

Improving Discharge Process Experience by Reducing Turnaround Time: A PDSA-Driven Quality Improvement Initiative Apollo Speciality Hospitals, Nellore, Andhra Pradesh, India.

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Abstract

Background:

Timely discharge is a key determinant of patient experience, bed availability, and accreditation compliance. At Apollo Speciality Hospitals, Nellore, India, the discharge process — from the clinical discharge decision to the patient's physical exit — historically took an average of 210 minutes, contributing to bed blocking, patient dissatisfaction, and non-compliance with internal audit findings in discharge-process standards.

Objective:

To reduce average discharge turnaround time (TAT) by $\geq 30\%$ within three months using a structured, Plan-Do-Study-Act (PDSA)-based quality improvement (QI) approach, and to assess whether gains could be sustained over a subsequent three-month period.

Methods:

This prospective QI study was conducted across all in-patient wards between December 2025 and June 2026. Root causes of discharge delay were identified using Pareto analysis and a Fishbone (Ishikawa) diagram. Two PDSA cycles were implemented during a structured QIP phase (January–March 2026), followed by a three-month Improvement Phase (April–June 2026) to institutionalise the changes. Interventions included an early-intimation system, a standardised discharge checklist, concurrent (parallel) processing of billing, pharmacy and documentation, a dedicated discharge-coordinator role, Hospital Information System (HIS)-triggered billing alerts, a discharge lounge, and a formal discharge standard operating procedure (SOP). Discharge TAT, sub-process timings, checklist compliance, and patient satisfaction were tracked using descriptive statistics.

Results:

Average discharge TAT fell from 210 minutes at baseline to 128 minutes by March 2026 (–39%, exceeding the 30% target) and to 112 minutes by June 2026 (–47% from baseline). Patient satisfaction with the discharge experience rose from 62% to 91%. The proportion of discharges completed within 120 minutes increased from 12% to 79%, and discharge-checklist compliance reached 94%. Billing clearance, pharmacy dispensing, and discharge-summary preparation times each improved by 40–52%.

Conclusions:

A structured, PDSA-based intervention combining process redesign (concurrency), technology enablement (HIS-triggered alerts), and dedicated ownership (a discharge coordinator) produced a substantial and sustained reduction in discharge TAT and a corresponding rise in patient satisfaction. The model is readily replicable in other tertiary-care settings.

Keywords:

Discharge turnaround time; quality improvement; Plan-Do-Study-Act; patient satisfaction; Lean healthcare; hospital discharge; internal audit findings in discharge-process standards.

1. Introduction

1.1 Problem Description

Timely discharge is one of the most visible touch-points in a patient's hospital journey, and delays at this final stage disproportionately shape overall satisfaction, bed availability, and operational efficiency. At Apollo Speciality Hospitals, Nellore, Andhra Pradesh — a multi-speciality tertiary-care unit within the Apollo Hospitals network — the discharge process from the point of the clinical discharge decision to the patient's actual exit had historically taken an average of 210 minutes, well beyond acceptable benchmarks. This was associated with bed blocking, patient dissatisfaction, and non-compliance with internal audit findings in discharge-process standards, driven primarily by inefficient, sequential coordination between the clinical, billing, pharmacy, and support-service teams.

1.2 Available Knowledge

Prolonged discharge TAT is consistently associated in the hospital-operations literature with reduced patient-satisfaction scores in tertiary-care settings; patients and caregivers waiting after being told they can go home often report this stage as more stressful than earlier parts of their stay, even when clinical care was rated highly [1,2]. NABH accreditation standards mandate timely discharge, clear patient communication, complete documentation, and billing transparency, making discharge TAT a natural key performance indicator (KPI) for accreditation-linked quality programmes [3]. Lean healthcare principles — eliminating non-value-added steps, enabling parallel rather than sequential processing, and standardising workflows — are widely used to redesign hospital processes for speed and reliability, with the shift from sequential to concurrent billing,

pharmacy, and documentation identified as a particularly impactful lever [4]. The Plan-Do-Study-Act (PDSA) cycle remains one of the most widely used frameworks for iterative, evidence-based improvement in live clinical environments, as it enables small, reversible tests of change with built-in measurement [1,2]. Studies from Indian tertiary-care hospitals report TAT reductions of 25–45% following the introduction of dedicated discharge-coordinator models and concurrent billing, often amplified by HIS automation such as auto-triggered billing alerts [5]. However, fewer published accounts combine process redesign, PDSA-based improvement, dedicated ownership, and HIS integration within a single, phased improvement-and-sustainability project at an Indian tertiary-care hospital, and report both improvement-phase and subsequent sustainability outcomes — the gap this study addresses.

