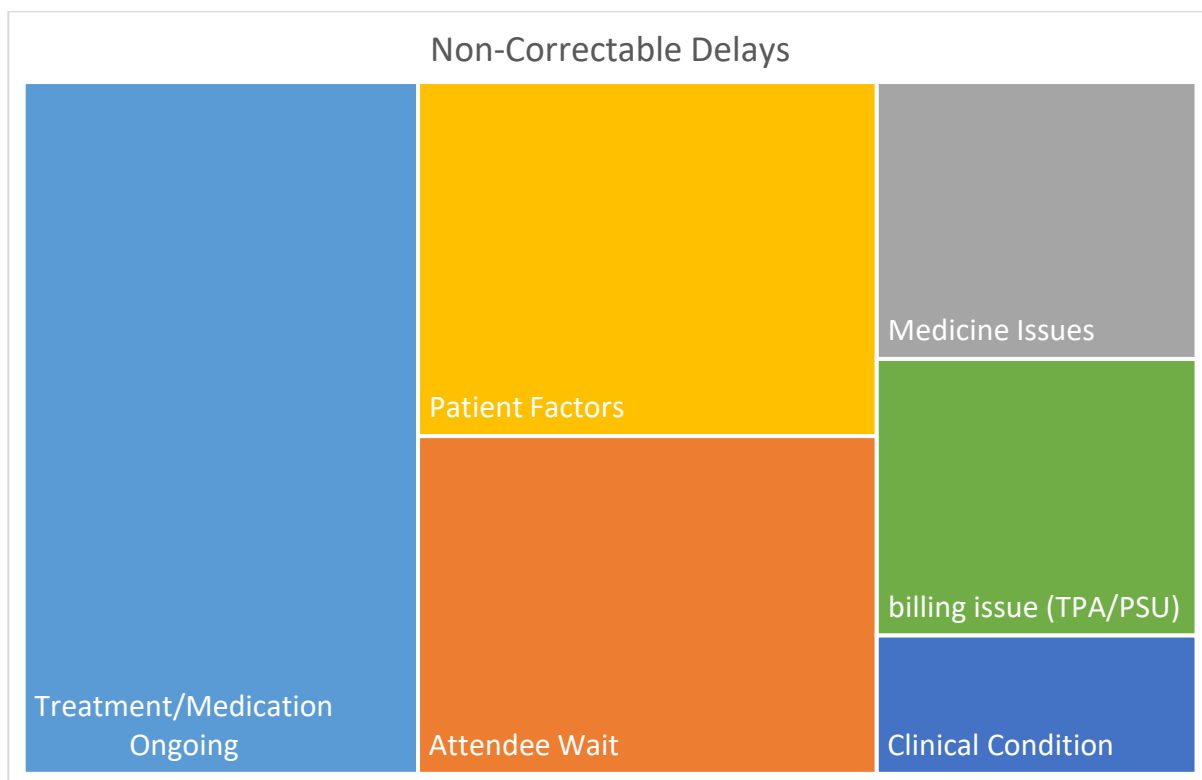


The top three causes No Dues Clearance (25%), Wheelchair Wait (21%), and Summary Delays (18%) account for nearly two-thirds of all correctable delays. These are primarily administrative or logistical, highlighting the need for tighter discharge coordination and communication among staff, billing, and transport teams.

Non-Correctable Delays (n = 110 | 25% of Total Delayed Cases)

Reason	Frequency	% of Non-Correctable Delays
Treatment/Medication Ongoing	37	34%
Attendee Wait	21	19%
Medicine Issues	12	11%
Patient Factors	22	20%
Clinical Condition	6	5%
billing issue (TPA/PSU)	12	11%

These cases were affected by patient-specific, clinical, or external factors, limiting the hospital's ability to influence turnaround time.



Ongoing treatments (34%) and patient-driven delays (20%), such as hesitation or exhaustion, were the most frequent non-correctable causes. Additionally, attendee wait times (19%) indicate the need for better discharge time communication with caregivers.

