

**A CROSS-SECTIONAL STUDY TO IDENTIFY AND ANALYZE FACTORS
CONTRIBUTING TO DELAYS IN INPATIENT DISCHARGE TURNAROUND TIME
IN A 170-BEDDED TERTIARY CARE FACILITY-CARE HOSPITAL, RAMNAGAR,
VISAKHAPATNAM FROM MARCH 2025 TO APRIL 2025**

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Sreyasi Chattopadhyay

Under the Supervision and Guidance of

Dr. Ritu Vashistha

2025

COMPLETION CERTIFICATE

This is to certify that Dr SREYASI CHATTOPADHYAY in partial fulfillment of the requirements for the award of the degree of MBA in Hospital and Health Management from the IIHMR University, Jaipur, has successfully completed her internship at **CARE Hospitals** during March 10th 2025 to May 31st 2025.

Place: Visakhapatnam

Date: 31-05-2025

For **Quality Care India Ltd,**


V. Anil Kumar
Senior Manager-HR


CERTIFICATE

This is to certify that dissertation titled “A CROSS-SECTIONAL STUDY TO IDENTIFY AND ANALYZE FACTORS CONTRIBUTING TO DELAYS IN INPATIENT DISCHARGE TURNAROUND TIME IN A 170-BEDDED TERTIARY CARE FACILITY-CARE HOSPITAL, RAMNAGAR, VISAKHAPATNAM FROM MARCH 2025 TO APRIL 2025” is a record of the research work undertaken by Dr. Sreyasi Chattopadhyay in partial fulfillment 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 his/her approach to the research study has been sincere, scientific, and analytical.

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Date

CERTIFICATE

I hereby declare that this dissertation titled “A CROSS-SECTIONAL STUDY TO IDENTIFY AND ANALYZE FACTORS CONTRIBUTING TO DELAYS IN INPATIENT DISCHARGE TURNAROUND TIME IN A 170-BEDDED TERTIARY CARE FACILITY-CARE HOSPITAL, RAMNAGAR, VISAKHAPATNAM FROM MARCH 2025 TO APRIL 2025” is the bonafide 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.



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Name of Student: Dr. Sreyasi Chattopadhyay

Date:

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LIST OF ABBREVIATIONS

S.No.	Abbreviation	Full Form
1.	2D ECHO	Two-Dimensional Echocardiography
2.	AP	Andhra Pradesh
3.	APL	Above Poverty Line
4.	AS	Aarogya Sri
5.	BPL	Below Poverty Line
6.	BSKY	Biju Swasthya Kalyan Yojana
7.	CATH Lab	Cardiac Catheterization Laboratory
8.	CCM	Critical Care Medicine
9.	CEO	Chief Executive Officer
10.	CGHS	Central Government Health Scheme
11.	CSSD	Central Sterile Supply Department
12.	CT	Computerized tomography
13.	CTVS	Cardiothoracic and Vascular Surgery
14.	DMAIC	Define, Measure, Analyze, Improve, Control
15.	DSA Lab	Digital Subtraction Angiography Lab
16.	ECG	Electrocardiogram
17.	ECHS	Ex-servicemen contributory health scheme
18.	EEG	Electroencephalogram
19.	EMG/EP/NCS	Electromyography/Evoked Potentials/Nerve conduction study
20.	EMR	Electronic Medical Records
21.	ENT	Ear, Nose and Throat
22.	ESI	Employee's State Insurance
23.	HDU	High Dependency Unit
24.	HK	HOUSEKEEPING
25.	HR	Human Resource
26.	ICCU/CTICU	Intensive Cardiac Care Unit / Cardiothoracic Intensive Care Unit
27.	ICU	Intensive Care Unit
28.	IPD	Inpatient Department
29.	IPD	Inpatient Department
30.	IT	Information Technology
31.	KPI	Key Performance Indicator
32.	MICU	Medical Intensive Care Unit
33.	MoHFW	Ministry of Health and Family Welfare
34.	MRD	Medical Records Department
35.	MRI	Magnetic Resonance Imaging
36.	NABH	National Accreditation Board for Hospitals and Healthcare Providers
37.	NHSRC	National Health Systems Resource Centre
38.	OT	Operation Theatre
39.	PFT	Pulmonary Function Test
40.	PRE	Patient Relations Executive
41.	PSU	Public Sector Undertakings
42.	RACHI	Rajiv Gandhi Aarogyasri Community Health Insurance
43.	TAT	Turnaround time
44.	THR	Total Hip Replacement
45.	TKR	Total Knee Replacement
46.	TPA	Third Party Administrator
47.	USG	Ultrasonography

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ABSTRACT

TITLE: -

A Cross-Sectional Study to Identify and Analyze Factors Contributing to Delays in Inpatient Discharge Turnaround Time in a 170-Bedded Tertiary Care Facility- CARE Hospitals- Ramnagar, Visakhapatnam from March 2025 to April 2025.

AUTHOR'S NAME: Dr. Sreyasi Chattopadhyay

ADVISOR'S NAME: Dr. Ritu Vashistha

KEYWORDS: IPD Turnaround time (TAT), Discharge Turnaround time (TAT), Discharge intimation TAT, Discharge summary TAT, IP Pharmacy TAT, OT Pharmacy TAT, CATH Lab pharmacy TAT, Bill Preparation TAT, Bill Settlement TAT, Bed Release TAT, Delay factors.

BACKGROUND

Operational efficiency is of utmost importance during the discharge process as it is the last point of contact of the patient with the hospital. The IPD discharge TAT can act as a major influencer of patient satisfaction and an important indicator of operational efficiency of a hospital and interdepartmental coordination. The delays in IPD TAT are not a siloed issue, but rather a challenge that requires a multidisciplinary approach to combat. In addition to that, reduction of discharge TAT also paves way for a better bed turnover, contributing to the revenue of the hospital.

OBJECTIVES

- **Broad Objective-** To identify and analyse the reasons that are contributing to the increased IPD discharge TAT. (TAT₀)
- **Specific Objectives-**
 1. To identify and analyse reasons that are contributing to the increase in the discharge intimation TAT. (TAT₁)
 2. To identify and analyse reasons that are contributing to the increase in the discharge summary preparation TAT. (TAT₂)
 3. To identify and analyse reasons that are contributing to the increase in the pharmacy clearance TAT. (TAT₃)
 4. To identify and analyse reasons that are contributing to the increased bill preparation TAT. (TAT₄)
 5. To identify and analyse reasons that are contributing to the increased bill payment TAT. (TAT₅)
 6. To identify and analyse the reasons that are contributing to the increased bed release TAT. (TAT₆)

METHODOLOGY: Data was collected for 547 inpatients (including cash, insurance and PSU) by a mix method of direct observation and through the SOPEONOW software. The SOPEONOW software was used to capture real-time data of the TAT of each step, while direct observation was done in order to note the on-ground realities of the delays for each case being shadowed. Convenience sampling method was used to

capture data of discharge cases of all days except Sunday. The data was recorded in an MS Excel spreadsheet for all the cases shadowed at the end of each day after the entire process was over. The data was analyzed using SPSS and the statistical significance of each step TAT was checked with the overall TAT using chi-square tests. ($p \leq 0.05$ was considered statistically significant)

RESULTS:

Out of the 547 cases from which the data was collected, 97 were cash patients, 115 were insurance patients and 335 were PSU patients. Most cases of unplanned discharges were seen among the cash patients (79%), followed by insurance patients (63%) and finally PSU (52%). The frequency of the cases under each age group, department and those which were within the TAT of each particular stage was calculated, along with the frequencies of the reasons for delay at each step. The discharge summary TAT, bill preparation TAT and nature of the case (planned/unplanned) was found significant with the overall IPD discharge TAT for cash patients. For insurance cases, the discharge summary TAT, pharmacy clearance TAT, bill preparation TAT, bill settlement TAT* were found to be statistically significant. For PSU patients, discharge intimation TAT, discharge summary TAT, bill preparation TAT, bill settlement TAT, bed release TAT and the nature of the case (planned/unplanned) were found to be statistically significant.

CONCLUSION:

The study done highlights the factors leading to delay in the IPD discharge process. Major recommendations based on the findings include fixing an allocated time for IPD rounds of consultants to prevent variability of discharge intimation and correction of summaries thereby leading to more number of planned discharges; operational streamlining at the pharmacy and billing areas, proper interdepartmental coordination between the designated departments of billing, including the PREs, nursing staff and the patient attenders. Integration of technology in the form of EMR systems, a digital tracking method to receive real time updates of the stage of the discharge process, barcode-based tracking for billing efficiency can all contribute to a more efficient process without delay. This can help increase patient satisfaction, positively contribute to the reputation of the hospital and increase revenue for the hospital by ensuring timely bed turnover.

CHAPTER 1- ABOUT – CARE Hospitals

CARE Hospitals is a part of the Evercare group, and is one of the top five pan-India hospital chains. On a global scale, it is one of the leading healthcare chains in South Asia and Africa. It was instituted in 1997 in Hyderabad by Bhupathiraju Somaraju as a single specialty cardiology hospital with 50 beds. Today, under CEO Jasdeep Singh, it has emerged as a regional leader of healthcare in south and central India. It came into existence identifying the massive gap between the need and availability of multi-specialty health services under one roof, especially in non-metro cities of India where several stand-alone nursing homes and hospitals exist with limited facilities. The organization's prime belief of health inclusivity is the primary reason for preferring to set up facilities in non-metro cities to ensure greater affordability and accessibility to quality healthcare. As of 2025, CARE Hospitals serves a population of over 25 million people through 16 hospitals, in 7 cities, spread across 6 states. Currently, the hospital provides care in over 30 clinical specialties.

Both the facilities of CARE hospitals, Visakhapatnam served as multi-specialty tertiary care hospitals.

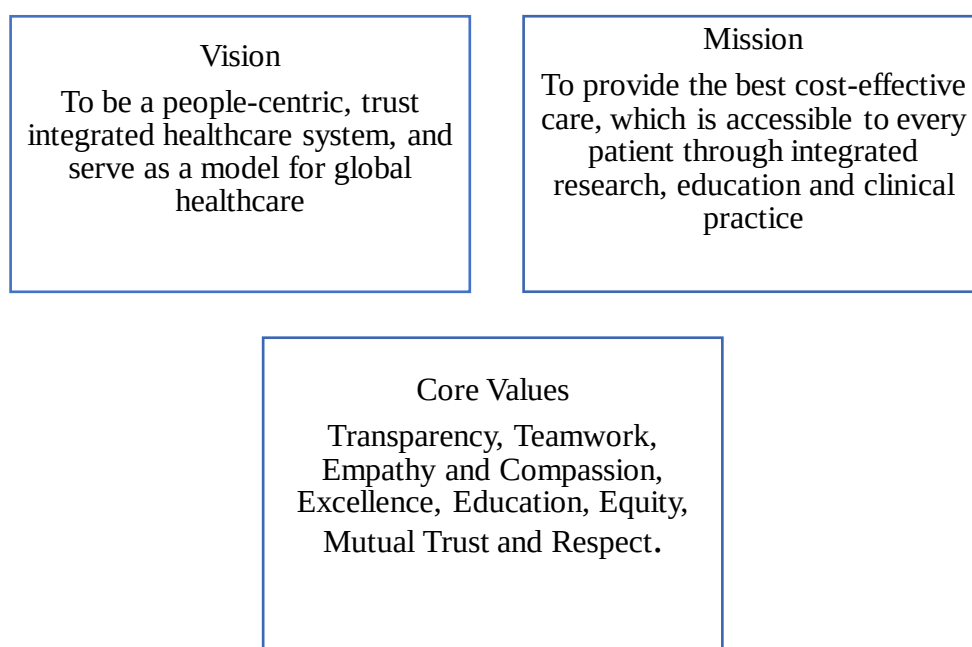


FIGURE 1.1: VISION, MISSION AND CORE VALUES

TABLE 1.1: SERVICES PROVIDED BY ORGANISATION

CLINICAL SERVICES and DEPARTMENTS	NON- CLINICAL SERVICES and DEPARTMENTS
Specialties- • Cardiology (also including interventional cardiology, Electro Physiology Study) • CTVS • CCM (including specialty ICU) • Dermatology (including Venerology)	Support service- • CSSD • Laundry • Housekeeping • Cafeteria services • Biomedical waste management • Biomedical equipment room • MRD

• Emergency Medicine • Endocrinology • General medicine • General surgery (also including Laparoscopic, Bariatric Surgeries, Robotic surgery) • ENT/Otorhinolaryngology • Interventional Neuro radiology • Liver transplant • Surgical Oncology • Urology • Heart and Lung transplant • Medical gastroenterology • Nephrology (and dialysis) • Neurology • Neurosurgery • Obstetrics and Gynecology • Orthopedic Surgery (also including Joint Replacement Surgery, Arthroscopy, Arthroplasty, Robotic- TKR and THR • Plastic and reconstructive Surgery • Pulmonary medicine and interventional pulmonology • Renal Transplant • Surgical gastroenterology (including Hepato-Pancreatic Biliary Surgery and Robotic Surgery) • Anesthesiology	• Security • Additional Assistance staff
Diagnostic services- • 2D ECHO • Bronchoscopy • Color Doppler • Colonoscopy • DSA Lab/ CATH Lab • ECG • EEG/ Video electroencephalogram • EMG/ EP/ NCS • Endoscopy • Holter monitoring • MRI • PFT • Spirometry • Sleep Study • USG • Treadmill testing	Billing department • Insurance desk • Billing

• X-Ray scans • CT scan (including CT angiography)	
Laboratory Services- • Clinical biochemistry • Microbiology, Serology • Clinical pathology • Hematology • Histopathology	Administration- • Operations department • HR department • Quality • Finance • Marketing
Professions Allied to Medicine- • Dietetics and Nutrition • Physiotherapy and rehabilitation • Clinical Pharmacology	
Transfusion Service- • Blood Transfusion Services	
Pharmacy Services- • Pharmacy 24x7	

A few of the notable achievements by CARE include-

- The development of India's first indigenous coronary stent
- The first hospital in the state of Andhra Pradesh to successfully perform swap kidney transplant
- The first hospital in India to successfully undertake a womb transplant
- The pioneer of fetal heart surgery in India
- Pioneer of 3D Laparoscopy Surgery in Central India
- The first hospital of Andhra Pradesh to start Endovenous Surgery to treat varicose veins
- The very first hospital to perform hybrid repair of thoracoabdominal aortic aneurysm in India
- The first hospital in south India to begin hybrid salvage of failed AV fistula
- One of select few centers in the world to perform cochlear implantation using local anesthesia
- Pioneer of image guided skull-based surgery for pituitary tumors in Andhra Pradesh
- Home of 1000+ stapedotomy surgeries by using a skeeter drill and self-retaining ear canal retractors to treat conductive deafness, which is the second largest study in the world done by a single surgeon, accepted by the Cambridge University

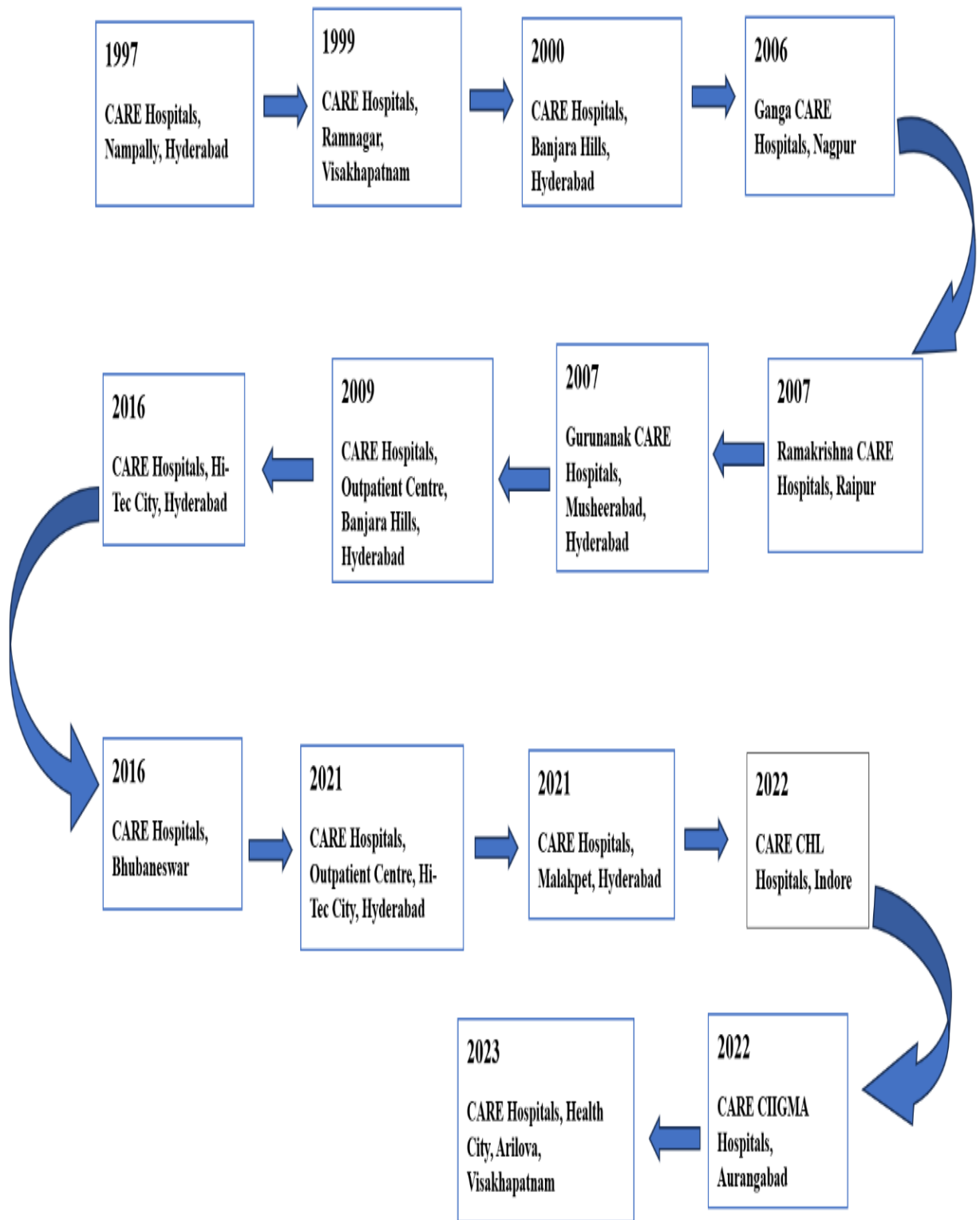


FIGURE 1.2: ROADMAP OF CARE HOSPITALS (1997-2023)