1.3 Rationale

Discharge TAT is an easily measurable, cross-functional indicator that touches clinical, billing, pharmacy, nursing, and information-technology (IT) functions simultaneously, making it a suitable and generalizable target for a structured quality-improvement initiative. Reducing discharge TAT was expected to improve patient experience, increase effective bed availability without capital investment, and support the hospital's NABH accreditation objectives.

1.4 Specific Aims

The primary aim was to reduce average discharge TAT by $\geq 30\%$ within three months (January–March 2026) through a structured, PDSA-based process-improvement approach. Secondary aims were to: improve patient satisfaction with the discharge process; reduce delays in billing clearance, pharmacy dispensing, and discharge documentation; enhance interdepartmental coordination; standardise the discharge workflow across all in-patient department (IPD) wards; and sustain the achieved improvements through a structured sustainability plan.

2. Methods

2.1 Context

This QI study was conducted at Apollo Speciality Hospitals, Nellore, a multi-speciality tertiary-care hospital offering in-patient and out-patient services across general medicine, surgery, cardiology, orthopaedics, and neurology. The study covered the in-patient discharge process across all IPD wards, from the point the treating physician recorded the discharge decision in the HIS to the point the patient physically exited the hospital. It spanned baseline measurement in December 2025, a structured QIP phase from January to March 2026, and an Improvement Phase from April to June 2026, during which Cardiology, Orthopaedics, and Neurology were progressively onboarded from May 2026. Out-patient discharge, ICU step-down protocols, and discharge processes at other network hospitals were outside the scope of this study.

2.2 Study of the Problem: Root-Cause Analysis

Two structured root-cause-analysis tools were used to diagnose the drivers of discharge delay prior to designing interventions: Pareto analysis, to rank root causes by their percentage contribution to total discharge delay; and a Fishbone (Ishikawa) diagram, to categorise root causes across the Man, Method, Machine/IT, Material, Environment, and Measurement dimensions (Table 1, Figure 1).

2.3 Intervention

This was a prospective QI study using the PDSA cycle approach. Two PDSA cycles were completed during the structured QIP phase (January–March 2026), and a third during the three-month Improvement Phase (April–June 2026), which was designed to institutionalise and sustain the gains achieved. The specific interventions tested in each cycle are described in Section 3 (Results), consistent with SQUIRE ("Service Quality Inspection Regime,") reporting conventions for iterative QI interventions.

2.4 Measures

Baseline data were collected in December 2025 across discharge TAT, patient-satisfaction scores, billing-clearance time, pharmacy-dispensing time, and discharge-summary-preparation time (Table 2). Data during each PDSA cycle were collected through the hospital's discharge-tracking log, the HIS, and a discharge-satisfaction survey / QR-code-based feedback mechanism. The study population comprised all in-patient discharges across the study wards; discharges against medical advice and inter-hospital transfers were tracked separately and excluded from the core TAT calculation, as they follow a different process path.

2.5 Analysis

Quantitative data (TAT, sub-process timings, checklist compliance, and satisfaction percentages) were analysed using descriptive statistics — monthly averages, percentage change from baseline, and trend charts — to track progress cycle-over-cycle. A simple before-after comparison across three measurement points (baseline, post-QIP, and Improvement Phase) was used to evaluate the impact of the combined intervention set, consistent with the operational, non-experimental nature of a QI study.

2.6 Ethical Considerations

All data used in this study were operational and aggregate in nature (ward-level timings, percentage compliance, and satisfaction scores); no patient-identifiable clinical information was extracted or reported. Data collection was carried out as part of routine hospital quality-monitoring activity, with findings used internally for process improvement and presented here only in aggregated form.