The analysis demonstrates that three out of every four delayed discharges are operationally correctable. These delays primarily arise after No Dues Clearance despite this milestone signifying administrative readiness for patient exit. This reflects a gap between administrative and actual physical discharge, caused by transport delays, pending summaries, or coordination issues.

5.5 Measures Taken for Improvement

To address the identified operational bottlenecks during the discharge process at Max Super Speciality Hospital, Vaishali mainly following the No Dues Clearance stage the specific interventions were introduced. These were taken to combat the commonest and avoidable causes of discharge delay and to improve TAT from NDC (No Dues Clearance) up to Physical Vacating of the bed.

1. Optimizing Wheelchair Availability and Accessibility

- According to studies, in the upper floor inpatient departments (IPDs), the most common causes of delay were the absence or late arrival of the wheelchair. To address this issue:
- It was suggested to decentralize the transport system by placing 2–3 wheelchairs on every floor of IPD.
- Knowing the floor plan of Tower 1 and Tower 2, representatives strategically placed a secondary place to transfer, on the 5th floor, which aligns with the 7th floor of Tower 2.
- At least 5–6 wheelchairs were permanently available on the fifth floor; thereby saving time for mobilizing patients after clearance.
- This intervention also significantly reduced transport times and facilitated patient flow with discharge.

2. Proactive Clearance Coordination and Discharge Counselling

- Delays on account of clarity in the discharge process and clearances pending - including no dues and billing - were also noticed. To improve this:
- Patients predicted to be discharged in the morning were notified by the system.
- Floor-wise these patients were identified and all cash, PSU, and TPA patients were counselled for discharge telling them what needs to be done and at what span of time.

- For cash patients, the relevant nursing stations were informed proactively when the bill status in the HIS was changed to 'Bill Ready'. Nurses were advised to notify patients or their attendants to move to final settlement, at the earliest.
- Attempts to reduce delays resulting from patients' lack of understanding of what was required of them included the clear and consistent articulation of what was asked of a patient and, when necessary, escorting them to the billing desk to avoid delayed wayfinding.
- This process increased patient understanding, eliminated transferring of calls between departments and less wait time due to possible miscommunication/lack of direction.

3. Streamlining Discharge Summary Collection and Handover

- Further delayed physical vacancy was the preparation and handover of the discharge summary. To address this:
- On completion of the discharge summary in the system, the nursing station was alerted to send a General Duty Assistant (GDA) for the pick-up.
- Routine checks made the discharge summary available as soon as it was picked up instead of being unattended at the nurse's counter once delivered.
- Nurses were also advised to focus on brief handover so that patients were able to vacate the premises promptly on lot clearance.
- This intervention effectively shortened the delay from documentation to physical discharge, with a higher rate of meeting the hospital's one-hour target.