FIGURE 1.3: LOCATION OF CARE HOSPITAL FACILITIES IN INDIA

CHAPTER 2-INTRODUCTION

The types of services in a healthcare facility can be divided into two broad types, namely outpatient services and inpatient services.¹ Any patient who has been admitted to a hospital and requires an overnight hospital stay classifies as an inpatient¹. Such a patient goes through three stages- admission, followed by the necessary intervention and finally discharge.¹ Discharge is a complex procedure involving various staff members across departments.² Mogly defined discharge as “the release of a hospital patient from the hospital by the admitting physician after providing necessary medical care for a period deemed necessary”.² According to the NABH, discharge is described as “a process by which a patient is shifted out from the hospital with all concerned medical summaries insurance stability; the process of discharge is deemed to have started when the consultant formally approves discharge and ends with the patient leaving the clinical unit”.² According to Davies and Macaulay, the process discharge can present as a bottleneck in many hospitals due to its complexity, affecting the efficiency of the healthcare facility.²

Overall, it is an essential indicator for determining the quality of services and the patient satisfaction². When we take a closer look, the delays in discharge process presents as a problem both for the parties involved, in terms of admissions, increased pressure on bed allocations, transfer of patients and also expenses of the hospital and the satisfaction of the patient.^{2,3} This may indirectly cause damage to the hospital’s reputation, cause ambulance diversions long admission queues and emergency department crowding leading to opportunity losses for the hospital.^{3,4}

Delayed discharge from the hospital also increases the risk of healthcare associated infections (HAIs).⁵The delays, although may seem unavoidable, are a direct reflection insufficient planning right from the time of patient admission, improper bed management and gaps in the coordination between staff.² Discharge process involves the following two ends- the front end, involving the doctors, nurses, patients and the patient’s attender or relatives; and the back end, involving the pharmacy and diagnostics department, billing department, the TPA, insurance departments and the medical records department.^{6,7}

Major delay factors related to the process of discharge includes waiting for the discharge summary, transfer to the nursing unit, incomplete documentation of discharge plan, waiting for the patient’s functions to show improvement.⁸Other than this, if there is a family burden, especially in terms of finances, when the patient party is dissatisfied, it may prolong the process further, not just by hours, but also by days in some cases.⁹

The patient party in the hospital can be broadly divided into two main categories-

1. Cash/self-pay patients
2. Insurance patients

According to the NHSRC Hospital Administration Module (MoHFW) cash patients are those who pay directly, or out of pocket for the health services received, without any kind of reimbursement or coverage under any insurance or government health financing scheme. These individuals directly pay the healthcare provider at the time of the service. Similarly, an insurance patient is one whose medical expenses and hospitalisation are covered, either in full capacity or partial capacity by a health insurance provider, certain government insurance schemes or third-party payers.

The insurance patients can be further divided into those who come under the public sector undertakings or government schemes and those availing private insurances.

One of the most widely used and notable schemes in the PSUs is the Rajiv Gandhi Aarogyasri Community Health Insurance in the state of Andhra Pradesh for upto Rs. 10 lakhs. Started in 2007, RACHI is currently functional in 23 districts of AP, involving both the private and public sector for providing accessible healthcare services to about 80 crore BPL population across the districts¹⁰. The state government is the only funding agency and takes responsibility for the entire premium on behalf of the beneficiary.¹¹

In addition to this, Aarogya Sahayata is another initiative that provides medical assistance to the employees of the Prohibition and Excise Department of Telengana¹²; whereas Aarogya Bhadrata is a health scheme for the police personnel and their dependants in Telengana and AP.¹³

The next most notable scheme is called the BSKY, (currently known as the Gopabandhu Jan Aarogya Yojana) which was launched in 2018 by the government of Odisha.¹³ This scheme covers both the BPL and APL families. BSKY provides for cashless healthcare services for up to Rs 5 lakh for males and Rs 10 lakh for females, in both public and private hospitals; both in the state of Odisha and outside.¹⁴ As of 2024, 1.1 crore patients have benefitted under this scheme. If the patient were to be referred to any hospital outside Odisha, they would also get an additional conveyance of Rs 2000.¹⁵

Other than this, the health schemes that are provided by the central government including a comprehensive care package and tertiary inpatient care along with prescription drugs to the employees, pensioners and families includes the CGHS, for civilian employees and pensioners, Railway health service, ECHS and ESI. This covers a population of almost 2.3 crore families i.e, 8.2 crore members.¹⁶

On the other hand, private health insurances are those where coverage is provided by non-governmental organisations.¹⁷ It can either be paid in total as a part of the package covered under a policy, or as a co-payment (where a fixed amount is paid by the insured, while the remaining is covered by the insurer) or co-insurance (where a fixed percentage of the treatment costs has to be borne by the policyholder out of their own pocket, while the remainder is paid by the insurer).¹⁷ The payment can be settled through a cashless process (usually at the network hospitals) through the TPA, or through reimbursement process; where the bills are settled by the patient and later on claimed (usually seen in non-network hospitals).¹⁸ Usually a premium is paid, and the plans can be customised as per the individual's needs. At times it may even cover pre-hospitalisation and post-hospitalisation costs as per the patients' package.¹⁹

The IPD department in CARE hospitals can be divided into 3 main functional areas-

- The Nursing Station- On all three floors of the IPD, the nursing station is responsible for the discharge initiation followed by correction and finalisation of the summary.
- The Pharmacy- Includes the inpatient pharmacy and the OT pharmacy/CATH Lab pharmacy (for surgical patients); responsible for providing pharmacy clearances after billing for the items and sending return medications for certain packages
- Billing department- Responsible for auditing of the bills, coordination with the TPAs, preparation of final bill; bill settlement and providing the clearance slips.

OVERVIEW OF THE INPATIENT DEPARTMENT DISCHARGE IN CARE, RAMNAGAR

The inpatient department in CARE Hospitals, Ramnagar was spread across all the floors, i.e, the ground floor to the third floor.

The first floor consisted of the CATH Lab, pre and post CATH ICUs (8 beds), CATH lab pharmacy, separate male and female general wards, semi private wards (total of 41 beds), dialysis rooms, first floor nursing station, security area and an administrative area. This floor catered mostly to the package patients of AS, BSKY or other PSU package patients. The staff at the nursing station included 10 nursing staff and one duty doctor. The administrative staff comprised of one floor in-charge (called the PRE).

The second floor comprised of 2 cardiac OTs, 2 neurology OTs, the OT pharmacy, IP Pharmacy, ICCU (12 beds), CTICU and triple sharing rooms (43 beds), second floor nursing station, security area and an administrative area. The nursing station comprised of 7 nurses. There was currently no designated duty doctor on this floor. Similar to the first floor, the administrative staff comprised of one floor PRE.

The third floor consisted of the remaining 2 General OTs, post-anaesthesia and neuro ICU (16 beds) the private wards (22 beds) the third-floor nursing station, security area and an administrative area. There was one designated duty doctor on this floor and 7 nursing staff at the nursing station. Administrative staff comprised of one floor PRE. The MICU (12 beds + 4 isolation beds) was located on the ground floor next to the Emergency department. (12 beds)

The discharge processes (planned and non-planned) began only with the consultant's approval. The planned discharges (also termed night-billings) would be billed the prior day (all pharmacy, OT and miscellaneous expenses) with the consultant's intimation to the floor in-charge. Usually, the rough summary of these cases would be kept ready, for minor changes that would be done during the final consultant's round and the pharmacy returns would also be sent back before the final bill was prepared. This was usually done to expedite the process of discharge as only one final clearance would be necessary to move the process forward. If the discharge was unplanned, usually certain billings were pending which would have to be updated taking up more time.

Once the consultants' approval was given, the nursing station would inform the floor in-charge and initiate the discharge process in the system. The rough summary once approved, was sent down to the typist for the preparation of the final typed document. For unplanned discharges, in some cases the rough summary would also have to be prepared before being sent for correction and typing. The files would be electronically sent to the pharmacy (where the billing for planned discharge cases would be done already) for clearance. After this is done, the pharmacy would forward the file to the billing department, where the auditing of the bill would be done; and the final bill would be prepared and communicated to the floor in-charge. The attenders would then be handed the invoice and the bill would be settled accordingly. Once this was done, the billing staff would hand two clearance slips-one for submission to the nurse's station and one to the security guard while exiting the facility.

The housekeeping and helper staff would usually be charged with helping with the proof pictures for the PSU patients, transporting the case files when needed and finally assisting the patient and their attenders while leaving the facility.

This entire process had to be coordinated by the PRE, who would stay in touch with all the required departments to ensure the process is done as soon as possible. Meanwhile if the package would include any medicines to be handed over to the patient at the time of discharge, this would also be kept ready after coordinating with the inpatient pharmacy.

OBJECTIVES OF THE STUDY

BROAD-To identify and analyse the reasons that are contributing to the increased IPD discharge TAT. (TAT₀)

Specific Objectives-

7. To identify and analyse reasons that are contributing to the increase in the discharge intimation TAT. (TAT₁)
8. To identify and analyse reasons that are contributing to the increase in the discharge summary preparation TAT. (TAT₂)
9. To identify and analyse reasons that are contributing to the increase in the pharmacy clearance TAT. (TAT₃)
10. To identify and analyse reasons that are contributing to the increased bill preparation TAT. (TAT₄)
11. To identify and analyse reasons that are contributing to the increased bill payment TAT. (TAT₅)
12. To identify and analyse the reasons that are contributing to the increased bed release TAT. (TAT₆)

TABLE 2.1: RECOMMENDED DISCHARGE TAT KPIs FOR IPD DISCHARGE PROCESS

S. No		CASH	INSURANCE	PSUs
1.	Discharge intimation TAT	10 mins	10 mins	10 mins
2.	Discharge Summary TAT	20 mins	20 mins	20 mins
3.	Pharmacy Clearance TAT	10 mins	10 mins	10 mins
4.	Bill Preparation TAT	20 mins	20 mins	20 mins
5.	Bill Settlement TAT	30 mins	150 mins	60 mins
6.	Bed Release TAT	30 mins	30 mins	30 mins
	TOTAL DISCHARGE TAT	120 mins	240 mins	150 mins

HYPOTHESIS

- TAT_1H_0 : TAT_1 has no effect on TAT_0
- TAT_2H_0 : TAT_2 has no effect on TAT_0
- TAT_3H_0 : TAT_3 has no effect on TAT_0
- TAT_4H_0 : TAT_4 has no effect on TAT_0
- TAT_5H_0 : TAT_5 has no effect on TAT_0
- TAT_6H_0 : TAT_6 has no effect on TAT_0
- TAT_0H_0 : The nature of the discharge (planned/unplanned) has no effect on TAT_0

