Pakistan Journal of Advances in Medicine and Medical Research (PJAMMR)
ISSN: (Online) 2957-5893
Website: https://www.pjammr.com/index.php/pjammr/homepage

Open Access
Volume 3, Issue 2, 2025

Quality Improvement Project (QIP)

Optimizing Heart Failure Management: Development and Implementation of a Standardized Discharge Checklist for Heart Failure Patients in a Tertiary Care Hospital in Pakistan

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Keywords
Heart failure, discharge checklist, quality improvement, GDMT, readmissions.

Article History
Received: January 28, 2025
Revision: March 12, 2025
Accepted: May 28, 2025
Published: July 10, 2025

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DOI: 10.69837/pjammr.v3i2.70

How to Cite This Article:
Saif SA, Ejaz M, Bibi A, Mehmood N. Optimizing Heart Failure Management: Development and Implementation Of A Standardized Discharge Checklist for Heart Failure Patients In A Tertiary Care Hospital in Pakistan: A Quality Improvement Project. Pak J Adv Med Med Res. 2025;3(2):70-78.

ABSTRACT

Background: Heart failure (HF) is a major contributor to hospital admissions, mortality, and healthcare costs globally, particularly in low- and middle-income countries such as Pakistan. Despite the availability of evidence-based guidelines from the European Society of Cardiology (ESC 2023) and NICE (NG106), their implementation in routine clinical practice remains inconsistent. In many tertiary care hospitals, discharge processes are fragmented, lacking standardized documentation, optimal therapy, and structured follow-up, leading to high rates of 30-day readmissions and poor outcomes.

Objective: To develop and implement a structured discharge checklist to standardize care, improve guideline adherence, and reduce early readmissions in HF patients.

Methods: This quality improvement project used the Plan–Do–Study–Act (PDSA) methodology. A retrospective baseline audit was conducted from July to August 2024, including 125 patients admitted with heart failure. A standardized discharge checklist based on the 2023 European Society of Cardiology (ESC) and NICE NG106 guidelines was implemented during PDSA Cycle 1 (10–24 September 2024) in 28 patients. Baseline and post-intervention outcomes were compared using the chi-square test.

Results: Significant improvements were observed in documentation of HF type (59.2% to 85.7%), NYHA class and LVEF (52.8% to 82.1%), and GDMT prescription (40.8% to 67.8%). Patient education improved from 31.2% to 60.7%, and follow-up planning within 14 days increased from 37.6% to 78.5%. Communication with primary care providers improved from 26.4% to 57.1%. The 30-day readmission rate decreased from 33.6% to 25.0%.

Conclusion: A standardized discharge checklist significantly improved discharge practices and demonstrated early potential to reduce readmissions. This low-cost intervention is feasible and effective for improving HF care in resource-limited settings.

INTRODUCTION

Heart failure (HF) is a major global public health problem associated with significant morbidity, mortality, and healthcare costs. It affects more than 64 million people worldwide and remains a leading cause of hospital admissions, particularly among older adults. Despite advances in pharmacologic and device-based therapies, outcomes remain suboptimal because of gaps in implementing evidence-based care [1,2]. In low- and middle-income countries such as Pakistan, the burden of HF is further exacerbated by limited healthcare resources, fragmented care pathways, and inadequate follow-up systems [3]. International guidelines, including those from the European Society of Cardiology (ESC) and the National Institute for Health and Care

Excellence (NICE), emphasize the importance of guideline-directed medical therapy (GDMT), structured discharge planning, and patient education to improve outcomes [4,5]. However, translating these recommendations into routine clinical practice remains a significant challenge. Studies have shown that failure to optimize GDMT and inadequate discharge processes are strongly associated with increased rates of readmission and mortality [6]. One of the key contributors to poor outcomes in HF patients is the lack of standardized discharge practices. Patients are often discharged without complete documentation of HF subtype, left ventricular ejection fraction (LVEF), or New York Heart Association (NYHA) functional class. Additionally, insufficient patient counseling regarding medication adherence, dietary modifications, and symptom monitoring further increases the risk of early clinical deterioration [7]. Poor communication between hospital teams and primary care providers also contributes to gaps in continuity of care. Quality improvement (QI) strategies, particularly those based on structured tools such as discharge checklists and Plan–Do– Study–Act (PDSA) cycles, have shown promise in addressing these deficiencies. Previous studies have demonstrated that implementing standardized discharge protocols can significantly improve adherence to guidelines, enhance patient education, and reduce readmission rates [8]. Given these challenges, there is a clear need for a simple, feasible, and scalable intervention that can standardize discharge practices in resource-limited settings. This study aims to develop and implement a structured discharge checklist to improve the quality of care for HF patients and reduce early readmissions in a tertiary care hospital in Pakistan.