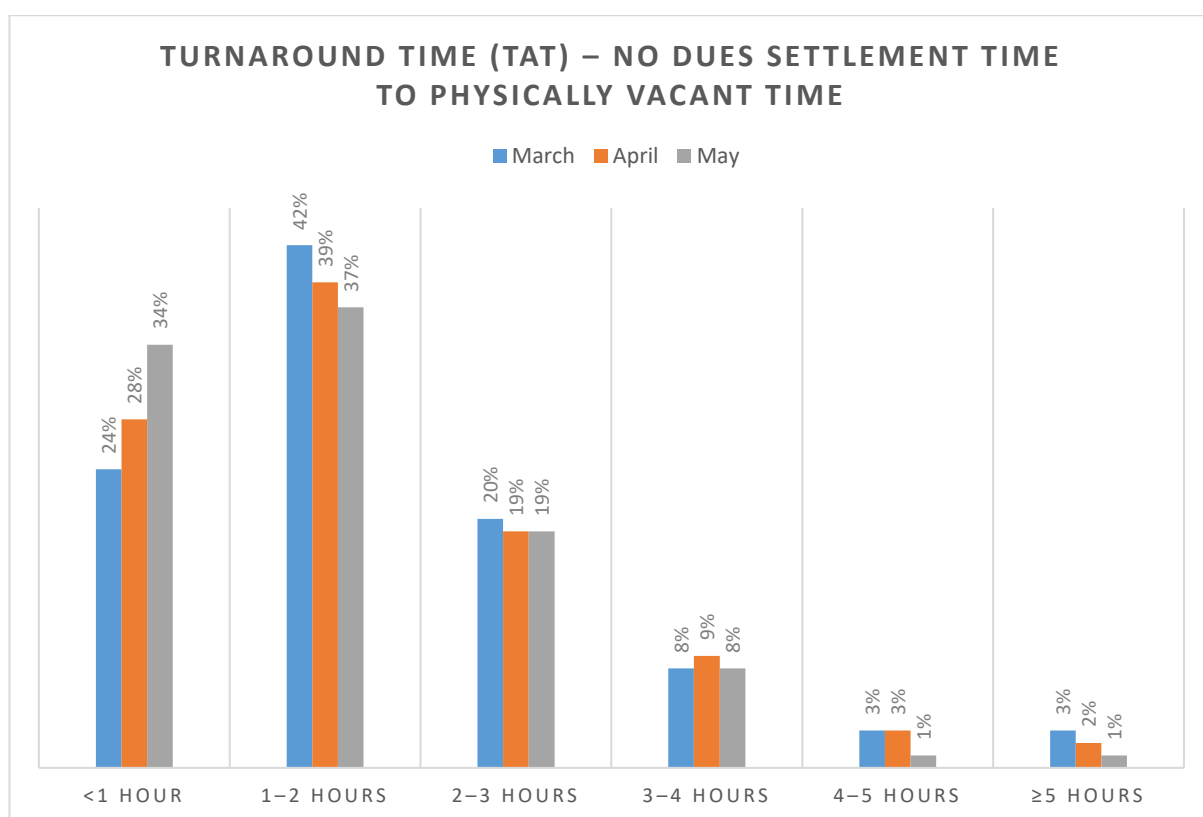
4. Reducing Consultant and Ancillary Service Wait Times

- In some instances, patients experience delays before a consultant, dietitian, or physiotherapist's final visit before discharge. To streamline this process:
- Patients being held for such rounds were "hot listed" on the floor and paged to the relevant department by Floor Managers.
- Consulting and support departments were coordinated to focus on the review of patients who had already been administratively cleared.
- Wherever possible, telephonic or in-person follow-ups were conducted to facilitate these final visits.
- This facilitated better response from support departments which resulted in earlier patient readiness and discharges.

5.6 Turnaround Time (TAT) – No Dues Settlement Time To Physically Vacant Time

This presents a monthly distribution of the turnaround time (TAT) from the point of No Dues Clearance to Physical Vacancy of the Bed. The time intervals are classified into six bands.

Turnaround Time (TAT) – No Dues Settlement Time To Physically Vacant Time						
Month	<1 Hour	1–2 Hours	2–3 Hours	3–4 Hours	4–5 Hours	≥5 Hours
March	24%	42%	20%	8%	3%	3%
April	28%	39%	19%	9%	3%	2%
May	34%	37%	19%	8%	1%	1%



According to hospital protocol, patients are expected to vacate their beds within 45 minutes to 1 hour following No Dues clearance. For this study, the 1-hour mark has been used as the benchmark to assess discharge efficiency. This interval is critical because delays beyond this point directly affect bed availability for incoming patients and operational throughput.

March Analysis

- Only 24% of patients vacated their beds within 1 hour, aligning with the hospital's upper-limit discharge standard.
- The largest proportion—42%—fell into the 1–2 hour range, indicating that while discharges are happening reasonably quickly, many patients are still exceeding the 1-hour ideal.
- 20% of patients vacated within 2–3 hours, while the remaining 14% took longer: 8% required 3–4 hours, and 3% each fell into the 4–5 hour and 5+ hour bands.