3. Results

3.1 Baseline Assessment (December 2025)

At baseline, average discharge TAT was 210 minutes (range 180–240 minutes), with only 12% of discharges completed within the internal 120-minute target and 38% within 180 minutes. Patient satisfaction with the discharge experience was 62% (Table 2).

Baseline metric	Value (December 2025)
Average discharge TAT	210 min (range: 180–240 min)
Patient satisfaction – discharge (%)	62%
Billing clearance time	~75 min
Pharmacy dispensing time	~45 min
Discharge summary preparation time	~50 min
Discharges completed within 180 min	38%

Table 1. Baseline discharge-process metrics, December 2025.

3.2 Root-Cause Analysis

The Fishbone analysis identified contributing causes across all six dimensions (Table 2); Pareto analysis (Figure 1) ranked these causes by their percentage contribution to total discharge delay, prioritising the sequential (non-concurrent) process design and the absence of automated billing triggers as the leading contributors.

Category	Root causes identified
Man	Delayed doctor discharge orders; no dedicated discharge coordinator; nursing workload during discharge
Method	Sequential (not concurrent) discharge process; no standardised checklist; no pre-intimation for planned discharges
Machine/IT	No automated billing trigger on discharge order; pharmacy dispensing not linked to discharge flagging
Material	Incomplete discharge summary templates; missing patient education material
Environment	High patient volume without structured discharge slots; ad-hoc discharge requests without prior planning
Measurement	No real-time TAT monitoring; no department-level accountability for discharge delays

Table 2. Fishbone (Ishikawa) analysis of root causes of discharge delay.

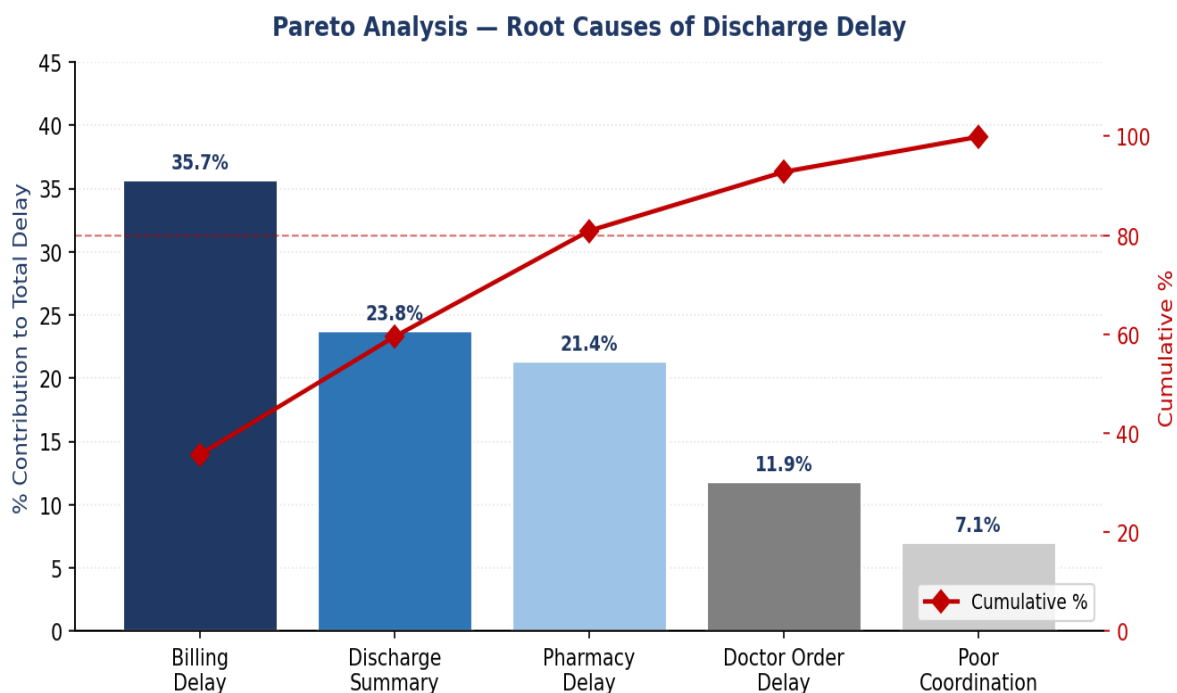


Figure 1. Pareto analysis of root causes of discharge delay.