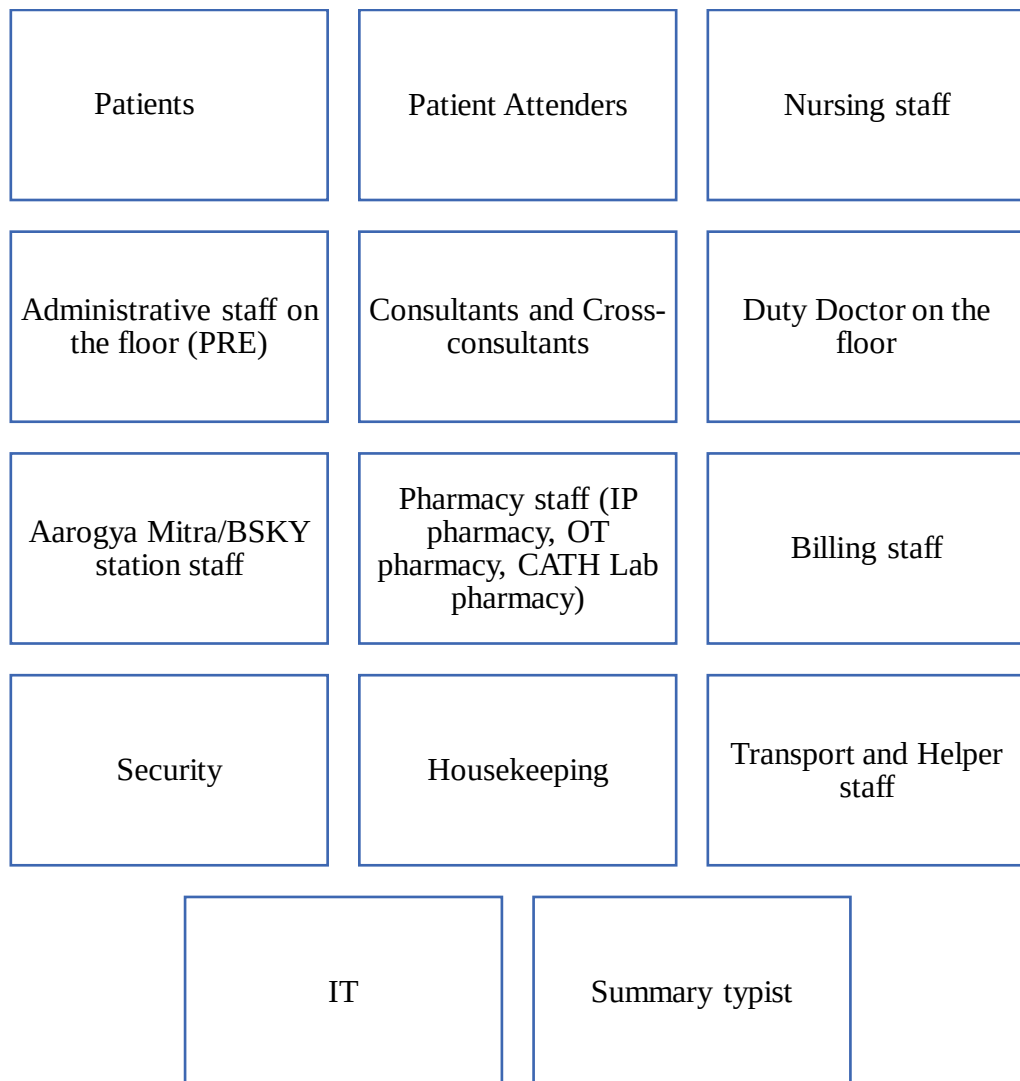


FIGURE 2.1: STAKEHOLDERS INVOLVED IN THE IPD DISCHARGE PROCESS

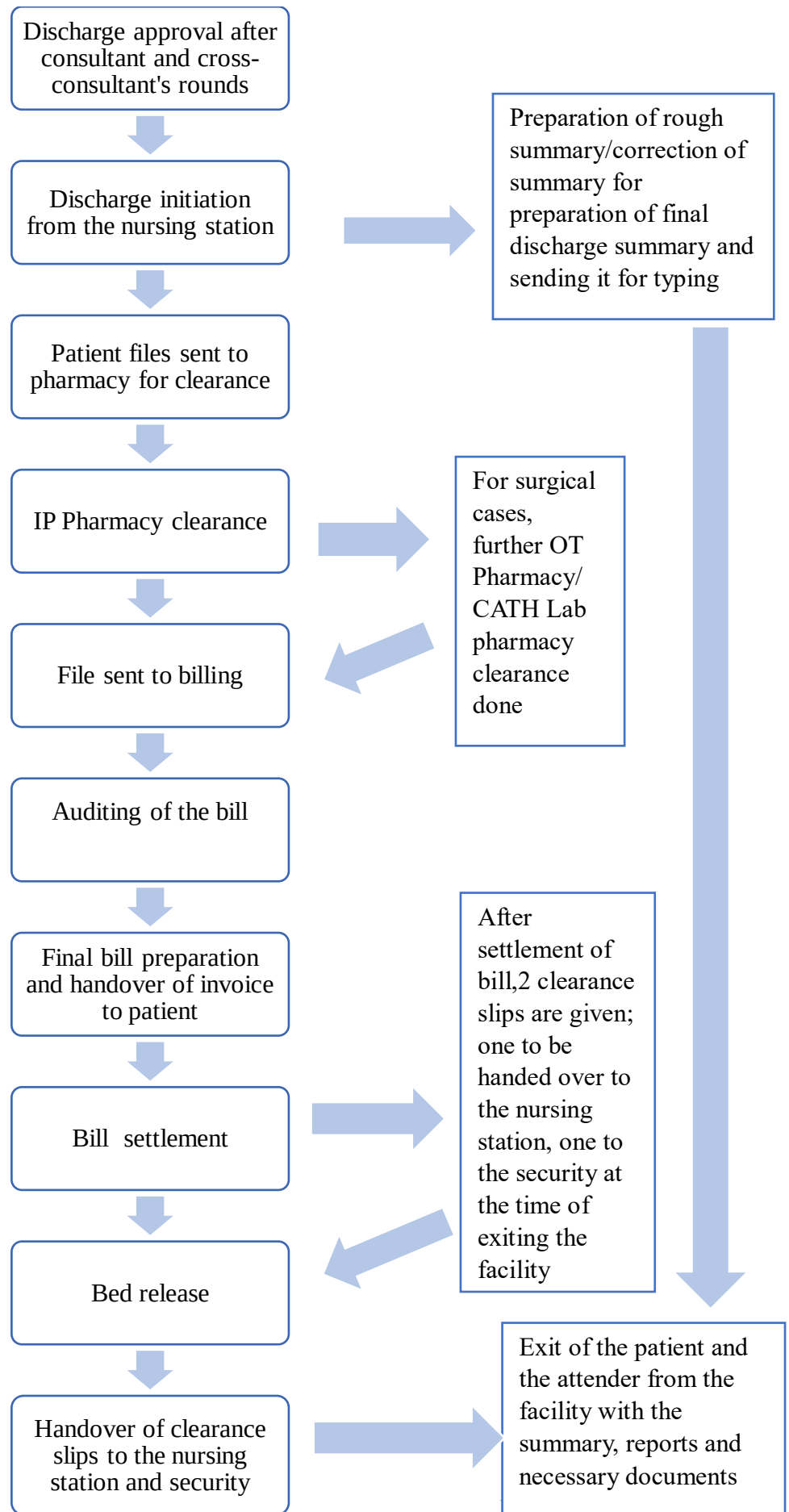


FIGURE 2.2: PROCESS FLOW FOR IPD CASH/ SELF-PAY PATIENTS

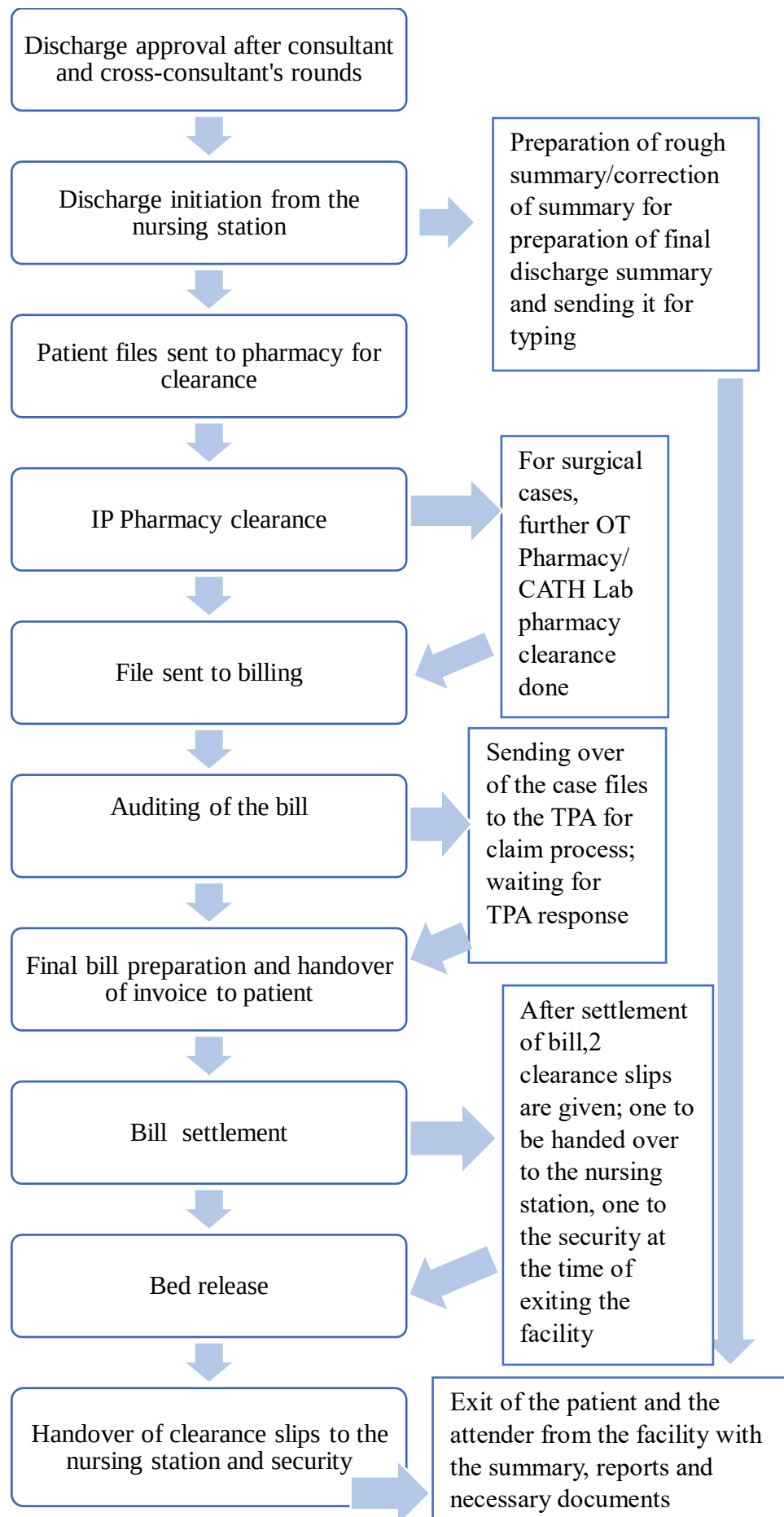


FIGURE 2.3: PROCESS FLOW FOR IPD INSURANCE PATIENTS

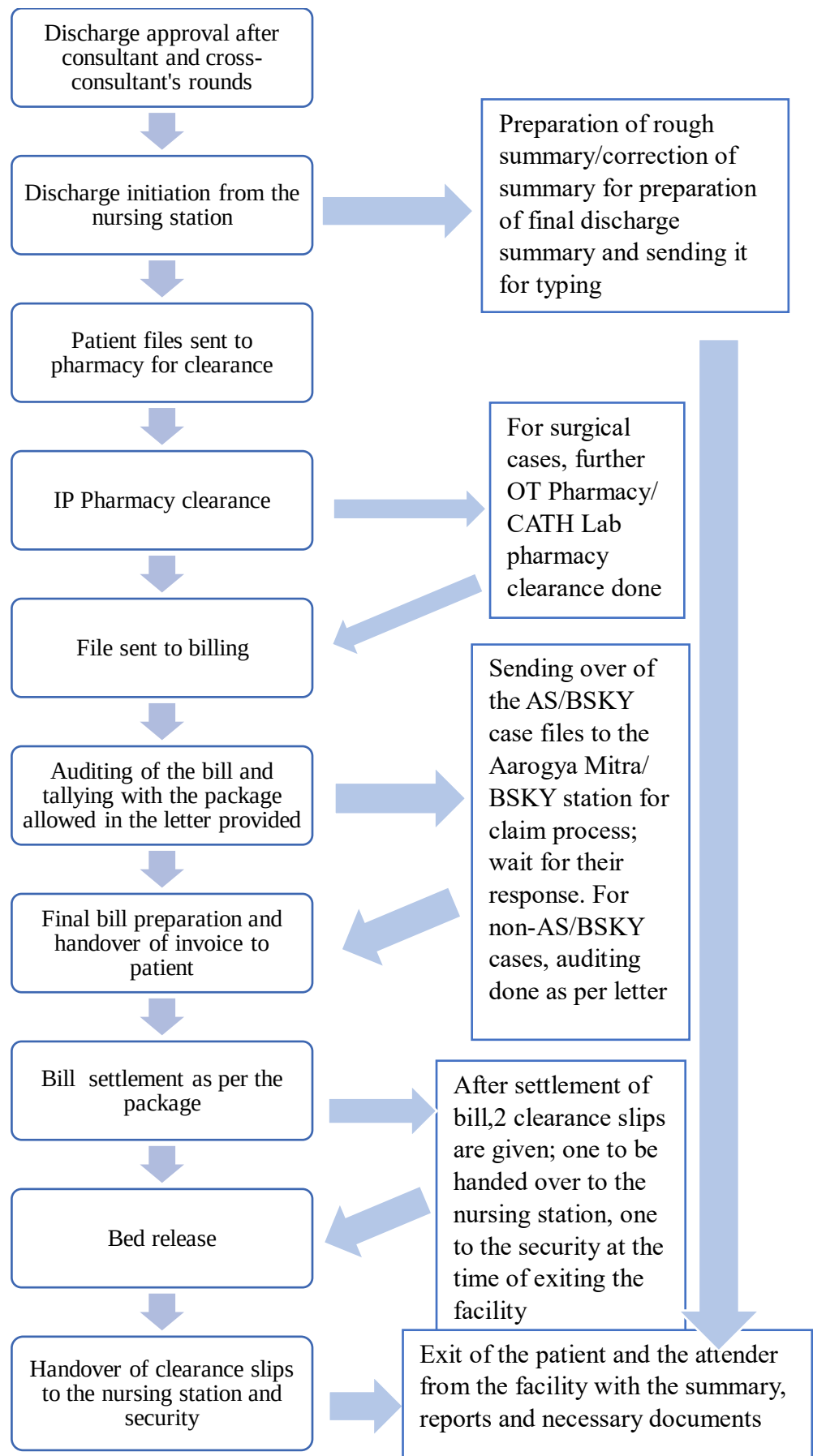


FIGURE 2.4: PROCESS FLOW FOR PSU PATIENTS

CHAPTER 3- REVIEW OF LITERATURE

S.No.	Author (Year)	Location of study	Sample size	Sampling technique	Salient Features
1.	Berta Ortega, Albert Salazar, Albert Jovell, Joan Escarrabill, Guillem Marca, Xavier Corbella <u>Year:</u> 2012 <u>Citation:</u> Ortega B, Salazar A, Jovell A, Escarrabill J, Marca G, Corbella X. Standardizing admission and discharge processes to improve patient flow: a cross sectional study. BMC health services research. 2012 Dec;12:1-6.	900 bedded university affiliated hospital in metropolitan Barcelona, Spain	53,361	Simple random sampling <u>Study design-</u> Cross-sectional study	- Patients' median stay in the hospital was for 8.56 days. - Number of interventions that were cancelled due to lack of beds was 216 in the year 2007 and 42 in the year 2009. - Planned discharges increased from 43.05% in the year 2007 to 86.01% in 2009.
2.	Jatin Kumar <u>Year:</u>2022 <u>Citation:</u> Kumar J. A study of the causes of delay in patient discharge process in a large multi-speciality hospital with recommendations to improve the turn around time. QAI Journal for Healthcare Quality and Patient Safety. 2022 Jan 1;3(1):13-20.	4 wards of a multi-speciality hospital (surgical ward, medical ward, pediatric ward, women's ward)	100	Purposive sampling (non-probability sampling) <u>Study design-</u> Descriptive cross-sectional study	- Average time taken for a cash patient's discharge is 3 hour and 57 mins, whereas for insurance patients it is 5 hours and 9 min. - This indicated that there was a delay of 1 hour 41 mins for cash and 1 hour 23 mins for insurance patients - Notable findings included that all process expect the billing was done by nurses

					themselves, most of the delay was in gaining clearance from the laboratory, followed by pharmacy, radiology and lastly the finalization of the discharge summary
3.	P Hendy, JH Patel, T Kordbacheh, N Laskar, M Harbord <u>Year:</u>2022 <u>Citation :</u> Hendy P, Patel JH, Kordbacheh T, Laskar N, Harbord M. In-depth analysis of delays to patient discharge: a metropolitan teaching hospital experience. Clinical Medicine. 2012 Aug 1;12(4):320-3.	Chelsea and Westminster Hospital, London	83	Prospective consecutive sampling technique (non-probability sampling) <u>Study design:</u> Descriptive study	• Delays in patient discharge exacerbated the bed shortages in a facility. • 65% of patients experienced a delay while awaiting a particular service • 48% of the patients had delays that extended their discharge date • 77% holdups resulted from delays in the provision of social and therapy requirements
4.	Mr. Raj Kumar Sharma, Dr. Nipul Kapadia, Mr. Sachin Raval, Mr. Sanket Shah, Mr. Amit Patel <u>Year:</u>2022 <u>Citation:</u> Sharma MR, Kapadia N, Raval MS, Shah MS, Patel MA. A STUDY OF	Apollo Hospital International Limited, Ahmedabad, Gujarat, India.	100	Purposive sampling for discharge process and convenience sampling for patient feedback (non-probability sampling) <u>Study design:</u> Observational study	• Maximum TAT was 8 hours between the discharge intimation to the handover to patient and average of 5 hours was taken between the discharge intimation to the room preparation for the next patient. • Before the intervention,

	DISCHARGE PROCESS WITH STRATEGY TO REDUCE THE TURN AROUND TIME IN TERTIARY CARE HOSPITAL				58% of the patients regarded the discharge process as excellent, 21% as very good, 14% as good, 5% as average and 2% as poor • After the intervention, 72% of the patients regarded the process as excellent, 17% as very good, 9% as good, 2% as average and none as poor
5.	Sayed Hisham, Shahina Abdul Rasheed, Brayal D'souza <u>Year:</u> 2020 <u>Citation:</u> Hisham S, Rasheed SA, Dsouza B. Application of predictive modelling to improve the discharge process in hospitals. Healthcare informatics research. 2020 Jul 31;26(3):166-74.	Inpatient department (cardiology) of a tertiary care hospital	108	Convenience sampling (non-probability sampling) <u>Study design:</u> Observational study	• The significant factors causing delay of the discharge process and prolonging the discharge TAT were the treating doctor (contributed over 30%) and the pending final day cross-consultations • The model developed through machine learning could predict the TAT with an accuracy of 77.3% (R^2 value) and a mean squared error (MSE) of 702.26 min². • The standard error of 26.7 minutes was seen with a 95% confidence interval

					The model developed can predict discharge TAT with an accuracy of ± 52 minutes
6.	Sima Ajami, Saeedeh Ketabi <u>Year:</u> 2007 <u>Citation</u> :Ajami S, Ketabi S. An analysis of the average waiting time during the patient discharge process at Kashani Hospital in Esfahan, Iran: a case study. Health Information Management Journal. 2007 Jul;36(2):37-42.	Kashani Hospital, Esfahan, Iran	448 patients and 40 hospital staff	Staff- Purposive sampling, Patients- Convenience sampling (non-probability sampling) <u>Study design:</u> Descriptive cross-sectional case study	- The average waiting time for the discharge process was 4.93 hours. - The longest hospital stay was in the neurology ward i.e., 5.7 days - The staff had the opinion that the factors that influenced the waiting time the most was the fact that physicians do not come for rounds on time, followed by the delay by the interns to complete the discharge summary, then the absence of a network HIS and finally the absence of guidelines for staff who play a role in the discharge process. - The hospital staff also identified major factors that were affecting the average waiting time as the patient's financial problems and the

					distance between different wards
7.	Pratiksha Suresh Chaudhari, Vitthal Shinde, Vandana Gudhe <u>Year:</u> 2021 <u>Citation:</u> Chaudhari PS, Shinde V, Gudhe V. A Study on Reducing the Discharge Turnaround Time of IPD Patients at AVBRH.	Acharya Vinoba Bhave Rural Hospital, Sawangi Meghe, Wardha, India	60	Purposive sampling (non-probability sampling) <u>Study design:</u> Observational retrospective study	- Staff involved in the discharge process should work properly and efficiently to ensure that patients do not suffer due to delays in discharge process. - Patient feedback during discharge process is an important parameter to gauge the overall patient satisfaction - Collaboration between the staff and patient education and empowerment are essential.
8.	Anil Pandit, Savita Prashar <u>Year :</u> 2019 <u>Citation:</u> Pandit A, Prashar S. A study of the Discharge Process of a Multi-Specialty Hospital. SCOPUS IJPHRD CITATION SCORE. 2019 May;10(5):6.	Multi-speciality hospital	150 insurance patients, 170 cash patients	Purposive sampling (non-probability sampling) <u>Study design:</u> Retrospective observational study	- Delay in discharge was a leading cause of patient dissatisfaction, major cause for unavailability of beds for new admission cases - Discharge time for both the cash and insurance cases exceeded the TAT of the hospital - The causes were found to be delay in the consultant's rounds, delay in the preparation and correction of the discharge summary, delay

					in insurance clearance, delay in vacating the bed after patient discharge and a delay in the arrival of the stretcher • Average time taken for insurance patients was about 7 hours and 5 hours for the cash patients
9.	Theodore T.Allen, Shih-Hsien Tseng, Kerry Swanson, Mary Ann McClay <u>Year</u> : 2009 <u>Citation</u>: Allen TT, Tseng SH, Swanson K, McClay MA. Improving the hospital discharge process with Six Sigma methods. Quality Engineering. 2009 Dec 7;22(1):13-20.	St. Mary Janesville Hospital, Wisconsin	100	Convenience sampling (for chart reviews and pilot data); Sequential sampling for 100 discharge records (non-probability sampling) <u>Study design</u>: Quality improvement case study	• When the five phase DMAIC approach was used along with process mapping, pareto charting and preparing cause-and-effect matrices, it was noted that focusing on the physician preparation of the discharge order writing has the greatest effect • Average discharge time was reduced from 3.3 hours to 2.8 hours (p=0.06) • Missing data from the chart was reduced by 62%

CHAPTER 4: METHODOLOGY

This was a cross-sectional observational study, which entailed a real time analysis of patient discharge processes in the IPD of CARE Ramnagar. The data collection was done for cash, insurance and PSU inpatients for a span of 26 days, starting from the 10th of March, 2025 till the 10th of April, 2025.

This research focuses on patients who were discharged from the IPD wards, HDUs, CCUs and the CATH Labs. Data was collected separately for cash, insurance and PSU patients, in order to make the process of capturing the essential details of delay in the TAT more efficient, owing to the difference in TAT of all three.

DATA COLLECTION METHOD

The real-time data of accepting the files or the clearances electronically was done using the SOPEONOW software, and the reasons for delay or any discrepancy in time data was noted through real-time observation at the nursing station, summary typing area, pharmacy and the billing department.

This was meticulously recorded in an Excel Spreadsheet at the end of each day, starting from the discharge initiation with the consultant's approval at the nursing station till the bed was released by the patient.

SAMPLE SIZE

Since the month of December 2024 till the month of February 2025, i.e., for a period of 3 months, 5470 patients were discharged from the inpatient department, out of which 970 belonged to the cash/self-pay category, 1150 belonged to the insurance category and 3350 came under the PSU category. This included discharges of inpatients from all the departments.

10% of the total discharges were taken under each category-

10% of 970 cash patients- 97 patients

10% of 1150 insurance patients- 115 patients

10% of 3350 PSU patients- 335 patients

SAMPLING TECHNIQUE

The sampling technique used for this study was a convenience sampling method in order to ensure data collection feasibility within the given time frame and the resources. This ensured that the sample is representative of the population of inpatients that were discharged from the hospital. By aiming for a 10% sample size, a balance between statistical validity and practical feasibility. This was done to ensure the study outcomes are reliable and actionable.