Insight:

Only one-quarter adhered to the desired 1-hour standard. This points to a substantial gap in process compliance and highlights an area needing operational tightening.

April Analysis

- The percentage of patients who met the 1-hour benchmark improved to 28%, reflecting progress in aligning with hospital goals.
- 39% were discharged within 1–2 hours, slightly down from March, which may suggest a shift toward faster exits.
- 19% vacated in 2–3 hours, and 9% required 3–4 hours—a slight uptick in moderate delays.
- 3% and 2% of patients fell into the 4–5 hour and ≥ 5 hour categories, respectively.

Insight:

April's data shows a modest performance improvement, with the share of timely discharges (<1 hour) rising and prolonged delays holding steady or slightly decreasing. It reflects better adherence to standards but still highlights that nearly 70% of patients are missing the 1-hour mark.

May Analysis

- In May, notable improvements were observed:
- A significant 34% of patients vacated their beds within 1 hour, the highest percentage across all three months.
- 37% were in the 1–2-hour category, showing a drop from earlier months—indicating acceleration in discharge pace.

- 19% still took 2–3 hours, while 8% took 3–4 hours.
- Only 1% of patients each required 4–5 hours and 5+ hours, the lowest delay rates across the period.

Insight:

May's data represents the best monthly performance. While 71% of patients were discharged within 2 hours, most notably, over one-third now meet the 1-hour standard, showing tangible progress in aligning with hospital expectations.

Observations

- There is a positive month-over-month trend in terms of quicker physical vacancy post no dues clearance.
- The percentage of patients discharged within 1 hour increased steadily from 24% in March to 34% in May, showing that process improvements or operational focus may be contributing to faster discharges.
- The proportion of significantly delayed discharges (those taking more than 4 hours) decreased from 6% in March to just 2% in May, indicating enhanced coordination and patient readiness.
- The 1–2 hour window remained consistently the peak category, though it slightly tapered in May as more discharges happened under 1 hour—showing growing adherence to efficiency goals.

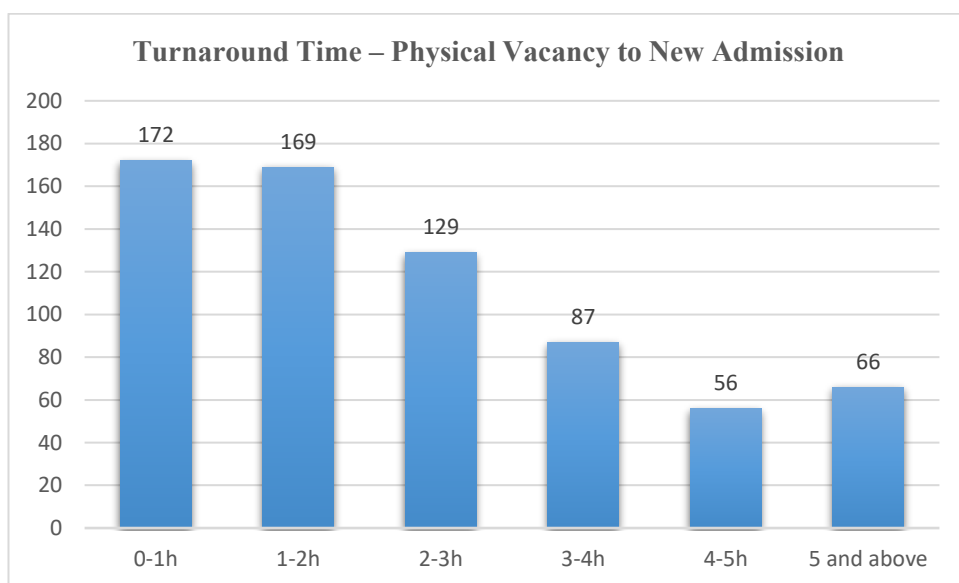
The analysis of the No Dues to Physical Vacancy interval reveals gradual but meaningful improvement in discharge efficiency. While only 24% of patients met the 1-hour standard in March, this rose to 34% by May. At the same time, extended delays (4+ hours) dropped from 6% to 2%, further underscoring enhanced process control.