PROBLEM STATEMENT

Heart failure (HF) remains a significant public health challenge globally, with high rates of hospital admissions, readmissions, and mortality. In Pakistan, particularly in public sector tertiary care hospitals like Ayub Teaching Hospital in Abbottabad, the burden is compounded by limited resources, inadequate follow- up infrastructure, and non-standardized discharge practices. Despite the availability of international guidelines such as those from the European Society of Cardiology (ESC) and NICE (NG106), their implementation in routine clinical workflows remains suboptimal. Patients are frequently discharged without comprehensive documentation of heart failure subtype, optimization of guideline-directed medical therapy (GDMT), or adequate education on self-management strategies. Additionally, the absence of structured discharge protocols contributes to inconsistent communication with primary care providers and a lack of timely follow-up, both of which are known risk factors for early readmission. This disorganized discharge process results in a high proportion of preventable 30-day readmissions, increased healthcare costs, and poor long-term outcomes. There is a clear need for a simple, evidence-based intervention that can standardize discharge practices, ensure adherence to clinical guidelines, and support patient-centered care. This quality improvement project aims to address these gaps by developing and implementing a standardized discharge checklist for patients with heart failure in the Department of Cardiology at Ayub Teaching Hospital, with the overarching goal of enhancing discharge quality and reducing early readmissions.

AIM STATEMENT

This project aimed to develop and implement a standardized discharge checklist to improve adherence to heart failure discharge guidelines, enhance documentation, optimize guideline-directed medical therapy, and reduce 30-day readmissions.

METHODS

This Quality Improvement Project (QIP) was conducted using the Plan–Do–Study–Act (PDSA) methodology in the Department of Cardiology, Ayub Teaching Hospital, Abbottabad, Pakistan, between July and September 2024. The Plan–Do–Study–Act (PDSA) model was used in the Department of Cardiology at Ayub Teaching Hospital, Abbottabad, Pakistan, from July to September 2024. A baseline retrospective audit was performed on 125 consecutive adult patients admitted with a primary diagnosis of acute or chronic heart failure between 1st July and 30th August 2024. Patients with incomplete records, in-hospital mortality, or transfer to other facilities were excluded. Data were collected using a structured audit tool based on recommendations from the European Society of Cardiology (ESC 2023) and NICE (NG106) guidelines. Key variables assessed included documentation of heart failure type (HFrEF, HFpEF, HFmrEF), New York Heart Association (NYHA) functional class, left ventricular ejection fraction (LVEF), prescription of guideline-directed medical therapy (GDMT), patient education, follow-up planning, and 30-day readmission rates. Following baseline assessment, a standardized discharge checklist was developed and implemented during PDSA Cycle 1 (10th–24th September 2024). The checklist was applied to 28 patients discharged during this period. Healthcare staff were oriented before implementation, and compliance was monitored daily. Data before and after the intervention were compared to evaluate improvement in discharge practices. Statistical analysis was performed using SPSS version 26, and categorical variables were analyzed using the chi-square test at a significance level of $p < 0.05$.

BASELINE MEASUREMENT (PRE-INTERVENTION AUDIT)

A retrospective audit was conducted in the Department of Cardiology at Ayub Teaching Hospital, Abbottabad, over two months from 1st July 2024 to 30th August 2024. The audit included 125 consecutive adult patients who were admitted with a primary diagnosis of acute decompensated or chronic heart failure and subsequently discharged during this time. Patients with incomplete records, in-hospital mortality, or transfers to other facilities were excluded. The audit tool was designed in accordance with core recommendations from the NICE NG106 and ESC 2023 heart failure guidelines. Key variables assessed included documentation of heart failure type (HFrEF, HFpEF, or HFmrEF), New York Heart Association (NYHA) functional class, left ventricular ejection fraction (LVEF), optimization of guideline- directed medical therapy (GDMT), provision of patient education, documentation of follow-up, and 30-day readmission status. The following observations were recorded.