- **Inclusion Criteria** – 547 Cash, Insurance and PSU inpatients discharged from the IPD of the tertiary healthcare facility between March 10th to April 10th, 2025
- **Exclusion Criteria** – Patients discharged from IPD before 10th March or after 10th April, 2025, patient discharges done on Sundays, patients admitted for daycare procedures.

DATA ANALYSIS

The entire discharge process TAT (TAT_0) divided into 6 sub-TATs as per the recommended turnaround times in the various departments.

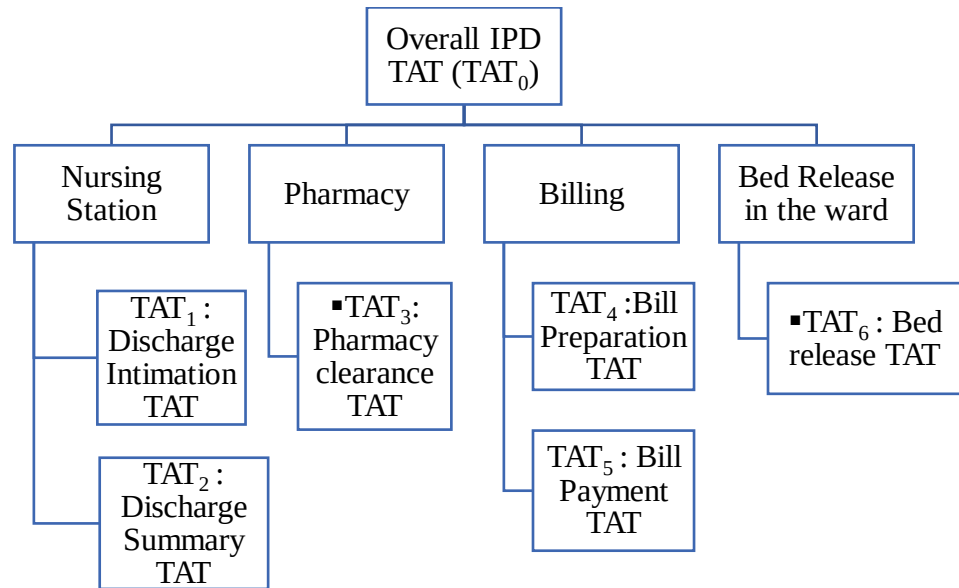


FIGURE 4.1: THE TATs CONSIDERED FOR ANALYSIS AS PER THE DEPARTMENTS

TABLE 4.1: DESCRIPTION OF THE TATs

TAT_1	The TAT of confirmation of discharge by the consultant and initiation of the discharge process by the nurses' station
TAT_2	The TAT from the beginning of the discharge initiation till the final discharge summary is ready
TAT_3	The TAT of the pharmacy receiving the file and providing complete pharmacy clearance
TAT_4	The TAT of the file being received by billing till the final invoice is prepared
TAT_5	The bill settlement TAT by the patient attenders
TAT_6	The TAT for the release of the bed by the patient after settlement of the bill
TAT_0	$TAT_1 + TAT_2 + TAT_3 + TAT_4 + TAT_5 + TAT_6 = TAT_0$ The total IPD discharge TAT.

The data for cash, insurance and PSUs were entered and analyzed separately as the overall IPD TAT varied for the three. (Table 2.1)

The TAT at every step was noted along with the specific reasons for delay in an Excel Spreadsheet. Then further analysis was done on IBM SPSS Statistics 27. Descriptive statistics was used to conduct univariate analysis at each stage to identify the median TAT, frequency of cases which were within the specified TAT and those which exceeded it; followed by identifying the reasons for delay and their frequency. Following this, a new variable was computed for the total IPD TAT, to identify the number of cases that met the KPI and those which did not. After this, bivariate analysis was done using chi-square tests to identify the significance of delays at each stage with the status of the overall IPD TAT. ($p \leq 0.05$ was considered significant)

ETHICAL CONSIDERATIONS

During the entire course of the study, highest regard was given to patient and staff confidentiality and privacy. The identifying information of the patient (their name, medical records and other details) or the consultant and staff names were accessed only for the ease of analysis and not disclosed to any authority. These were kept under strict security measures to avoid any unauthorized access or disclosure and not reflected in any part of the study.

The software access was done only after taking permission from the designated hospital authorities. For the real-time observations, permission was taken from the staff to shadow the files to prevent any disruption in day-to-day activities. When the patient attender had to be shadowed, the nature of the study and reason for conducting it was thoroughly explained; further inclusion was done only when verbal consent was obtained.

BIASNESS IN THE STUDY

In order to prevent bias in the study, only the case files that could be shadowed and followed were included. No secondary data was collected from any sources, the data from SOPEONOW was correlated with the rough data noted while shadowing the files and the patient attenders. No secondary information was collected from any staff member, only the reasons that could be observed first-hand were included. On each day, all types of patients (cash, insurance and PSU) patients' data were collected using convenience sampling to capture day-to-day variations.

The number of cases followed daily were kept to a minimum in order to ensure effective observation. Each case was followed till the completion. Additionally, when seeking permission to observe, I introduced myself to both the staff and attenders as an intern aiming to learn about the process for academic purpose. This was done to ensure transparency while minimizing the Hawthorne effect, keeping the natural environment of the setting intact.

LIMITATIONS

The data collection was done using convenience sampling due to time and resource constraints only over a period of 26 days only in CARE Ramnagar. This limits the representativeness of the sample, generalizability to other healthcare institutions and the short observation window may not capture the seasonal patterns or periodic fluctuations in discharge process. Furthermore, the discharges on Sundays were not included, which could be relevant as several staff were usually on leave. Similarly, the daycare process discharges were not included, leading to omission of relevant process variations.

In addition to this, despite efforts to minimize bias through the Hawthorne effect, regular presence and participation in other activities throughout the internship may have contributed unintentionally to influencing staff behavior.

CHAPTER 5: RESULTS

The overall data that was collected in CARE Ramnagar, Visakhapatnam from 10th March to 10th April elaborated on the factors that influenced the TAT in the IPD discharge process at each step and as a whole

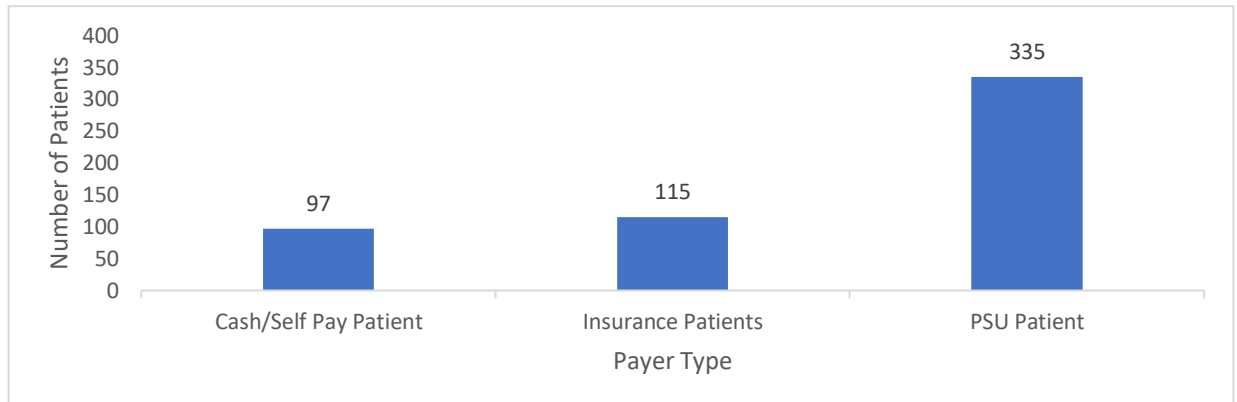


Figure 5.1: Number of patients in each payer type (N=547)

5.1: CASH/SELF-PAY PATIENTS

When we look at the age-wise demographic distribution of the cash patients, more than 2/5th of the patients were senior citizens (44.3%) [Table 5.1.1]

Table 5.1.1: Age-wise demographic distribution of cash patients (N=97)

Age group	Percent
Child (0-12 years)	1.0
Teen (13-19 years)	1.0
Junior Adult(upto 30 years)	16.5
Senior Adult(upto 60 years)	37.1
Senior Citizen(60+ years)	44.3

Among the 97 discharge cases, more than 4/5th were normal cases (89%), whereas the remaining cases came under DAMA, Discharges on Request for non-complicated cases, MLCs or Death. [Figure 5.1.1]

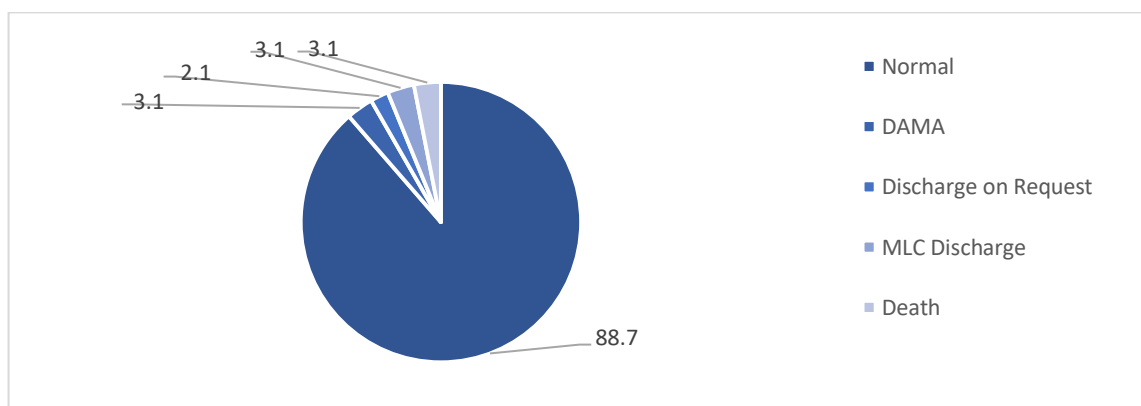


Figure 5.1.1: Types of discharges of cash/self-pay patients

Nearly 2/5th of the patients was admitted under the department of cardiology (40%), nearly eight percent of the cases under neurology, seven percent of the cases under gastroenterology followed by the remaining departments. [Table 5.1.2]

Table 5.1.2: Department-wise distribution of the cash patients in IPD (N=97)

Specialty	Percent
Cardiology	40.2
Neurology	8.2
Gastroenterology	7.2
Nephrology	7.2
Cardiothoracic surgery	5.2
Urology	5.2
Internal Medicine	4.1
Surgical Gastroenterology	4.1
General Medicine	3.1
Neurosurgery	3.1
Orthopedics	3.1
Plastic Surgery	3.1
Critical Care Medicine	2.1
Pulmonology	2.1
ENT	1.0
Obstetrics/Gynecology	1.0

It was noteworthy that more than 3/5th of the cash discharge cases were unplanned day discharge cases (79%). [Table 5.1.3]

Table 5.1.3: Frequency of planned and unplanned discharge cases (N=97)

	Frequency	Percent
Planned	20	20.6
Unplanned	77	79.4

Majority of the cash discharge cases had their discharge intimation done by the nursing station within the stipulated turnaround time (TAT₁) after the consultant's approval (96%). The delays were confined to prolonged time taken up by the consultant and cross-consultant's discussion leading to a delay in marking from the nurses' station, leading to a delay in the marking from the nurses' station as the staff would be preoccupied with other tasks and any last-minute dressings for surgical cases that had to be done and billed before initiation of the process. [Figure 5.1.2]

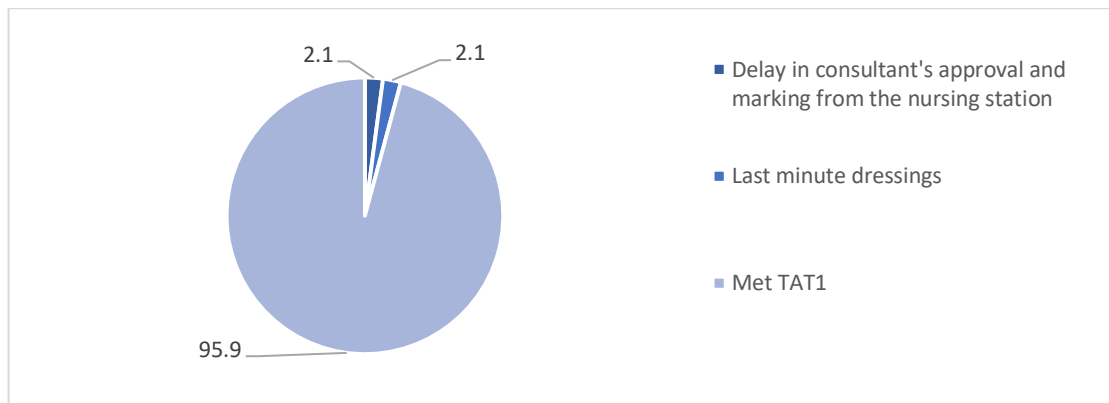


Figure 5.1.2: Delay reasons for discharge intimation from the nurses' station for cash patients

When it came to the discharge summary preparation turnaround time (TAT₂), more than 3/5th cases had exceeded the recommended time (63%). The reasons for delay were- waiting for the consultant to go through the rough summary and suggest corrections in more than 2/5th of the cases (41%), followed by waiting for the cross-consultant's approval of the summary and waiting for the change of medication as per the consultant's advice. [Figure 5.1.3]

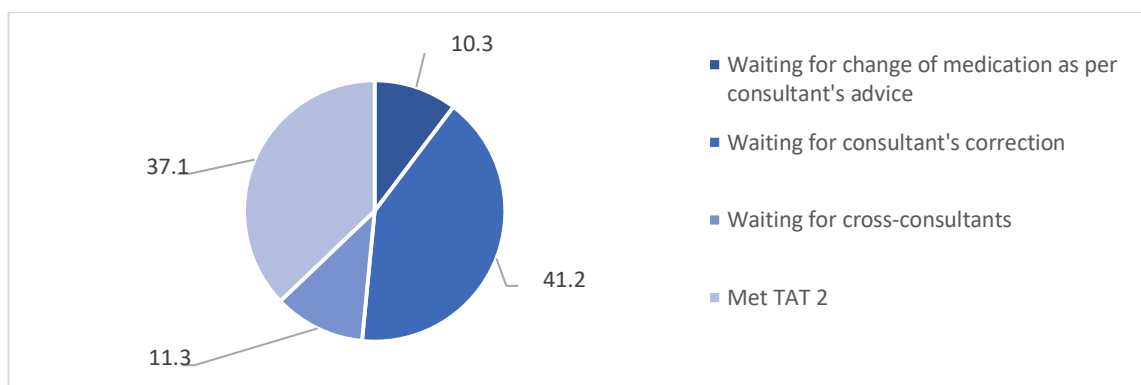


Figure 5.1.3: Delay reasons for preparation of discharge summary for cash patients

Similarly, more than 3/5th of the cases (69%) did not get the pharmacy clearance within the turnaround time (TAT₃). In more than half of the cases, the delay was due to procedural inefficiency (52%), followed by the delay from the OT pharmacy for surgical cases and those cases which did not receive the invoice from the external vendor for the material used during the surgery. [Figure 5.1.4]

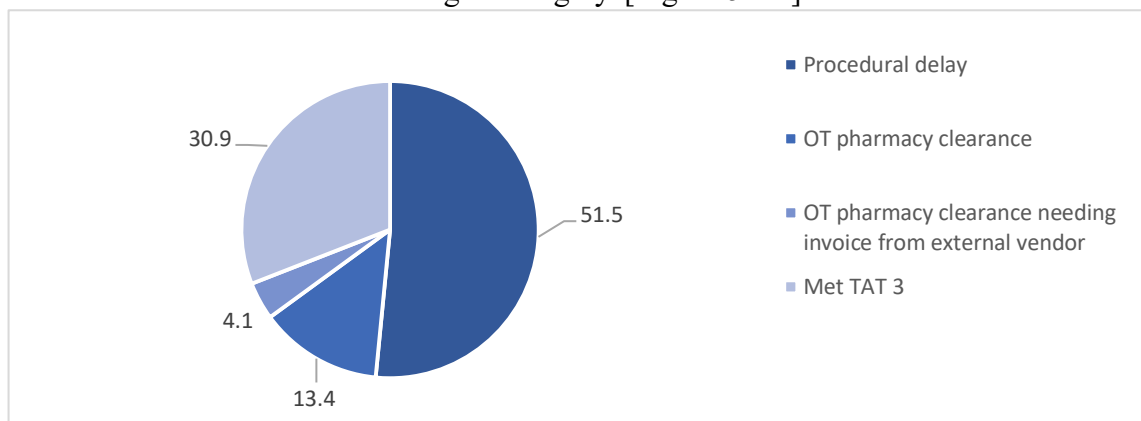


Figure 5.1.4: Delay reasons for pharmacy clearance for cash patients

More than half of the cases (59%) had their bill prepared with the recommended TAT (TAT₄); but simultaneously more than half (57%) of the invoices exceeded the turnaround time for settlement (TAT₅). The delays that occurred during bill preparation were solely due to an inefficient procedure. 2/5th of cases had a delay from the patient party (40%) whereas the remaining were cases where the bill was prepared but not communicated leading to the delay from the patient party. [Figure 5.1.5]

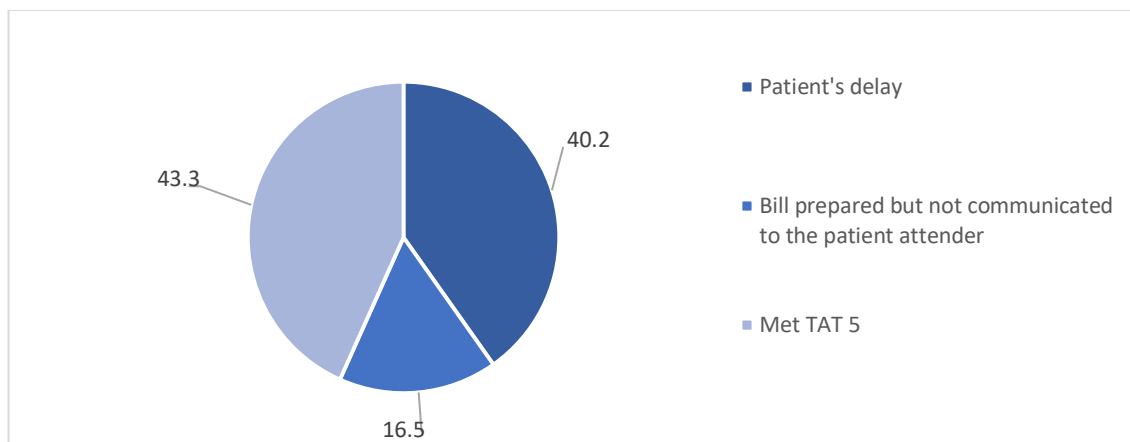


Figure 5.1.5: Delay reasons for bill settlement of cash patients

Majority of the cases (91%) released the bed in the ward within the stipulated time (TAT₆). The cause for delay was due to patients' personal reasons such as lunch, waiting for their personal transport.