3.3 PDSA Cycle 1 (January 2026)

Interventions: an early-intimation system providing previous-day notification of planned discharges to Billing, Pharmacy, and Nursing; a standardised discharge checklist introduced across all IPD wards; parallel initiation of billing, pharmacy, and discharge-summary preparation; a dedicated discharge coordinator appointed per shift; a fast-track billing lane for planned discharges; and a daily discharge-TAT monitoring dashboard.

Outcome: average TAT fell from 210 to 165 minutes (–21%); patient satisfaction rose from 62% to 71%.

3.4 PDSA Cycle 2 (February–March 2026)

Interventions: HIS integration with an auto-triggered billing alert on discharge-order entry; a 10 AM discharge-order target implemented in Surgical and Medical wards; a discharge lounge for patients awaiting final clearance; monthly grand-round presentations of discharge-TAT data to clinical teams; and peer-feedback sessions between billing, pharmacy, and nursing teams.

Outcome: average TAT fell further to 128 minutes (–39% from baseline, exceeding the 30% target); patient satisfaction reached 84%.

3.5 Improvement Phase (April–June 2026)

Interventions: a discharge SOP formalised and approved by the Medical Director; mandatory discharge-process training integrated into new-staff induction; automated SMS alerts to patients at each discharge milestone; discharge TAT integrated into the monthly departmental KPI scorecard; onboarding of Cardiology, Orthopaedics, and Neurology by May 2026; incentive recognition for departments sustaining TAT <120 minutes; and a discharge-feedback QR code at the exit for real-time satisfaction capture.

Outcome: TAT was sustained at 112 minutes (–47% from baseline); patient satisfaction reached 91%; 79% of discharges were completed within 120 minutes.

3.6 Overall Outcomes

Indicator	Baseline (Dec 2025)	Post-QIP (Mar 2026)	Improvement Phase (Jun 2026)
Average discharge TAT (min)	210	128 (–39%)	112 (–47%)
Patient satisfaction – discharge	62%	84%	91%
Discharges within 120 min	12%	61%	79%
Billing clearance time (min)	75	42 (–44%)	36 (–52%)
Pharmacy dispensing time (min)	45	26 (–42%)	22 (–51%)
Discharge summary preparation (min)	50	30 (–40%)	25 (–50%)
Discharge checklist compliance	N/A	83%	94%

Table 3. Key performance indicators — baseline, post-QIP, and Improvement Phase.