While the 1-hour benchmark remains challenging, the trend suggests that with sustained effort, more discharges can move below that threshold. Future audits may consider shifting focus toward the 45-minute mark, which aligns more strictly with optimal hospital throughput standards.

5.7 Turnaround Time – Physical Vacancy to New Admission

This graph captures the time interval between the moment a discharged patient physically vacates a bed and the subsequent new patient admission into that same bed. The data is grouped into six-time bands. This analysis is critical for understanding how efficiently vacated beds are being turned over and reused for incoming patients.

PHYSICALLY VACANT VS NEW ADMSSION	Frequency
0-1h	172
1-2h	169
2-3h	129
3-4h	87
4-5h	56
5 and above	66



Observations

- **0–1 Hour Band:**

The highest number of new admissions (172 cases) occurred within 1 hour of the bed being vacated, accounting for the most efficient turnover category. This suggests that nearly 28% of beds were quickly readied and reused, aligning well with operational targets.

- **1–2 Hour Band:**

Close behind, 169 cases (another ~28%) fell into this range, indicating that over 55% of all beds were reoccupied within 2 hours—a strong indicator of relatively quick turnaround in most cases.

- **2–3 Hour Band:**

The number drops to 129 cases, showing that although many beds are still reused within a reasonable timeframe, there is a decline in efficiency beyond the 2-hour mark.

- **3–4 Hour Band:**

Only 87 beds were reoccupied in this band, reflecting a more significant gap in readiness or admission coordination.

- **4–5 Hour Band:**

With just 56 cases, this time band shows further inefficiency. Delays here may stem from uncoordinated admission scheduling, slower housekeeping response, or departmental lags.

- **5 Hours and Above:**

Alarming, 66 beds remained vacant for over 5 hours before being reused. This highlights critical opportunities for process improvement in bed management, housekeeping, and admission planning.

The data demonstrates that while a significant portion of beds are turned around efficiently (within 1–2 hours), a considerable number remain underutilized for extended periods.

Chapter 6: Recommendations

1. Creation of a Fast-Track Lane for Cash Patients

A separate "fast lane" should be set up specifically for cash patients, so that they can wrap up the billing and discharge processes much faster. This would decrease the time spent at billing counters and facilitate the discharge process, particularly during peak times.

Generate estimated billings automatically and proactively calculate them with at least 12 hours advance notice of potential discharge and have the ability to modify the amount before discharging.

2. Designation of a GDA Exclusively for Discharge Summary Collection

During the high discharge hours in order not to delay discharge due to lack of availability of personnel to pick up the discharge summary, one GDA should be posted just for collecting the discharge summary. This would guarantee swift retrieval of summaries and quicker handovers to patients.

3. Automated Notification and Alert System

Alert System must be so incorporated into the nursing station computers that a warning is generated when:

- The discharge summary is signed and available for pick-up.
- The bill is generated for the patient and HIS status is updated as "Bill Ready".

These can be sent as notifications to nursing staff and patients, either in the form of screen pop-ups, SMS, or calls, to prevent any chances of missing an alert or response.

4. Implementation of a Discharge Summary Tracking System

A digital tracking should be developed to record key timestamps like -

- At the time the discharge summary was completed.
- When the GDA arrives to collect it.
- When the summary is handed over to the patient.

That way one can track progress at each milestone, spot any delays, hold staff accountable.