When it came to the overall KPI of IPD discharge TAT (TAT₀), more than 3/4th of the cases did not meet the required TAT for a cash patient's discharge (78%).

Table 5.1.4: Cases that met the recommended KPI at each stage of discharge (N=97)

TAT stage	Cases met KPI (%)	Median time (mins)		IQR	Minimum Time (mins)	Maximum Time (mins)
TAT ₁	95.9	1		1	0	459
TAT ₂	37.1	60		172	1	10198
TAT ₃	30.9	17		21	3	87
TAT ₄	58.8	17		37	0	1513
TAT ₅	43.3	49		125	0	4378
TAT ₆	90.7	0		11	0	94
TAT ₀	21.6	224		302	38	10238

Table 5.1.5: Association between individual TATs within KPI of the step and the overall IPD TAT KPI (N=97)

Variable	Frequency of cases within TAT of the step and met overall IPD TAT	Total cases within TAT of that particular step	<i>p-value</i>
TAT ₁ (Discharge Intimation TAT)	20	93	0.868
TAT ₂ * (Discharge Summary TAT)	18	36	<0.001
TAT ₃ (Pharmacy clearance TAT)	7	30	0.788
TAT ₄ * (Bill preparation TAT)	17	57	0.020
TAT ₅ (Bill settlement TAT)	13	42	0.052
TAT ₆ (Bed release TAT)	20	88	0.420
<i>*p≤0.05</i>			

A chi-square test was done in order to check for the significance of the individual step TATs with the overall IP discharge TAT. Discharge summary preparation TAT and bill preparation TAT were found to be statistically significant. This led to rejection of null hypothesis TAT₂H₀ and TAT₄H₀. All other hypothesis about individual TATs (TAT₁H₀, TAT₃H₀, TAT₅H₀ AND TAT₆H₀) were accepted for cash patients. [Table 5.1.5].

Furthermore, a chi-square test was done in order to understand if there was any significant relationship between the overall IPD TAT and planned/unplanned discharges. It was found to be statistically significant. This led to rejection of null hypothesis TAT₀H₀ for cash patients. [Table 5.1.6]

Table 5.1.6: Overall KPI Met/Not Met * Planned/Unplanned Discharge(N=97)

KPI (Met/Not Met)		Planned/Unplanned		Total	Asymptotic Significance (2-sided) (<i>p-value</i>)
		Planned	Unplanned		
	Met KPI	5	16	21	0.042*
	Not Met KPI	15	61	76	
Total		20	77	97	
* <i>p</i> ≤0.05					

5.2: INSURANCE PATIENTS

The age wise demographic distribution of the insurance patients revealed that nearly 37 percent were senior citizens, 31 percent were senior adults and the remaining were aged 30 years or below [Table 5.2.1]-

Table 5.2.1: Age-wise demographic distribution of insurance patients (N=115)

Age group	Percent
Child (0-12 years)	0.9
Teen (13-19 years)	0
Junior Adult(upto 30 years)	30.4
Senior Adult(upto 60 years)	31.3
Senior Citizen(60+ years)	37.4

Among the 115 patients, majority of the cases were normal discharges (96%), while there were very few DAMA or Death cases during the observation period. [Figure 5.2.1]

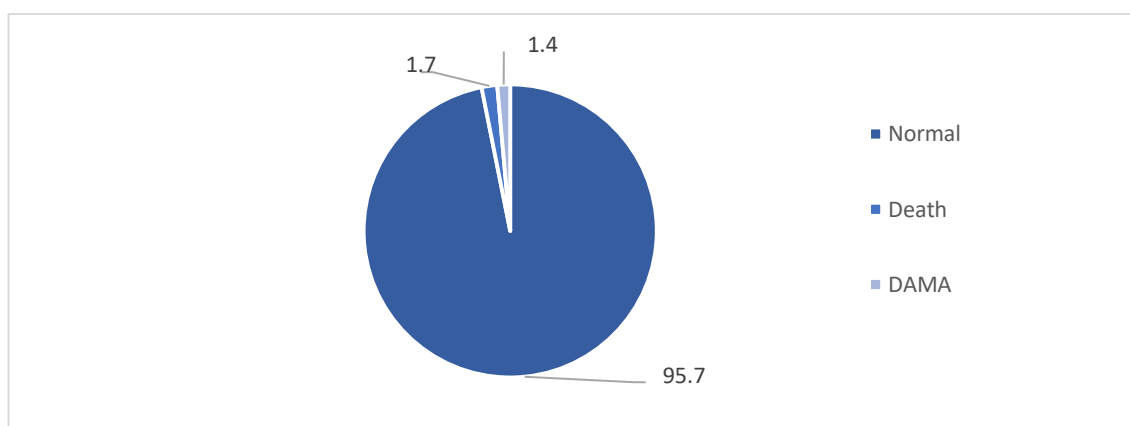


Figure 5.2.1: Types of discharges of insurance patients

Twenty three percent of the cases were admitted under the department of gastroenterology, followed by 19 percent under cardiology and endovascular surgery, 10 percent under neurology and orthopedics, followed by the remaining departments. [Table 5.2.2]

Table 5.2.2: Department-wise distribution of the insurance patients in IPD (N=115)

Specialty	Percent
Cardiology	18.3
Gastroenterology	11.3
Surgical Gastroenterology	11.3
Neurology	10.4
Orthopedics	10.4
ENT	8.7
Urology	7.0
General Medicine	5.2
Internal Medicine	4.3
Nephrology	4.3
Pulmonology	3.5
Neurosurgery	2.6

Obstetrics and Gynecology	0.9
Plastic Surgery	0.9
Endovascular Surgery	0.9

In the case of insurance patients, more than 3/5th of the cases (63%) were unplanned day discharge cases. [Table 5.2.3]

Table 5.2.3: Frequency of planned and unplanned discharge cases (N=115)

	Frequency	Percent
Planned	43	37.4
Unplanned	72	62.6

It was seen that majority of the cases had their discharge intimation done within the recommended TAT, i.e. TAT₁ (96%). The only cause for delay was the time taken by the nursing staff to mark it in the system following the consultant's approval as they would be preoccupied with other tasks.

When it came to the discharge summary turnaround time (TAT₂), more than 3/5th of the cases (66%) exceeded the recommended TAT. The cause for delay in more than 2/5th of the cases was due to prolonged time taken by the consultant for correcting the summary (42%) while the remaining were due to the wait for a change in medication as per the consultant's advice or waiting for cross consultant's approval. [Figure 5.2.2]

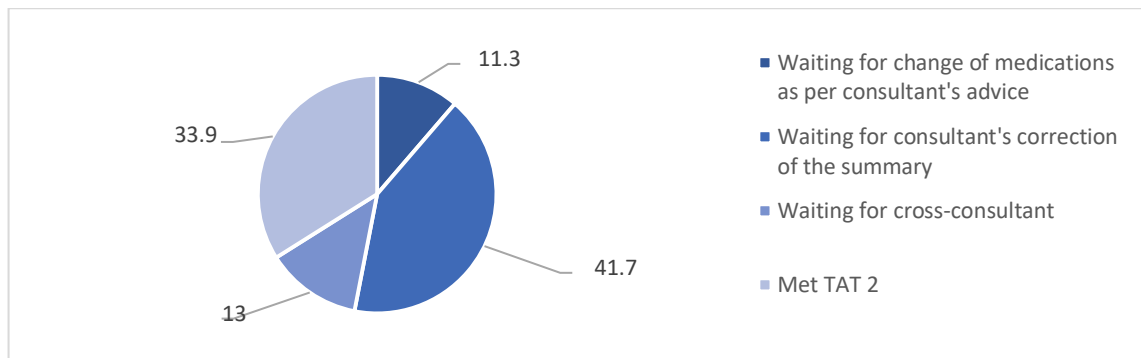


Figure 5.2.2: Delay reasons for preparation of discharge summary for insurance patients

Seventy three percent of the cases were given pharmacy clearance within the recommended turnaround time (TAT₃). More than half of the cases delay was due to procedural inefficiencies (52%), followed by delay in being granted OT pharmacy clearance and those surgical cases which needed the external vendor's clarification. [Figure 5.2.3]

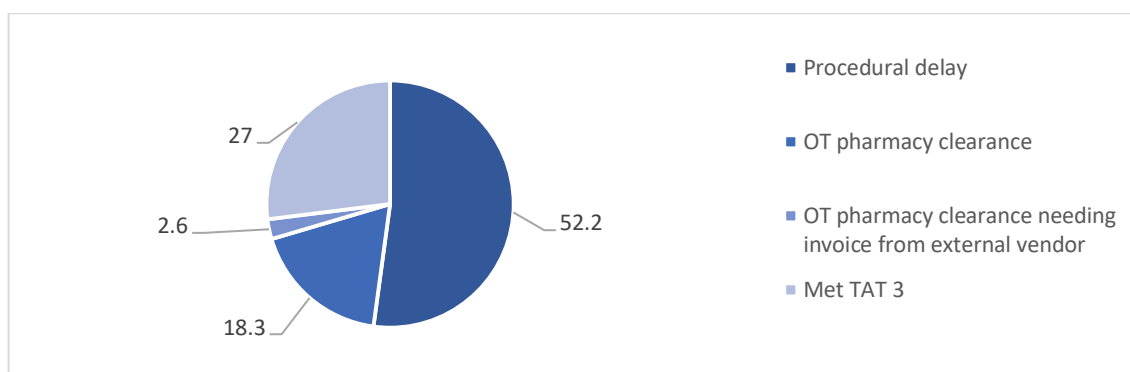


Figure 5.2.3: Delay reasons for pharmacy clearance of insurance patients

Majority of the cases did not meet the bill preparation turnaround time (TAT₄) (96%) due to factors such as procedural delay, additional auditing and delayed response from the TPA. Invoices of more than 3/4th of the cases (76%) were settled within the bill settlement turnaround time (TAT₅). The causes for delay were due to the bill being prepared and not communicated to the attender and lack of proper communication from the TPA. [Figure 5.2.4]

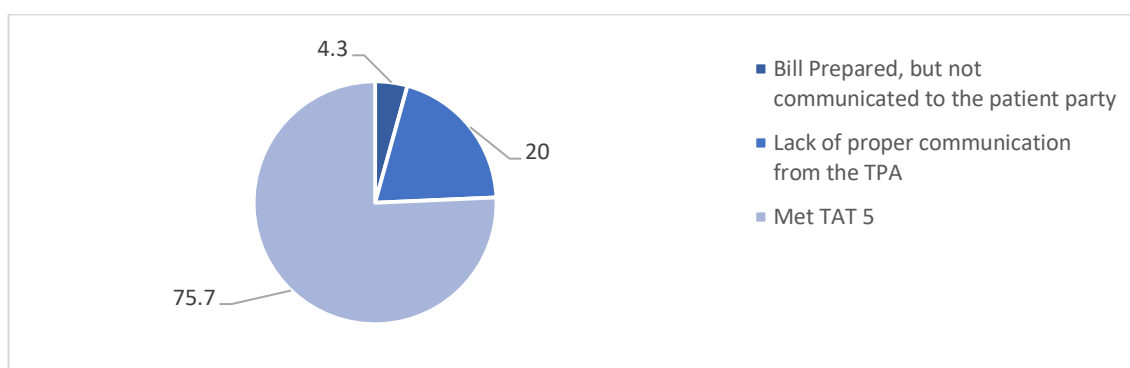


Figure 5.2.4: Delay reasons for bill settlement of insurance patients

Most of the cases took a reasonable time to release the beds in the ward after settling the invoice (90%). The delays were due to patient's personal reasons such as lunch, waiting for transport, waiting for a relative etc.

When it came to the overall KPI of the IPD discharge TAT of insurance patients (TAT₀), more than 4/5th of the patients of the cases did not meet the recommended discharge TAT of insurance patients (83%). [Table 5.2.4]

Table 5.2.4: Cases that met the recommended KPI at each stage of discharge (N=115)

TAT stage	Cases met KPI (%)	Median time (mins)	IQR	Minimum Time (mins)	Maximum Time (mins)
TAT ₁	95.7	0	1	0	841
TAT ₂	33.9	47	138	0	4586
TAT ₃	27.0	16	19	3	1061
TAT ₄	4.3	184	152	0	1053
TAT ₅	75.7	52	129	0	3919
TAT ₆	89.6	1	10	0	135
TAT ₀	17.4	407	423	4	4967

Table 5.2.5: Association between individual TATs within KPI of the step and the overall IPD TAT KPI (N=115)

Variable	Frequency of cases within TAT of the step and met overall IPD TAT	Total cases within TAT of that particular step	<i>p-value</i>
TAT ₁ (Discharge Intimation TAT)	19	110	0.875
TAT ₂ * (Discharge Summary TAT)	12	39	0.007
TAT ₃ * (Pharmacy clearance TAT)	9	31	0.045
TAT ₄ * (Bill preparation TAT)	7	13	0.010
TAT₅ (Bill settlement TAT)	20	87	0.005
TAT ₆ (Bed release TAT)	20	103	0.093
*$p \leq 0.05$			

A chi-square test was done in order to test the significance between the individual step TATs and the overall IP discharge TAT. The discharge summary TAT, pharmacy clearance TAT, bill preparation TAT and bill settlement TAT were found to be statistically significant. This led to the rejection of null hypothesis TAT₂H₀, TAT₃H₀, TAT₄H₀ and TAT₅H₀. The TAT₁H₀ and TAT₆H₀ were accepted for insurance patients. (However, the bill settlement TAT's significance and TAT₅H₀ cannot be considered as a cell value was less than 5) [Table 5.2.5]

Furthermore, another chi-square test was done in order to check for statistical significance between the overall IPD TAT and the planned/unplanned cases. No statistical significance was found in the case of insurance patients. Therefore, null hypothesis TAT₀H₀ was accepted in the case of insurance patients. [Table 5.2.6]

Table 5.2.6: Overall KPI Met/Not Met * Planned/Unplanned Discharge(N=115)

KPI (Met/Not Met)		Planned/Unplanned		Total	Asymptotic Significance (2-sided) (<i>p-value</i>)
		Planned	Unplanned		
	Met KPI	10	10	20	0.200
	Not Met KPI	33	62	95	
Total		43	72	115	
* <i>p</i> ≤0.05					

5.3: PSU PATIENTS

The age-wise demographic distribution of PSU patients showed that 37 percent of the patients were senior citizens, 39 percent of the patients were between 31 and 60 years of age, while the remaining were below 30 years of age. [Table 5.3.1]

Table 5.3.1: Age-wise demographic distribution of PSU patients (N=335)

Age group	Percent
Child (0-12 years)	2.4
Teen (13-19 years)	1.2
Junior Adult(upto 30 years)	20.9
Senior Adult(upto 60 years)	38.5
Senior Citizen(60+ years)	37.0

Among the 335 PSU patients, majority were normal discharges (92%) while the remaining included DAMA, Death, Discharge on Request for non-complicated cases and MLCs. [Figure 5.3.1]

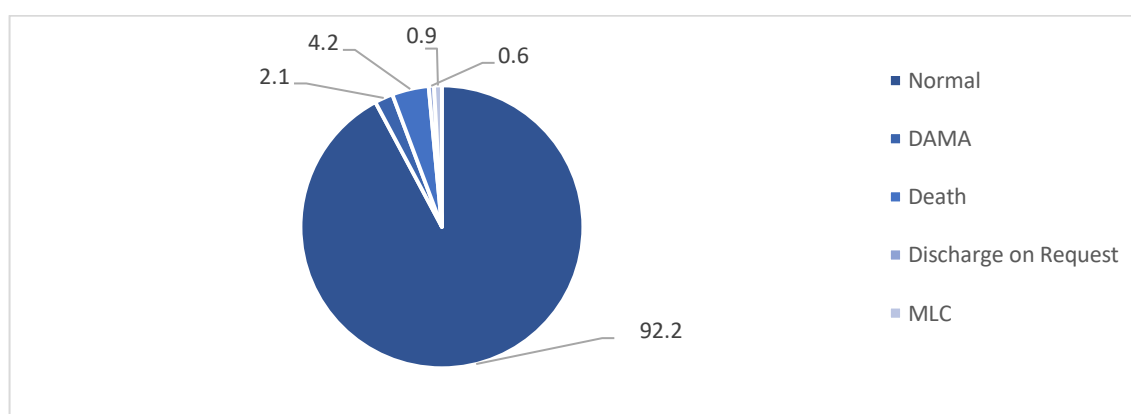


Figure 5.3.1: Types of discharges of PSU patients

More than 1/4th of the patients was admitted under the department of cardiology and cardiothoracic surgery (26%). The remaining major departments were orthopedics, gastroenterology, urology, nephrology and neurosurgery. [Table 5.3.2]

Table 5.3.2: Department-wise distribution of the PSU patients in IPD (N=335)

Specialty	Percentage
Cardiology	21.8
Orthopedics	14.9
Urology	9.9
Nephrology	8.4
Neurosurgery	8.4
Surgical Gastroenterology	8.4
Gastroenterology	5.4
Neurology	4.8
Pulmonology	4.5
Cardiothoracic Surgery	3.9
General Medicine	3.0
Internal Medicine	3.0