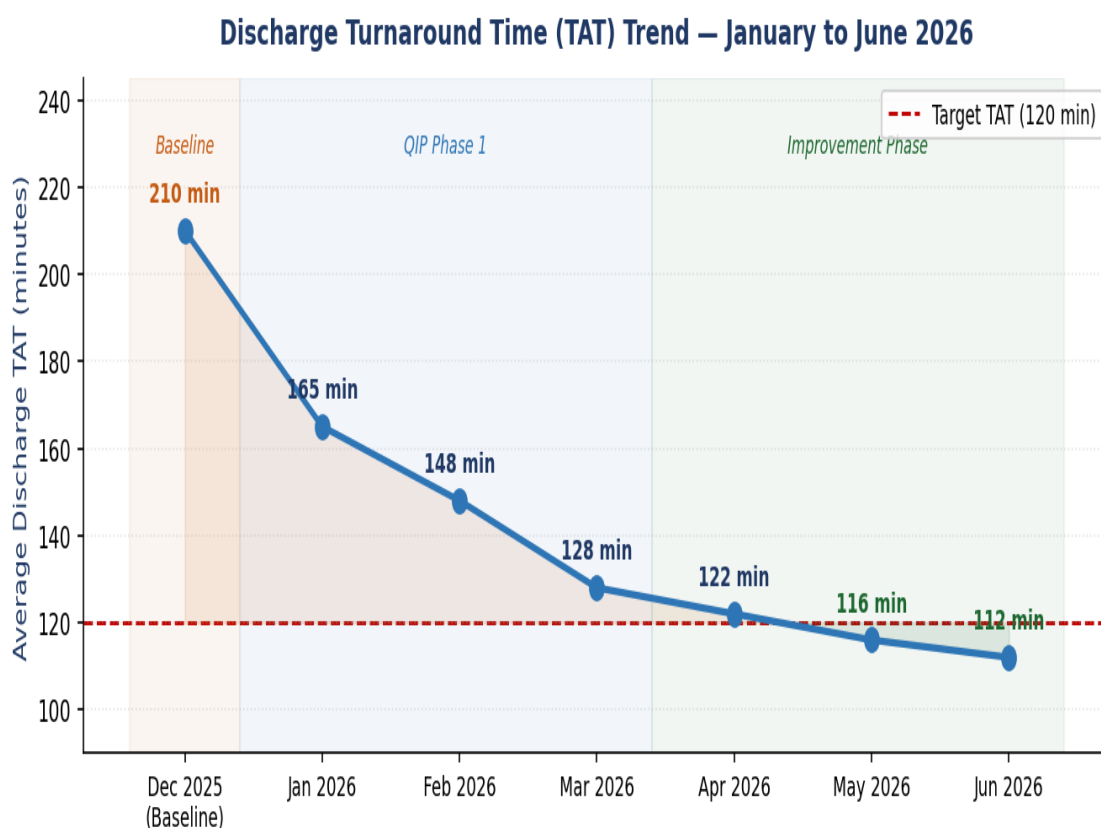


Figure 2. Discharge TAT trend, January–June 2026.

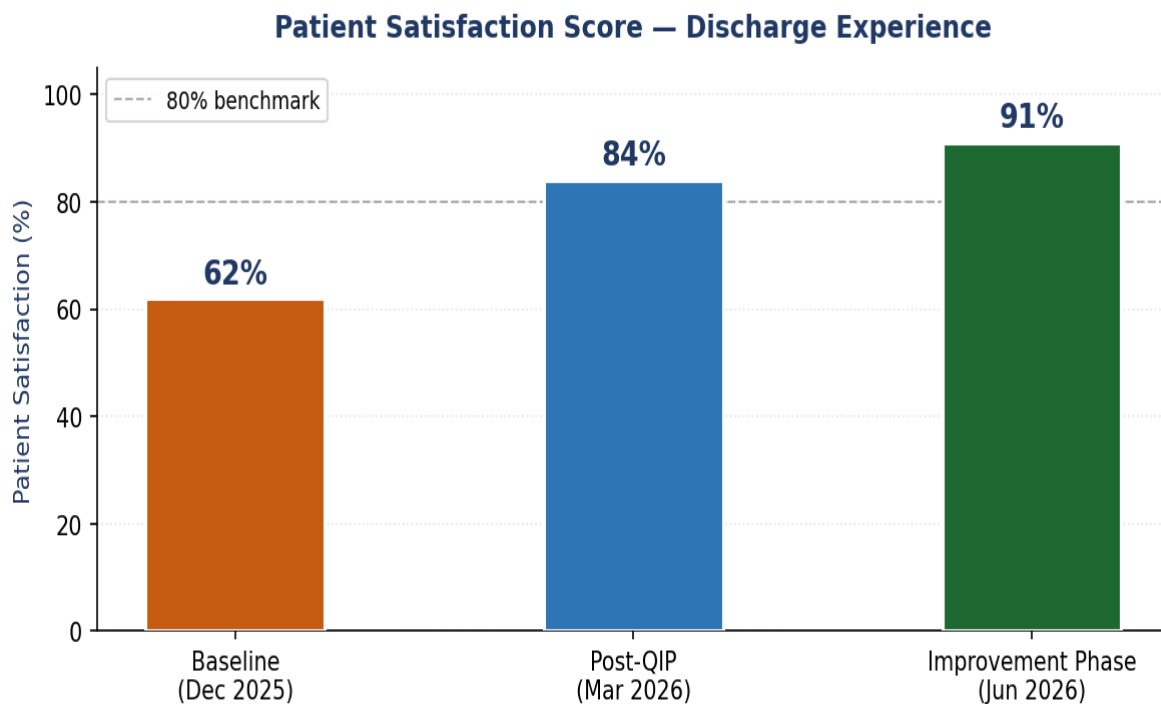


Figure 3. Patient satisfaction score – discharge experience.