5. Address Post-No Dues Delays

- Experience shows that 75 % of the delays at post the dues clearance stage are rectifiable hence targeted intervention is essential.
- Preparation for transport Arrange dedicated wheelchairs and stretchers during peak hours of the discharging (11:00–14:00) hour to reduce wait time for patients.
- Nursing Readiness: More discipline needs to be implemented in patient preparation (dressing, drug counselling, final check) before the final No Dues.

6. Integration of CPRS and HIS Systems

At present, the CPRS and the HIS are kept in isolation, thus leading to disjointed processes for monitoring and discharging.

Interfacing CPRS with HIS will provide real real-time view of patient status, ease discharge tracking and reduce discrepancies like CPRS showing beds as vacant before all discharge-due procedures are done.

This common interface would make way for more informed decisions, better transparency of the process and better integrations across various departments.

7. Enhancing Interdepartmental Coordination with Defined SOPs and Time Benchmarks

Bottlenecks regarding discharges are frequently exacerbated by communication silos and lack of consistent time frames within units. Formulate unambiguous SOPs for nursing teams, GDAs, and billing staff. These SOPs should include:

- Swift TAT (e.g., in 10 min) to deliver the CK report to the patient at the bedside after receiving it at the nursing station.
- GDA is obligated to organize the discharge summaries ‘momentarily’ or within a predetermined time (e.g., no more than 5–10 minutes) following notice of the arrival.
- Compulsory intimation of the patient or the relative from the nursing team once the bill status is “Bill Ready” in the HIS and help the patient to fasten the process without any waiting.
- Promoting the use of effective communication channels between departments and following these timelines is expected to prevent bottlenecks and enhance patient flow.

Chapter 7: Conclusion

This study was designed to measure and analyze the discharge TAT from NDC to the physical vacation of the bed at Max Super Specialty Hospital, Vaishali. For more than 900 patients including cash, PSU, and TPA categories, discharge activities were analyzed over 3 months. The results indicated that no dues were cleared promptly following the completion of most administrative and clinical clearance processes, however, marked delay occurred after no dues till the departure of the patient from the bed in the last step. Many of the processes that come into play at the time of discharge. In March only 24% of patients got out of bed within an hour, yet by May the figure had improved with 34% managing to meet the above benchmark. It was a positive sign and a step in the correct direction, but not meeting the NABH standard of three hours for discharge.

Further studies demonstrated that approximately 75% of delays were operational in origin and hence correctable. The most common were waiting time for wheelchairs, delay of the discharge summary to be handed over, lack of information transfer to the patient, and poor departmental coordination. The payment-specific analysis supported cash as having a significantly short discharge compared to PSU and TPA patients, however, all categories often violated the desirable time range. Although over half of the vacated beds were filled within 2 h, some beds remained vacant for longer than 5 h, suggesting suboptimal housekeeping or admission scheduling.

Several QI-based interventions were made in the internship which included stocking wheelchairs on several floors, early diagnosis and counselling of discharging cases, better synchronization with the consultants and timely retrieval and handing over of Discharge summary. This has led to a small, but significant decrease in delays and an overall enhancement of the efficiency of discharges.

To make further progress in this direction, a range of suggestions have been made. These have included establishing a fast-track billing lane for cash patient payment, assigning specific GDAs for discharge summary collection, instigating automatic alerts for notifying staff and patients that the bill or discharge is ready, and linking the CPRS with the HIS for seeing in real-time. In addition, clear SOPs for all personnel involved in discharge, with all critical tasks having defined time-frames, will ensure accountability and prevent unnecessary delays. Enhanced communication between various departments

by building coordination and feedback mechanisms is also essential to sustain interventions.

In summary, the study highlights the discharge process end of care as a significant opportunity for improvement. Through operational efficiency, improved utilisation of technology and cutting-edge collaborations, Max Super Speciality Hospital, Vaishali, can dramatically improve the efficiency of discharges, bed occupancy and patient experience. These actions in compliance with our and NABH standards stand as a testament to the hospital's priority of providing empathetic and efficient patient care.

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