ENT	2.4
Critical Care Medicine	1.2
Pediatrics	0.3

More than half of the cases of discharge under public sector undertakings were unplanned day discharge cases (52.2%). [Table 5.3.3]

Table 5.3.3: Frequency of planned and unplanned discharge cases (N=335)

	Frequency	Percent
Planned	160	47.8
Unplanned	175	52.2

Majority of the discharge process intimation was done within the stipulated TAT, i.e., TAT₁ (98%). The major causes for delay in this step was similar to the insurance and cash cases, i.e., delay in the consultant's approval and marking from the nursing station and delay in the consultant's approval. [Figure 5.3.2]

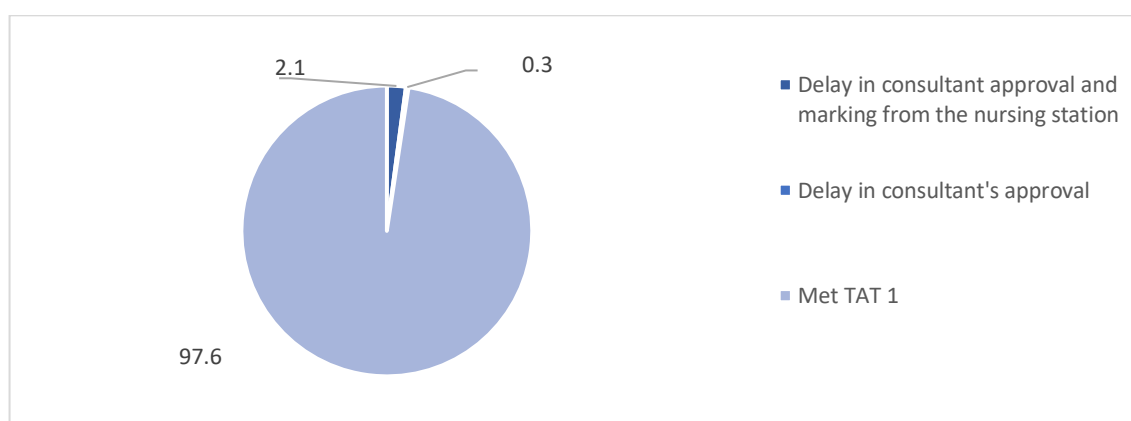


Figure 5.3.2: Delay reasons for discharge intimation from the nurses' station for PSU patients

Following this, more than 3/5th of the cases had their discharge summary ready within the stipulated turnaround time i.e. TAT₂ (70%). The delays recorded in this step was also because of similar factors such as waiting for the consultant's correction, waiting for a change of medications as per the consultant's advice and waiting for the cross-consultants. [Figure 5.3.3]

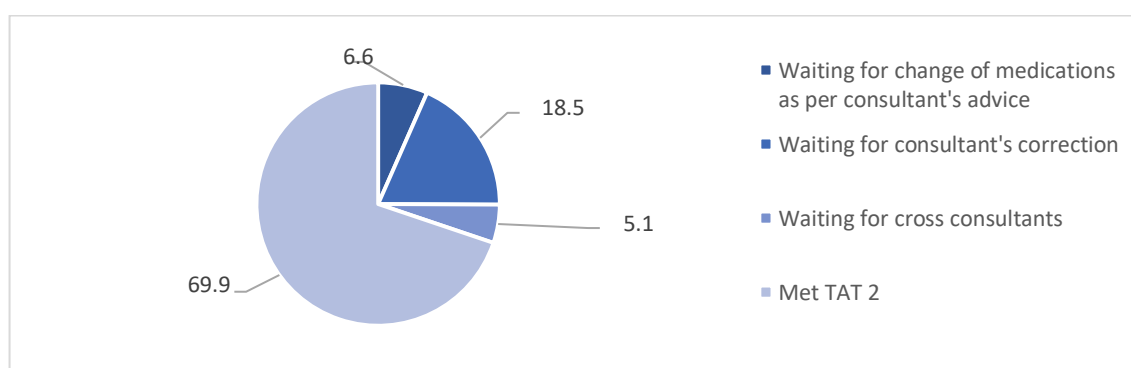


Figure 5.3.3: Delay reasons for preparation of the discharge summary of PSU patients

Seventy three percent of the discharge cases exceeded the pharmacy clearance turnabout time, i.e. TAT₃. More than half of the cases here too were due to procedural inefficiencies (54%), followed by delays from the OT pharmacy and delay in the OT pharmacy clearance due to a lack of clarity about the invoice from the external vendor. The last one was more important in the case of PSU discharges as only certain types of stents, implants and valves were allowed under the packages. [Figure 5.3.4]

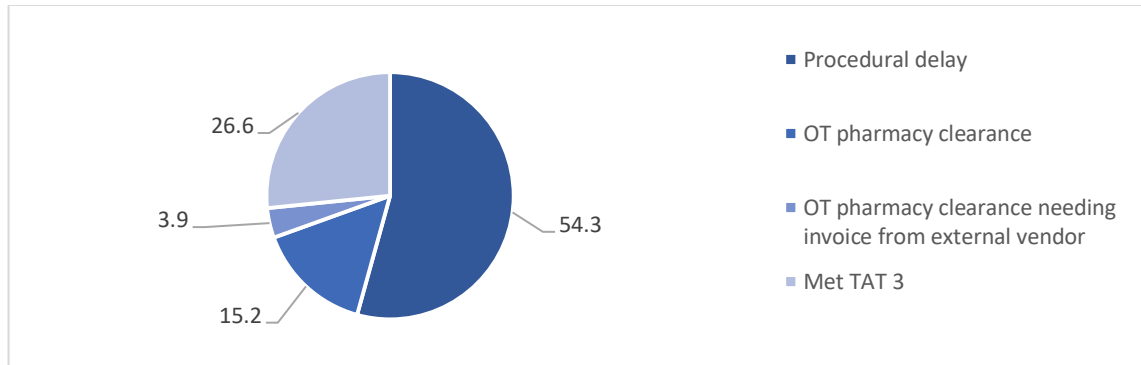


Figure 5.3.4: Delay reasons for the pharmacy clearance of PSU patients

Seventy two percent of the PSU cases had their bills prepared within the recommended TAT (TAT₄). The delays if any, were solely due to procedural inefficiencies in the billing department.

More than 3/4th of the cases bills was settled within TAT₅, (77%). The TAT was exceeded only in cases of patient's personal delays and when the bill was prepared, but it was not communicated to the attenders. [Figure 5.3.5]

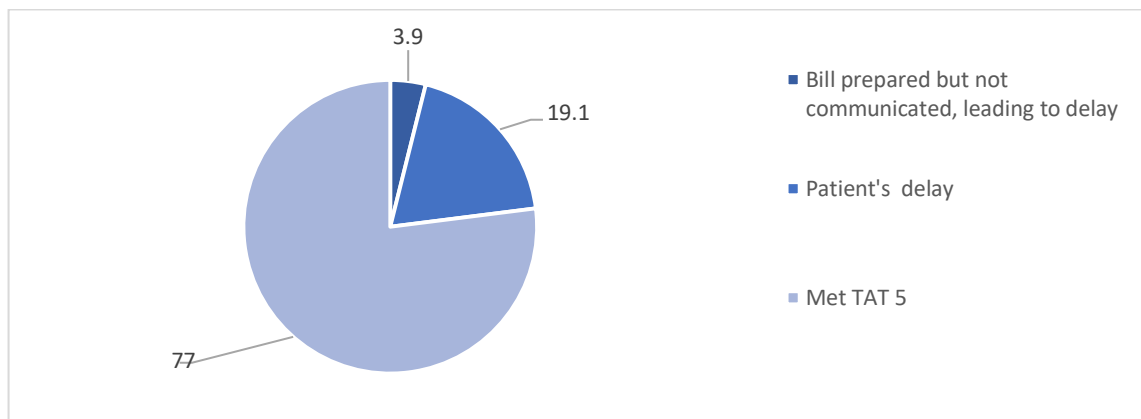


Figure 5.3.5: Delay reasons for the bill settlement of PSU patients

More than 4/5th of the cases had a reasonable bed release TAT in the wards (86%). The delays were similar, and almost always due to the patient's personal reasons such as finishing lunch, waiting for a relative, waiting for transport etc.

When it came to the overall KPI of IPD discharge TAT for PSU patients, more than half of the discharge processes were within the recommended TAT for PSU. (59%)[Table 5.3.4]

Table 5.3.4: Cases that met the recommended KPI at each stage of discharge (N=335)

TAT stage	Cases met KPI (%)	Median time (mins)	IQR	Minimum Time (mins)	Maximum Time (mins)
TAT ₁	97.6	0	1	0	7087
TAT ₂	69.9	0	42	0	11668
TAT ₃	26.6	17	19	1	1244
TAT ₄	71.9	4	27	0	1282
TAT ₅	77.0	4	45	0	3753
TAT ₆	85.7	4	14	0	361
TAT ₀	59.1	105	204	9	12594

A chi-square test was done in order to test for statistical significance between the overall IPD TAT and the individual step TATs. The results showed that the discharge intimation TAT, discharge summary TAT, bill preparation TAT, bill settlement TAT and bed release TAT were statistically significant. Therefore, in the case of PSU patients, null hypothesis TAT₁H₀, TAT₂H₀, TAT₄H₀, TAT₅H₀ and TAT₆H₀ were rejected. Only TAT₃H₀ was accepted in the case of PSU patients. [Table 5.3.5]

Table 5.3.5: Association between individual TATs within KPI of the step and the overall IPD TAT KPI (N=335)

Variable	Frequency of cases within TAT of the step and met overall IPD TAT	Total cases within TAT of that particular step	<i>p-value</i>
TAT ₁ *(Discharge Intimation TAT)	196	327	0.047
TAT ₂ *(Discharge Summary TAT)	176	234	<0.001
TAT ₃ (Pharmacy clearance TAT)	59	89	0.108
TAT ₄ *(Bill preparation TAT)	164	241	<0.001
TAT ₅ *(Bill settlement TAT)	182	258	<0.001
TAT ₆ *(Bed release TAT)	178	287	0.008
*$p \leq 0.05$			

Another chi-square test was done in order to test for the statistical significance between the overall IPD TAT and planned/unplanned discharge cases. The results showed a significant relationship. Therefore, null hypothesis TAT₀H₀ was rejected for the PSU patients. [Table 5.3.6]

Table 5.3.6: Overall KPI Met/Not Met * Planned/Unplanned Discharge(N=335)

KPI (Met/Not Met)		Planned/Unplanned		Total	Asymptotic Significance (2-sided) (<i>p-value</i>)
		Planned	Unplanned		
	Met KPI	104	94	198	0.036*
	Not Met KPI	56	81	137	
Total		160	175	335	
* <i>p</i> ≤0.05					

CHAPTER 6: DISCUSSION

The present study evaluated the turnaround time for the inpatient discharge process at CARE Hospitals, Ramnagar, Visakhapatnam. The study focused on cash and insurance patients. The insurance cases were further divided into the private insurances and the PSU package patients.

The median time for the discharge of cash patients was found to be 3 hour and 44 minutes; 6 hours and 47 minutes for insurance patients and 1 hour and 45 minutes for the PSU patients. This showed that all the median TAT values except that of the PSU patients were notably delayed. This finding was aligned with the previous studies done by Choudhury et al. (2022) and Rathie et al. (2019), both the studies noting that delays in the discharge process among the insured patients was more frequent as there were additional complexities of approvals, auditing workflows and relied heavily on communication from the third-party administrator. The maximum delay was seen in cases that were being discharged on holidays or around holidays as this meant that most of the staff would be on leave. Additionally, planned/unplanned discharges tended to have an effect on the overall IPD discharge TAT₀. This was found significant for cash and PSU patients but not insurance patients. This reflects that having a better pre-discharge planning was necessary for insurance patients considering additional TPA response times. However, on a larger scale, the main arenas for delay were noted to be from the discharge initiation to pharmacy clearance, file review and billing process and preparation of the discharge summary for all three types of patients.

For cash patients, the median time taken to receive pharmacy clearance was noted to be 17 minutes, for insurance patients it was found to be 16 minutes and 17 minutes for PSU patients. The study conducted by Malhotra et al. (2020) highlighted that gaps in the interdepartmental coordination, the effect of which was more commonly seen in pharmacy and billing were instrumental in prolonging patient discharge times. Another reason was the extent of manual dependency in spite of using a HIS in order to provide pharmacy clearance after billing and even in the generation of the final bill. In this hospital, there was a functional HIS which provided a digital interface, but this system lacked integration and communication within the departments leading to fragmented workflows. Unlike the streamlined electronic discharge systems that were described in the findings of Ranjan et al. (2020) which was seen in high-performing private hospitals, integration of all the workflows would be difficult; as there was no automated notification systems, leading to further delays.

Another key area of delay was during the discharge summary preparation, where the process relied heavily on the consultant and cross-consultant's approval. The consultants usually had no fixed time for rounds and were engaged in surgeries (either emergency or preplanned) along with their regular outpatient duties. This issue was also noted in the study conducted by Ghosh et al. (2021) which was done in order to evaluate the discharge processes in the private sector hospitals of Kolkata, West Bengal, where a lack of clarity of consultant's availability extended the discharge times. This highlights the need for a better and more effective delegation of summary correction and preparation among the consultants and their assistants and also a provision for digital approval or pre-approval should be present. The findings of our study can be further correlated with the lack of clear roles in initiating the summary and billing process simultaneously.

A finding of this study also reinforced the findings of a study conducted by Varma et al. (2018) which suggested that non-clinical factors such as the document verification for insured patients and patient and relatives' confusion about the final bill settlement play an important role in the discharge timeline. The on-ground observations of patient attenders being confused about the final invoice amount, how to pay it and gathering the amount, repeatedly moving in and out of the billing counter, or between the billing counter and the ward supports this behavioral inefficiency. This "human courier" phenomenon was also noted in the study conducted by Choudhury et al., and noted that such avoidable delays and movements add further psychological burden to patients and inefficiencies to the system.

The findings of this study showed that there was a relatively fast bed clearance and a following next admission readiness for the cash, insurance and PSU cases, pointing out that the housekeeping, ward teams and the administrative staff on the floor are responsive once the total clinical and financial discharge steps are complete and delays in this step, if any was confined to being around the lunch time, where the patient would usually be in the room and proceed once the meal is over. Post-lunch, the usual delays were due to waiting for an attender, or waiting for their personal vehicles to arrive. However, there was still a delay in both the pharmacy and the bill preparation stages, especially for insurance patients, which resulted in extended bed occupancy, reducing the overall bed turnover efficiency. These concerns were also highlighted in an operational inefficiency study conducted by Iqbal et al. (2021). Studies conducted by Rathi et al. and Iqbal et al. also emphasize the fact that this delay not only affected the discharging patient, but also the incoming patients who wait in the emergency or other holding areas. As mentioned earlier, the manual billing process was a contributor of delay, mostly seen in the insurance cases. The finding can be correlated with the study of Malhotra et al. who advocated for provisions of automated billing platforms to fast-track the financial clearing process.

DISCHARGE INITIATION:

The fishbone (Ishikawa) diagram plotted for the delays in discharge initiation showed that there were multiple factors at play. Key contributors although, could be classified into four main domains: delays that were originating at the nursing station, primary consultant, the cross-consultant's involvement and procedural dependencies. This TAT was found significant only for the PSU patients suggesting maybe procedural/communication delays at the nursing station are more pronounced for PSU cases.

The most commonly observed delays stemmed due to operational bottlenecks. The nursing staff were usually occupied with many concurrent tasks and responsibilities, all contributing to the timely marking of the discharge of IPD patients in the HIS. There were usually a limited number of computer systems at each nursing station across all three floors; where activities such as raising indents for medications, returning all the unused medications and other supplies to the pharmacy and entering all the laboratory and radiology orders took precedence. The same systems were also being used to receive the reports for lab/radiology investigations limiting the accessibility for discharge related processes and leading to further congestion.

The delays were most frequently related to the unpredictable availability of attending consultants. There was a lack of standardized IPD round timings; the most major contributor, leading to long waiting periods about the status of discharge of the patients. They were also engaged with other clinical responsibilities such as daily OPD consultations, emergency surgeries. There would be more delay as they would often have lengthy discussions with the with the nurse in charge, junior doctors or their own assistants.

The cross-consultants were also involved in cases requiring input from other specialties. Each department had its own IPD round schedule which would not always align with the primary consultant. This caused the primary team to wait for the cross-consultant's clearance. There were similar obligations even with the cross-consultants regarding their own department, i.e, OPD, surgeries and their own rounds. There was a lack of synchronized multidisciplinary involvement.

Pending diagnostic and therapeutic processes also caused delay in a few cases. Certain cases required essential lab or radiology tests which had to be done compulsorily before the discharge. While these tests were requested early, there was delay in obtaining and discharge initiation could be done only after review of these results. Additionally, surgical patients were advised last minute dressings and wound inspections, causing delays. While these processes are necessary, they lacked pre-planned scheduling and led to avoidable delays.