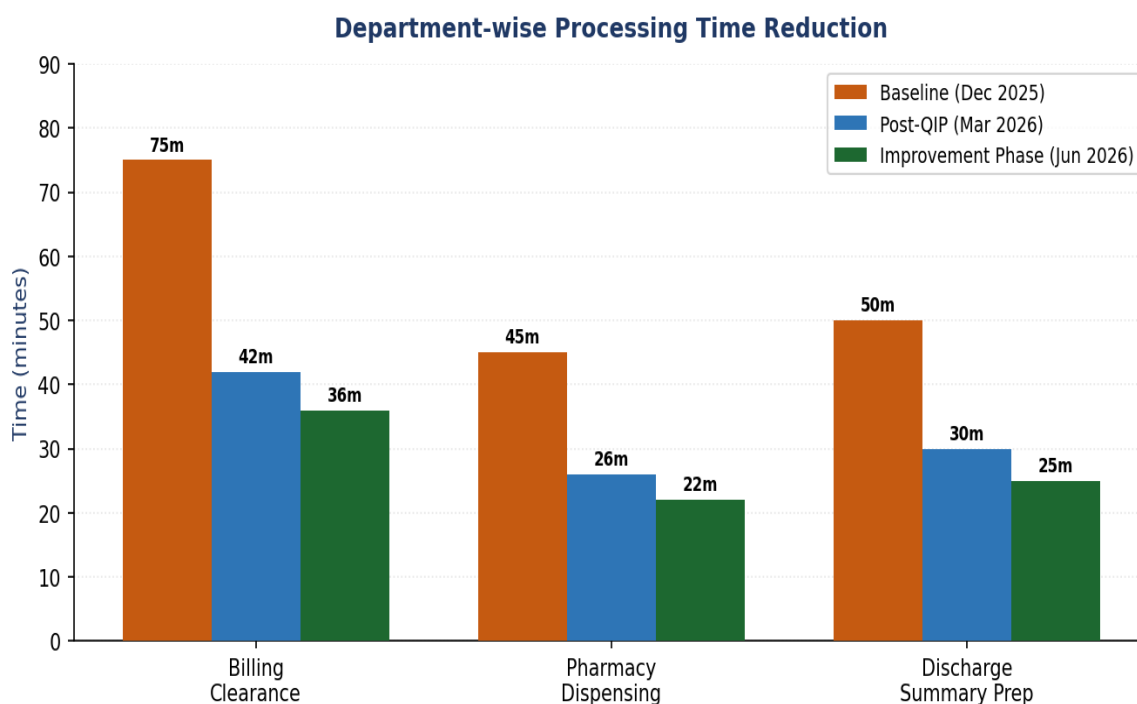


Figure 4. Department-wise processing-time reduction.

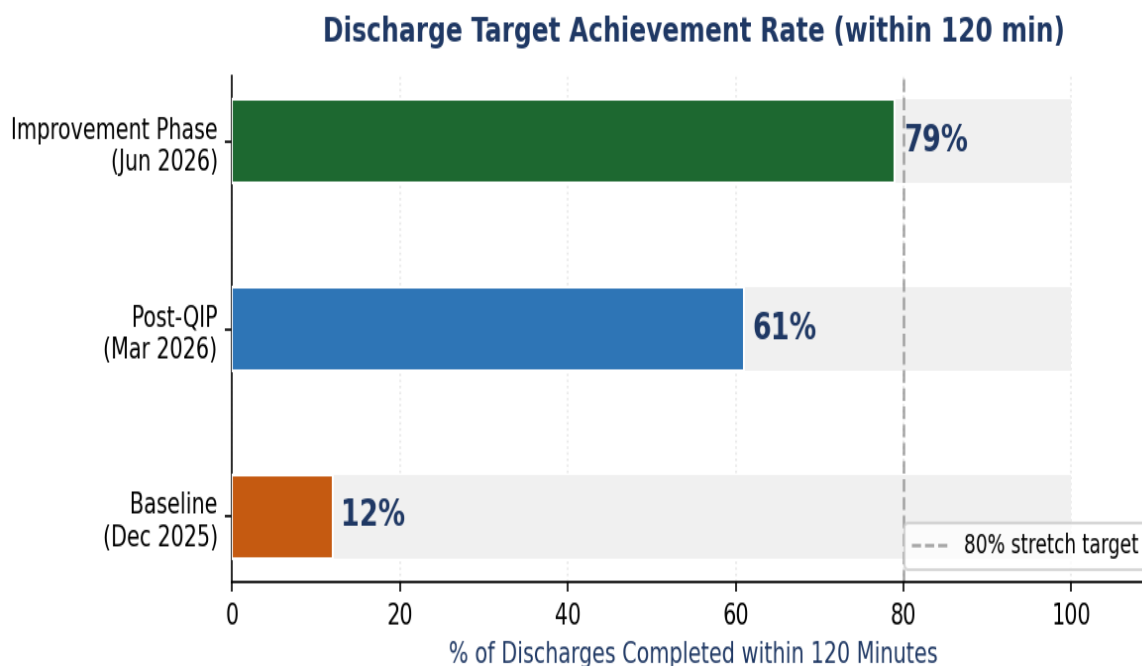


Figure 5. Discharge target achievement rate (within 120 minutes).

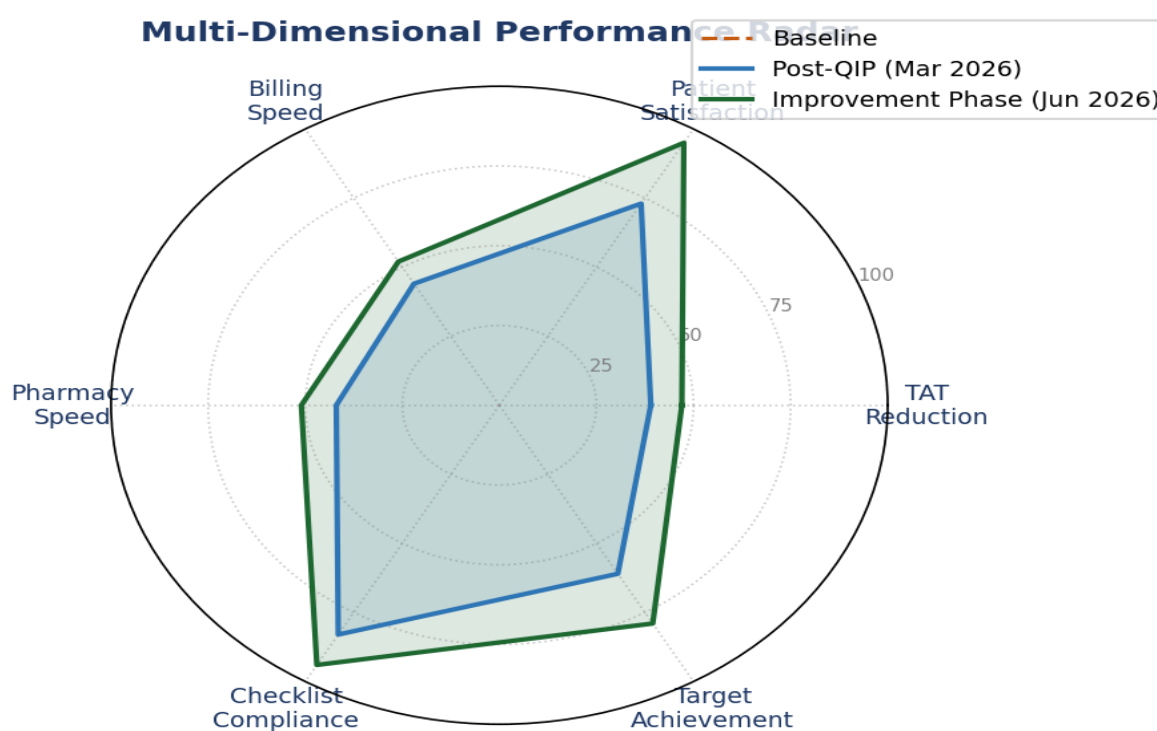


Figure 6. Multi-dimensional performance radar, baseline vs. Improvement Phase.