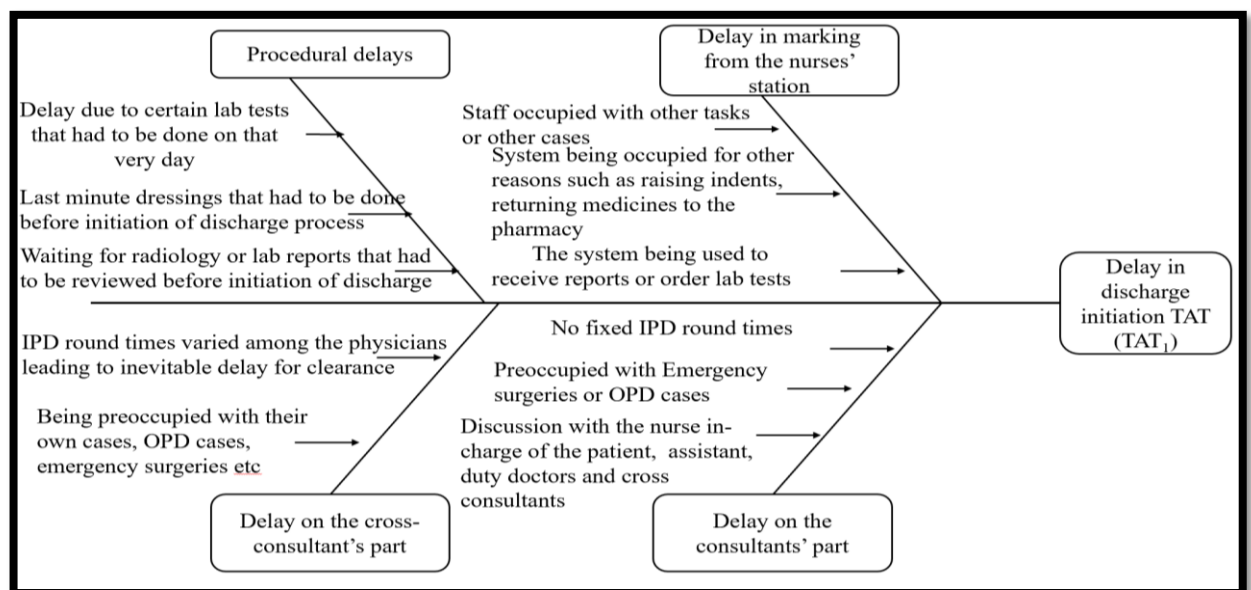


Figure 6.1: Fishbone diagram depicting factors contributing to delay in discharge initiation

DISCHARGE SUMMARY:

Another contributor to the overall delay of the discharge process was the time taken to prepare and finalize the discharge summary. This step showed statistical significance on overall TAT across all three patient types suggesting this kept showing up as a consistent critical bottleneck. The four main areas responsible for this were: Duty doctors, consultants, administrative staff and summary typists.

There was a recurring problem of initial rough summary not being prepared on time by the duty doctors. The summaries weren't drafted as the doctors would wait for confirmation of the final medication changes or any other input. When it came to unplanned same day discharges, there was no rough draft prepared at all, leading to a lastminute confusion. The lack of communication between the administrative and nursing staff with the duty doctor led to further misalignment.

Consultants would often delay the finalization of the discharge summaries. The summaries would be reviewed and corrected only after the rounds were complete. While this process can be considered clinically considerate, this prolonged the administrative closure. The dependance on lab/radiology results or a need for an input from a cross-consultant delayed the process further (as mentioned earlier, there were no fixed IPD round timings) causing summaries to remain pending even when a draft was prepared on time.

Administrative inefficiencies such as hospital software issues, computers running slow, preoccupied systems etc likely due to multiple parallel occurring operations delayed the processing of the discharge summary. The communication of the final draft of the summary to the designated typist was also delayed, as the admin staff would be preoccupied with other tasks. There was noticeable gap in coordination among these members.

The typing of the summaries faced infrastructural and manpower challenges. There were only two systems dedicated to summary typing creating a bottleneck. Frequent IT and software glitches caused this lag, slowing the process. In addition to that, there was excessive workload on two typists.

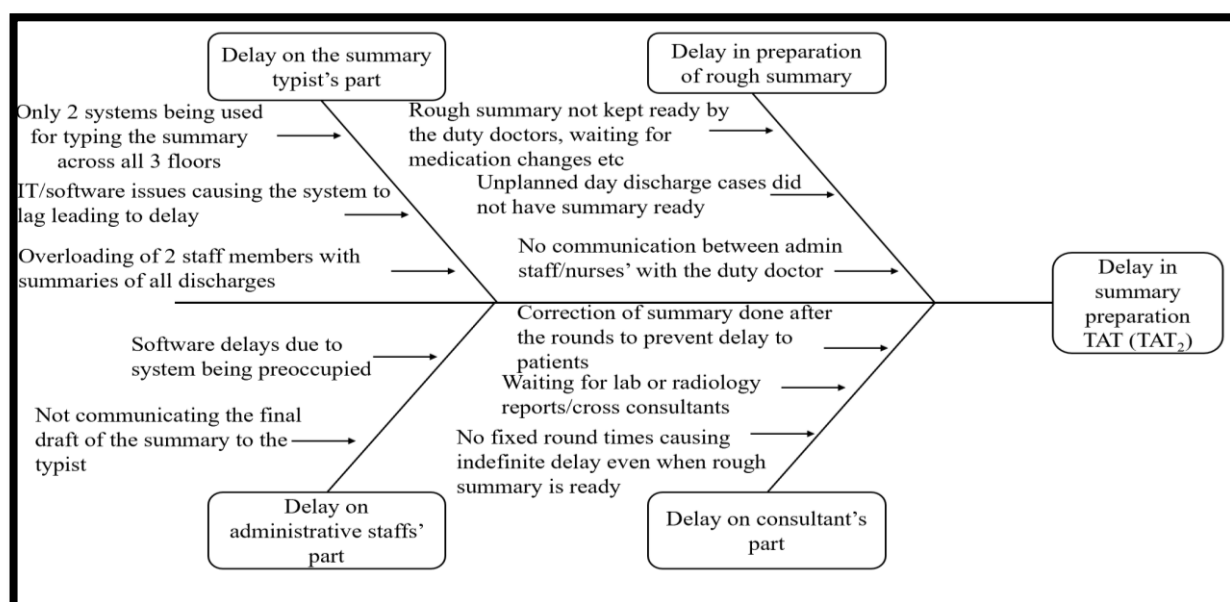


Figure 6.2: Fishbone diagram depicting factors contributing to delay in discharge summary preparation

PHARMACY CLEARANCE:

Pharmacy was a key contributor to the overall discharge turnaround time with delays in multiple areas such as the IP pharmacy, OT Pharmacy, CATH Lab Pharmacy and with an additional burden of the role of the external vendors. This TAT was found significant

only in insurance patients, possibly due to more complexities in the claims requirements and approval processes, but each area presented with its unique operational challenges.

The IP pharmacy, which was responsible for the final billing of the dispensed medications and processing of the return, dealt with a number of delays due to overburdened staff. They were simultaneously managing all the above, leading to a workflow congestion and a slower turnaround. The majority of the operational issue lied in the fact that there was a lack of clear task delegation, resulting in a single staff member being burdened with all the activities running parallelly without any support. To add on to this, the software performance issues such as system lag or freezing further hampered the timely execution of pharmacy clearance functions.

The constraints were similar in the OT pharmacy, where the staff had a considerable burden due to being engaged not only in providing a pharmacy clearance but also in active intraoperative support. Further, there was a absence of structured communication channel between the OP and the IP pharmacy and technical challenges leading to a delay in updating the discharge medication records. The staff had to frequently needed to restart or refresh the software system resulting in lost time and repeated tasks.

The CATH Lab was understaffed, with a single staff member usually handling both the CATH Lab and OT Pharmacy responsibilities. This left this part of the system highly vulnerable to bottlenecks. There was also a lack of interdepartmental coordination between the IP and CATH pharmacy further adding to the difficulty of information transfer and task alignment.

Discharges of surgical cases that involved external vendor supplied implants, stents, valves or other materials introduced a massive course of delay. The invoices were not usually handed over to the CDS on the day of surgery, delaying the billing and final clearance. Occasionally, incorrect invoices were submitted causing last minute confusion needing follow-ups with vendors stalling the process. These delays were a result of poor communication and coordination with the vendors, the interactions being deferred till the final stages of pharmacy clearance.

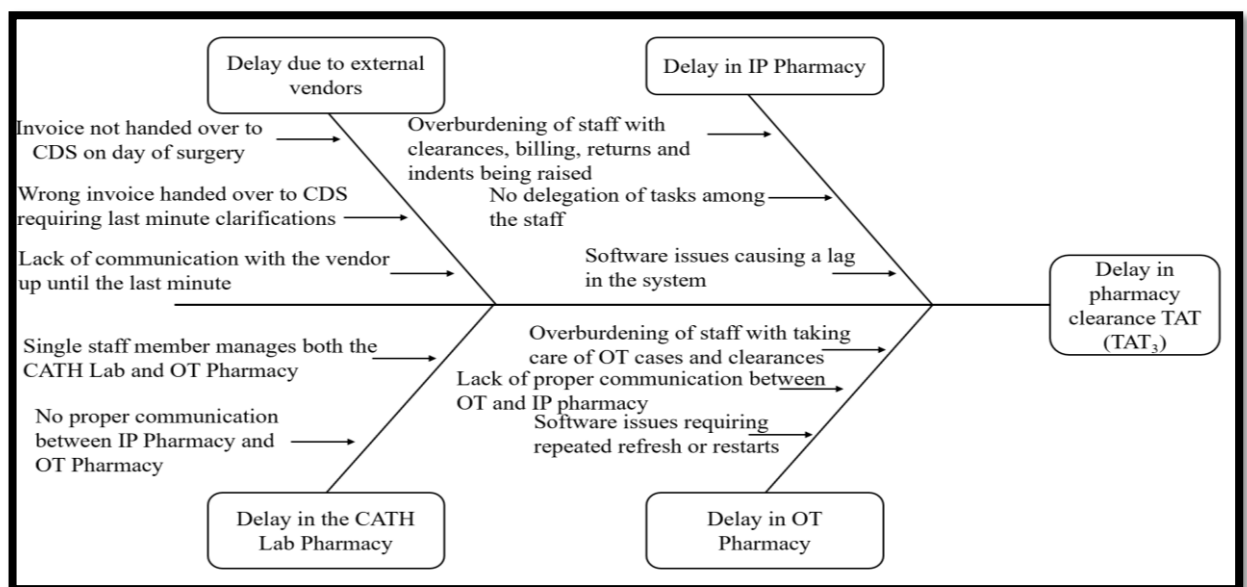


Figure 6.3: Fishbone diagram depicting factors contributing to delay in pharmacy clearance

BILL PREPARATION:

This step emerged as a statistically significant factor contributing to total IPD discharge TAT in all three patient groups. The delays that occurred during the bill preparation process arose from the billing staff, auditing team, role overload and IT/communication issues.

The major portion of delay was attributed to the operational inefficiencies among the billing staff. On several occasions, the staff members were engaged in unrelated activities, deviated from core billing responsibilities. There were instances where the billing personnel left their system unattended without any prior intimation creating unnecessary idle periods. The magnitude of these delays were exacerbated by the fact that only a single system was being used for billing of the entire hospital.

When it came to the internal audit process, the staff were often seen engaging in informal conversations and non-work-related activities, which reduced the task efficiency. The audit access was restricted to the billing system preventing the auditors from cross-verifying information slowing their workflow. Incomplete activity charts frequently needed reconfirmation of clinical procedures, causing further delay.

Besides this the billing staff were tasked with responsibilities outside the scope of their core function such as approval of clearance slips for the AS/BSKY blood bank patients, diverting the focus and time from the primary tasks. Procedural code variations or discrepancies went unmentioned or unnoticed until the billing stage requiring last minute clarifications with the clinical teams.

There were several technical or communication challenges that impacted billing efficiency. Specific procedural codes would fail to display in the billing system, requiring manual intervention or IT support. Billing system would intermittently freeze forcing a restart. The cases which involved intra-transfers such as the patients transferred from the Health City units suffered as the calls to those units went unanswered delaying the bill finalization.

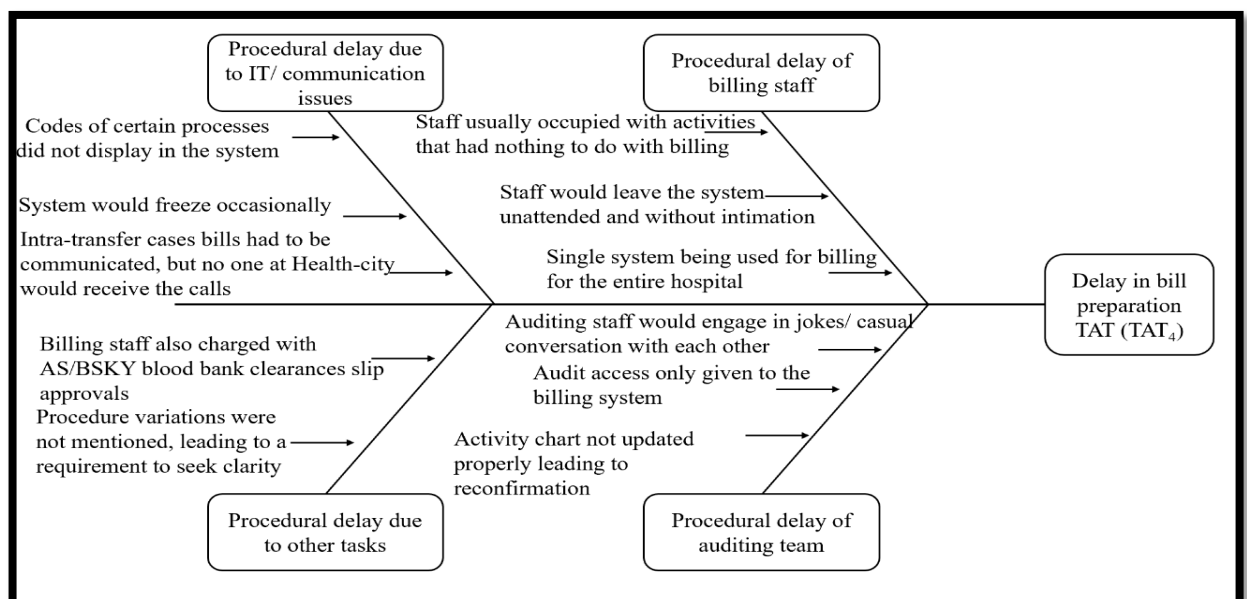


Figure 6.4: Fishbone diagram depicting factors contributing to delay in bill preparation

BILL SETTLEMENT:

The final step before patient discharge was found to be delayed due to factors pertaining to the billing staff, administrative staff on the floor and the patient attenders. This TAT was found significant in insurance and PSU cases (although the results of the insurance patients must be interpreted with caution as one of the cell's values were lesser than recommended during analysis).

In several cases, the delay stemmed from the lack of proactive communication by the billing staff. Even after the invoice was finalized and ready for payment, no intimation was given to the patient attenders resulting in unnecessary waiting. Surprisingly, some billing staff were themselves unaware of the final status of the bill leading to confusion and inaction, unfortunately causing the patient to wait in spite of the bill being ready.

The floor administrative staff had the potential to play the role of a vital intermediary but often failed to follow up with the billing department to ensure that the patient is guided. No prior intimation to the attenders was given, requesting them to remain present at a stable location (could be the wards or the billing counter) when the time to settle the invoice arrived. The communication with the hospital diet kitchen was not clear, causing lunch to be served either too late or unnecessarily to the patients ready for discharge, contributing to the extended period of stays.

The delayed response or non-availability of the patient attender was also responsible for this delay. The attender in several cases could not be located or was unresponsive to phone calls. Even when they would be present, they would often seek clarity regarding the total payable amount, leading to further delay. Practical constraints like arranging funds at the last moment or arranging for transport or lunch for the patient contributed to further delays. These human factors while understandable, highlight the importance of a holistic process involving both the patient and their attender during the discharge planning process.

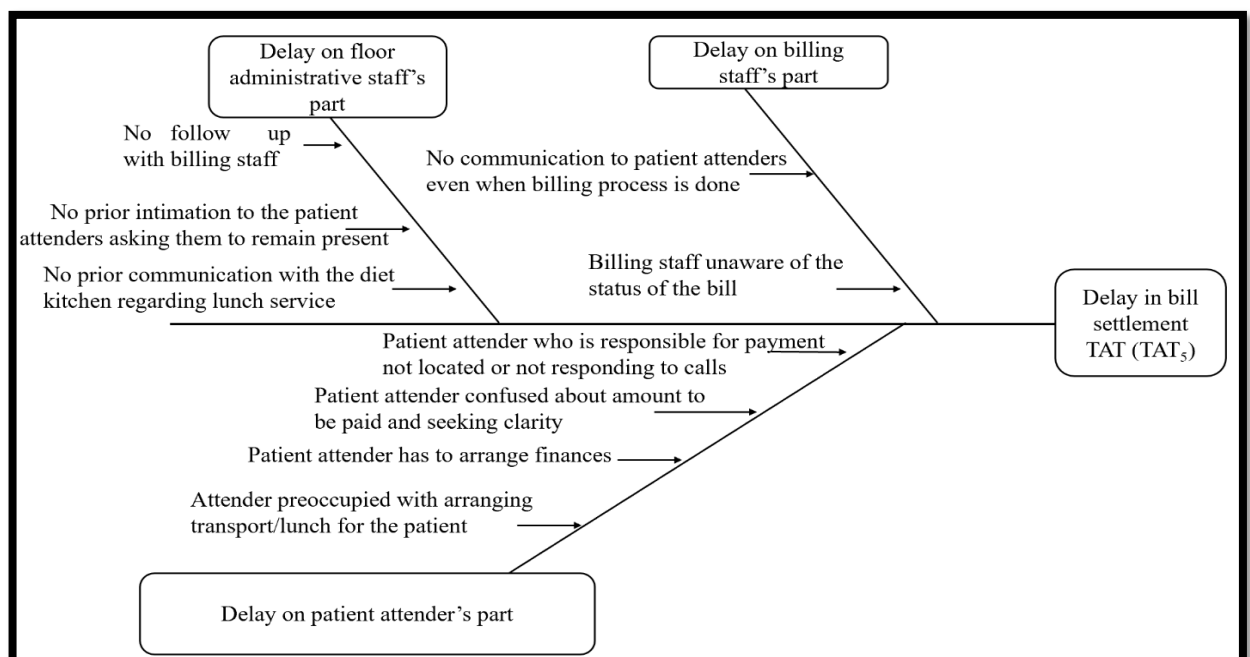


Figure 6.5: Fishbone diagram depicting factors contributing to delay in bill settlement

BED RELEASE:

Timely bed release is one of the most important factors for efficient IPD turnover and optimal bed utilization. This step, however, seemed to be frequently delayed due to operational issues, communication gaps and logistical issues involving the patients/attenders, housekeeping and helper staff, and administrative personnel. This step was significant only for the PSU cases.