4. Discussion

4.1 Summary

A structured, three-cycle PDSA intervention reduced average discharge TAT from 210 to 112 minutes (−47%) over six months, exceeding the 30% target within the first three months, with patient satisfaction rising from 62% to 91% and discharge-checklist compliance reaching 94%. Gains were broad-based: all constituent sub-processes (billing clearance, pharmacy dispensing, discharge-summary preparation) improved by 40–52%, and the proportion of discharges completed within the 120-minute target rose from 12% to 79%.

4.2 Interpretation

Concurrent (parallel) processing of billing, pharmacy, and documentation — rather than sequential processing — was the single largest driver of TAT reduction, contributing to the drop from 210 to 165 minutes in the very first PDSA cycle, consistent with Lean healthcare literature emphasising parallel processing as the most impactful redesign lever [4]. Technology-enabled triggers (automated billing alerts on discharge-order entry) produced a further step-change during PDSA Cycle 2, confirming that manual hand-offs identified in the Fishbone analysis were a major bottleneck. The introduction of a dedicated discharge-coordinator role was strongly associated with improved cross-departmental accountability and with the corresponding rise in patient-satisfaction scores, echoing findings from other Indian tertiary-care hospitals that combine coordinator models with HIS automation [5]. Notably, gains achieved during the QIP phase were not only maintained but modestly extended during the Improvement Phase (128 to 112 minutes), suggesting that formalising the SOP, staff induction training, and KPI-scorecard integration converted a project-level improvement into a durable operating practice — directly addressing the sustainability gap identified in the existing literature. The rate of improvement was not uniform across cycles: PDSA Cycle 1 delivered the largest absolute drop (45 minutes), while PDSA Cycle 2 and the Improvement Phase delivered smaller, incremental gains (37 and 16 minutes respectively), a pattern consistent with diminishing returns as easier process-level bottlenecks are addressed before harder, system-level fixes.

4.3 Limitations

- Single-site study: conducted at one hospital location, so results may not directly generalise to hospitals with different patient volumes, case-mix, staffing ratios, or HIS maturity.
- Short observation window: the Improvement Phase covered only three months; longer-term sustainability of the 112-minute TAT beyond this window has not yet been established.
- Self-reported satisfaction data: collected through surveys and QR-code feedback, which are subject to response bias and may not capture the experience of patients who did not respond.
- Confounding factors: concurrent hospital-wide initiatives (e.g., NABH accreditation preparation) may have contributed to some of the observed improvement independent of the discharge-specific interventions.
- Departmental scope: specialty departments (Cardiology, Orthopaedics, Neurology) were onboarded only from May 2026, so Improvement-Phase KPIs reflect a mix of departments with differing exposure durations.
- No formal control group: as an operational QI study rather than a randomised trial, a before-after comparison was used, which cannot fully rule out secular trends unrelated to the intervention.

4.4 Implications for Practice and Future Directions

Building on these results, priorities for future work include: extending the concurrent discharge model to ICU step-down units; developing a predictive, HIS-embedded discharge-planning tool to flag high-probability next-day discharges; institutionalising discharge TAT as a permanent hospital KPI reported to the Board on a quarterly basis; conducting a longer-term (12–24 month) follow-up study to assess durability against seasonal patient-volume variation; and benchmarking against other Apollo network hospitals for discharge-TAT best practices.

5. Conclusions

This PDSA-driven QI initiative demonstrates that a structured, multidisciplinary approach combining process redesign (concurrency), technology enablement (HIS-triggered alerts), and dedicated ownership (a discharge coordinator) can produce substantial and durable reductions in discharge TAT. Average discharge TAT fell from 210 to 112 minutes (–47%), far exceeding the 30% target, while patient satisfaction rose from 62% to 91%. The transformation from a sequential to a concurrent discharge model, supported by a formal SOP and real-time KPI monitoring, offers a replicable model for tertiary-care hospitals seeking to improve discharge efficiency and patient experience.

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