There were several instances of delay in vacating the beds due to last-minute activities by the patient or their family. These were due to tasks such as packing or belongings or personal preparations-leading to unnecessary occupancy. The transport arrangements were often poorly planned or delayed, causing patients to remain in the wards for extended periods of time even after the discharge was over. Another commonly observed delay occurred due to patients choosing to have lunch after using the washroom which was often started late or extended beyond the expected time of departure.

Operational inefficiencies among the support staff further contributed to delay. At times the helper/HK staff were either unresponsive or unavailable on the respective floors to assist with physical movement or dressing. The HK team was usually charged with aiding the patient with activities such as dressing or shift, causing further delay. A limited number of wheelchairs created logistical constraints particularly when multiple discharges were scheduled around the same time, resulting in delayed transport of the patients from the ward to the exit.

The administrative staff failed to communicate with the helper/HK staff, leading to service delays. There was no prior assessment of specific aids or support the patient might need at the time of discharge (eg- wheelchair or mobility assistance). There was also a lack of discharge counselling were neither the attenders, nor the patients were briefed in advance about what to expect or prepare for, exacerbating the delays in this final transition phase.

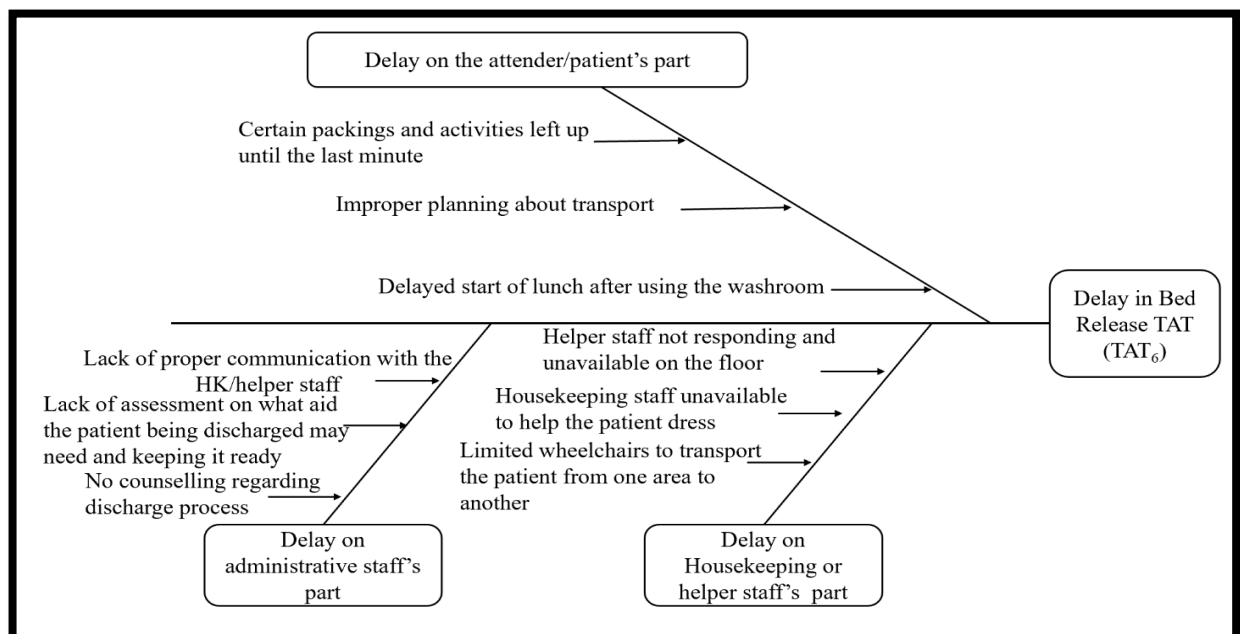


Figure 6.6: Fishbone diagram depicting factors contributing to delay in bed release

CHAPTER 7: RECOMMENDATIONS

In view of the results of the study, the observations and the challenges described in the prior chapters, it is necessary to put forth a detailed set of recommendations that covers both corrective and preventive measures. The recommendations are aimed not only at solving the current operational bottlenecks in the discharge process of Care Ramnagar, but also to inform future policy decisions and administrative reforms, and serve as a guide for future systemic interventions.

The recommendations being provided are contextually grounded, aligned with the aim of reducing the TAT while being operationally feasible to allow other activities of the hospital. This will enable us to reduce patient dissatisfaction, streamline functioning and coordination between the departments and increase the operational efficiency of the hospital by having a reasonably faster bed turnover.

7.1: RECOMMENDATIONS FOR DISCHARGE INTIMATION AND SUMMARY PREPARATION

One of the most recurrent delays observed for all three types of inpatient discharges was the late discharge intimation and an unstructured discharge summary preparation process. The delay in the initial few stages although not prominent, when done without a proper planning often snowballs into last-minute chaos and delays at every stage. This in turn on a larger scale leads to prolonged wait times, frustration among caregivers and revenue loss for the hospital due to extended stays. An effective and anticipatory approach is required to mitigate these challenges.

7.1.1: Fixing consultant and cross-consultant round to specific time slots for better planning and coordination

One of the major challenges encountered during billing was the unpredictability of the timing of the consultant and cross-consultant rounds. The consultants are mostly occupied with surgeries or OPD rounds during the morning hours, there is often a delay in visiting inpatients till noon; post which the discharge process and the summary preparation begins. Fixing all the consultant rounds to a specific time, preferably in the post noon time slot can help streamline the discharges. There should be no OPD slots allocated during this time period. Discussions with cross consultants can also foster timely decision making and shared care-planning, instead of redundant re-assessments. This will help enhance the accuracy and speed of the discharge decisions. When the rounds are done the prior day in the early afternoon, the decision to discharge the patient the following day can be finalised, along with inputs from all the cross-consultants. This gives the PREs, nurses and duty doctors ample time to ensure things are in order by the next day morning. This also helps in initiating the summary preparation and correction process in an unrushed manner. When the discharge process is ensured for the next day, the dressings and planning of tests can be done with more clarity. The consultants can also brief the duty doctors on the required parameters and standard of dressings for a smooth process the following day without requiring intervention from the consultant or their assistants; who may be involved in surgeries.

7.1.2: PREs communication with the pharmacy a day prior

When informed a day prior, the pharmacy can thoroughly start processing the billing and auditing the consumables. The PREs should be fully aware of the package and

coverage of the insurance or PSU cases. Indent for any take at home medication must be raised immediately and kept at the nursing station for a faster process the following day and any pharmacy returns must be sent back to prevent mismatches during clearance in advance. This preparatory work done a day prior will reduce the pharmacy TAT during discharge.

7.1.3: Preparing for pending tests and dressings in advance with the Laboratory and the nursing station

As mentioned above, the X-rays, blood work and final wound dressings required before initiation of the discharge process should be planned and coordinated with the laboratory or radiology a day prior to ensure slots are pre-booked for these patients earlier in the morning, (preferably before the OPD functioning hours, i.e., before 10 A.M. as the crowd then would be limited to OPD patients who have to get a test or scan done without breaking their fast) to ensure a faster pathology or radiology report. This can be reviewed by the duty doctor as per the consultant's instructions and communicated accordingly. If all the values are within the required range, the initiation of the discharge process can be done.

7.1.4: Proactive summary preparation the day prior; summary typists to be assigned fixed slots

After the consultant's rounds in the afternoon, the rough summary finalisation can be done, which is kept ready by the duty doctors in advance. When the corrections are completed, the PRE should communicate the finalised summary to the typist. This will ensure that the summary is kept ready a day prior and entire focus of the PRE remains on the discharge process and ongoing functions of the IPD. The summary typists should also be available at their respective stations, both in the mornings (for day discharges) and especially in the evening hours, to ensure summaries are typed without any delay.

7.1.5: Consultant approval through digital means

If the consultant or their assistant is unavailable, the summaries can be reviewed digitally and signed off by the consultant. This will reduce the TAT for discharge summaries especially when the consultant is unavailable on site due to holidays or their own reasons.

7.1.6: Prioritising discharge at the nursing stations

While all the activities progressing in the nursing station is very essential, discharge intimation being a task that requires lesser time, should be prioritised. The tasks related to final medication checks, pharmacy indenting for home medications the day prior and preparation of all the clinical documents should be given priority when there is no emergency or urgent case to attend.

7.1.7: Integration of an EMR system**

While EMR is not currently being used in the facility, implementing EMR where feasible can reduce documentation time. Real time summary updates, auto-populated medication charts, digital consultant approvals and quicker preparation of the final invoice can streamline the process. The transition may take time, but can provide noticeable benefits.

7.2: RECOMMENDATIONS FOR IP/OT AND CATH LAB PHARMACY

The bottlenecks in pharmacy billing and clearance were among the most significant contributors to discharge delays.

7.2.1: Delegated and defined roles for the tasks

It is essential to have a clear task delegation among the pharmacy staff. Out of the available staff at the pharmacy, one individual should be exclusively responsible for billings and clearances. The remaining members can manage returns, indents and stock updates to the CDS. Lack of delegations, especially in the IP pharmacy caused the same person to be interrupted by different requests, prolonging the TAT.

7.2.2: Ensure a minimum of two members in OT/CATH Lab pharmacy

During days when there are surgeries scheduled or higher number of discharges, it is not feasible for one person to manage all requests, especially the CATH lab pharmacy and the OT pharmacies together when they are located on two different floors. It is recommended that at least two trained pharmacy staff are present to ensure seamless operations. One of these staff members should also prioritise billing and clearances during discharge process.

7.2.3: Completion of OT Billings on surgery day itself

It should be mandated to bill all the materials that are used in the OT on the very day of the surgery. There should be no scope for billing to be carried forward and collide with the discharge process. Timely billing can aid in prior auditing and immediate clearance during the discharge process.

7.2.4: Same day billing by vendors of outsourced items

Stents, implants, valves or any externally sourced item would be selected intra-procedurally. It should be mandated that the vendors submit a clear and correct invoice to the CDS on the same day. This will allow the CDS to input these into the system, and the OT pharmacy would bill it on the very same day, removing the possibility of a prolonged delay.

7.2.5: Centralised pharmacy communication

The IP pharmacy, OT pharmacy and CATH lab should have a dedicated central communication channel (such as a phone line or a WhatsApp group) dedicated only to communicate and coordinate the discharge process. This will allow instant updates, item verifications if any, billing queries etc. Since the final clearance is given by the IP Pharmacy, only after the OT/CATH clearance is given, any lag can also be communicated immediately.

7.2.6: Provide material and code lists to the nurses

Repeated calls from the nurses to confirm or enquire the stock names or codes of the materials often disrupted the activities. To prevent this, a comprehensive material catalogue should be provided to the nursing stations in the form of an accessible digital link, to reduce repetitive back and forth.

7.2.7: Barcode based tracking for billing accuracy**

This is currently not being implemented, but implementing barcode systems can make indent tracking, consumption reconciliation and overall billing more accurate and efficient. This reduces the scope for manual errors and enhances the transparency for the auditing team

7.3 RECOMMENDATIONS FOR THE BILLING DEPARTMENT

Billing is another critical checkpoint in the discharge process. Delays due to pending audits, incomplete file documentation or any miscommunication may reflect as longer waiting times for patients and lead to dissatisfaction.

7.3.1: Discipline and accountability should be reinforced

Repeated delays in the billing department which may be because of laxity in file handling, late arrival, leaving the system unattended without prior intimation, absenteeism should be dealt with strict corrective and disciplinary actions. A standard operating procedure should be developed to handle internal escalations, that the department must be made aware of.

7.3.2: Ensure availability of at least two dedicated billers

A hospital facility which is functioning at such a high capacity, should have a minimum of two billers during peak hours. One billing system presents itself as an operational bottleneck. Backup and rotational billers can be brought in during rush periods and can help with the continuity of operations in the department.

7.3.3: Pre-submission of files for auditing and bill closure

As mentioned earlier, planned discharges should be encouraged. The patient's files must be submitted the prior day evening, so that the invoice can be kept ready for auditing. The auditing staff should ensure all documents are available, missing charts are placed, cross-checking of test reports and pharmacy invoices are done thoroughly. Any discrepancy if noted can eliminate last minute chaos and enhances accountability of the department.

7.3.4: Delegation of specific tasks within billing department

The workload in the department should be distributed intelligently. The blood bank related documentation (credit letters for AS/BSKY cases should be handled by one designated person. Insurance paperwork, when applicable should be handled by a different staff member. This ensures parallel functioning of operations instead of sequential which causes excessive delays.

7.3.5: Separation of the billing and the auditing teams

Audit team should function independently of the billing team. This will promote objectivity in the reviewing of the file, ensure thoroughness, reduces burdening of the billing staff. Only relevant staff should be allowed in billing to avoid confusion.

7.3.6: Streamline the processes using EMR/Auto billing**

Auto capturing of the billing items such as lab tests, radiological investigations, procedures etc can significantly reduce manual errors.

7.4: RECOMMENDATIONS FOR DOCTORS AND NURSING DEPARTMENT

The discharge process to a large extent depends upon the clarity, legibility and comprehensiveness of the clinical documentation. This is necessary to prevent many unnecessary clarification calls or auditing queries.

7.4.1: Legibility and completeness in documentation

When there was illegible handwriting in the case sheets, progress notes, activity charts or the ICU charts, it led to an end moment confusion, where cross-checking with the nursing station, doctors or ICU staff were needed. All doctors and nurses should be trained to write clearly, date every entry and sign off their name clearly.

7.4.2: Mandating written orders

Verbal orders are risky, not only along a medicolegal perspective, but also along the lines of errors and missed tasks. Every order for investigations, medication, procedure or progress should be written clearly in the patient file. This provides a scope for verification.

7.4.3: Nursing shift handover standardisation

Every shift change should include a comprehensive handover of cases that are to be discharged the next day. This aids in improving coordination between the nursing station, the PRE and the entire billing process.

7.5 RECOMMENDATIONS FOR THE PREs

The PREs serve as an important bridge of communication between the patient, their family and the hospital departments. Their main role is ensuring coordination in the IPD floor, billing progress and for caregiver readiness.

7.5.1: Complete awareness of the patient case, package and payment method

The PRE must be up-to-date with the patient's treatment history, package details (surgical and medical) and most importantly payment mode. This aids them to anticipate potential roadblocks and guide the caregivers accordingly.

7.5.2: Case monitoring and proactive follow-up, patient family counselling

After the case is declared as clear for discharge by the consultant, the PREs should immediately inform billing and pharmacy departments. They should also inform the family about the discharge the prior day evening to counsel them about the expected time of discharge so that they can arrange the transportation and lunch accordingly. This also gives an opportunity for the relatives to become financially prepared to settle the bills the following day. Further, the PRE should inform the PSU and insurance patients about the possibility of the time taken by the TPA or agency. This will help patient attenders understand the process and know what to expect. The PRE should also aim to complete the billing process for the planned discharges the prior day evening within their shift or at least streamline the activities so that they finish overnight.

7.5.3: Technology enabled discharge tracking

To reduce confusion and repeated queries, there should be a technology enabled tracking system for both the PREs and the patient attenders (in the form of an internal

messaging or dashboard system) that enhances transparency and minimizes frustration. This can also aid the PREs to directly communicate and follow up with the area of delay.

7.5.4: Ensure the availability of HK/helper staff and necessary aid on the floor during bed release time

During the final stages of bed release after bill settlement, there should be all necessary staff on the floor to provide all necessary help. The PREs must ensure things are in order and helper staff is present to help the patient dress, or to provide mobility aid to patients.

CHAPTER 8: CONCLUSION

This study was done in order to analyze the TAT of the entire discharge process in CARE Hospitals, Ramnagar. It specifically focused on identifying the process inefficiencies, delays in the various departments and other systemic bottlenecks across the three different types of inpatients- cash, PSU and insurance. The goal of the study was not only to understand where and why the delays were occurring, but also to formulate sustainable and practical recommendations to enhance the hospital performance, bed turnover and patient satisfaction rates.

Although the hospital followed a routine discharge process, there were several pain points that hindered timely execution of the activities. The most recurrent issue happened to be a lack of standardized consultant time, leading to a smaller number of planned discharges and delays at the pharmacy and billing. The delay of standardized IPD round time of consultants triggered a domino effect of delays in pharmacy, billing and summary preparation. Discharge initiation was mostly dependent on the consultants, unless they were planned discharge cases from the previous day. This usually caused a chaos leaving narrow time for completion of all the downstream activities such as pharmacy clearance, summary completion, billing finalization and the bed release.

It was noted that insurance patients face significantly greater delays than cash or PSU patients. This is due to multilayered processes including obtaining the final authorization from the TPA. This results in prolonged TATs, leading to patient dissatisfaction and avoidable occupancy of beds in the wards.

The discharge summary preparation, although a clinical task emerged as a recurring cause of delay because it was largely dependent on the consultants and their IPD rounds. The pharmacy delays were largely due to procedural inefficiencies and lack of proper interdepartmental coordination. The other causes of delays were largely due to the external vendor not submitting the invoice for the material used in the surgery and tasks piling up till the last minute.

The billing process was largely affected by limited manpower and behavioral issues. From a broader perspective, the lack of real-time coordination, communication and proper planning among key stakeholders-consultants, PREs, nurses, pharmacy, billing and auditing teams was a recurring theme throughout this entire study.

It can be concluded that reducing discharge TAT is neither a siloed problem, nor can it be solved by individual targeting the problems in a sequential manner. It has to be a multi-departmental and process driven that requires collective responsibility, system level reforms and predictive planning.

The long- term solution lies in the development of a discharge ecosystem that is standardized, proactive, tech-enabled and patient centered. This will aid in strengthening the operational efficiency and also bolster the reputation of the facility in terms of clinical excellence and compassionate care.

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ANNEXURE – I

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
	Patient Name	Gender	Age Group	Payor Name	Planned/Unplanned	Discharge/Intimatio	DELAY REASONS	Discharge summary	DELAY REASONS	Pharmacy clearance	DELAY REASONS	Bill Prepared	DELAY REASONS	Bill Payment	DELAY REASONS	Bed Released	DELAY REASONS	Discharge Time (in	Discharge Remark	Speciality	KPI (Met/Not
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