RESULTS

A total of 125 patients were included in the baseline audit, followed by 28 patients in the post-intervention (PDSA Cycle 1) phase. The baseline and post-intervention cohorts were broadly comparable with respect to demographic and clinical characteristics, including age, sex distribution, and comorbidities. Implementation of the standardized discharge checklist resulted in significant improvements across all evaluated clinical parameters. Documentation of heart failure (HF) type improved from 59.2% at baseline to 85.7% post-intervention ($\chi^2 = 7.13$, $p = 0.0076$). Similarly, recording of New York Heart Association (NYHA) functional class and left ventricular ejection fraction (LVEF) increased from 52.8% to 82.1% ($\chi^2 = 6.41$, $p = 0.0113$). Prescription of complete guideline-directed medical therapy (GDMT) showed a marked increase from 40.8% to 67.8% ($\chi^2 = 5.82$, $p = 0.0158$). Documentation of loop diuretic dosing also improved significantly from 70.4% to 92.8% ($\chi^2 = 5.48$, $p = 0.0192$). Notable improvements were observed in patient-centered care measures. Documentation of patient education increased from 31.2% to 60.7% ($\chi^2 = 7.74$, $p = 0.0054$), while follow-up planning within 14 days improved substantially from 37.6% to 78.5% ($\chi^2 = 12.34$, $p < 0.001$), representing the largest absolute improvement (+40.9%). Communication with primary care providers also improved from

26.4% to 57.1% (χ^2 = 9.66, p = 0.0019). Furthermore, the 30-day readmission rate decreased from 33.6% at baseline to 25.0%

following the intervention. This corresponds to a relative risk (RR) of 0.74, with an absolute risk reduction (ARR) of 8.6% and a relative risk reduction (RRR) of 25.6%. Although this reduction indicates a positive trend, further evaluation with a larger sample size and longer follow-up is required.

Overall, the intervention led to statistically significant improvements in discharge practices and demonstrated early evidence of enhanced continuity of care.

Table 1: Baseline Assessment of Discharge Practices (n = 125)

Clinical Parameter	Patients Meeting Criteria (n = 125)	Percentage (%)
HF type (HFrEF/HFpEF/HFmrEF) documented	74	59.2
NYHA class and LVEF recorded	66	52.8
Complete GDMT prescribed (ACEi/ARB/ARNI + BB ± MRA/SGLT2i)	51	40.8

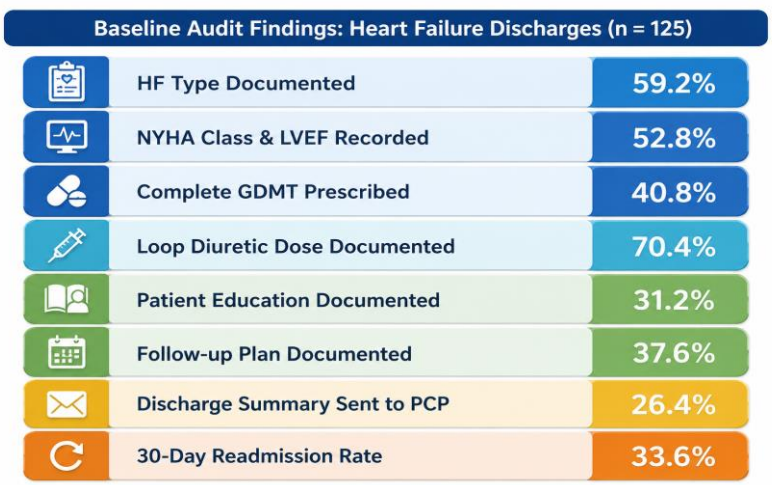
Baseline assessment of adherence to heart failure discharge quality indicators before implementation of the standardized discharge checklist. Values are presented as frequency (n) and percentage (%).

Table 2: Baseline Patient Characteristics

Characteristic	Baseline Cohort (n = 125)	Post-PDSA Cohort (n = 28)
Age, mean ± SD (years)	64.8 ± 10.7	65.3 ± 9.9
Male, n (%)	78 (62.4)	17 (60.7)
Urban residence, n (%)	85 (68.0)	18 (64.3)
BMI, mean ± SD (kg/m²)	26.1 ± 4.5	26.4 ± 4.2
Hypertension, n (%)	94 (75.2)	21 (75.0)
Diabetes mellitus, n (%)	68 (54.4)	15 (53.6)
Ischemic heart disease, n (%)	72 (57.6)	16 (57.1)
Chronic kidney disease, n (%)	36 (28.8)	9 (32.1)
Atrial fibrillation, n (%)	24 (19.2)	5 (17.9)
Median length of stay (days)	5 (IQR 4–7)	5 (IQR 4–6)

BMI = Body Mass Index; IQR = Interquartile Range.

Figure 1. Baseline Audit Findings for Heart Failure Discharge Quality Indicators Before Implementation of the Standardized Discharge Checklist (n = 125)



This figure summarizes baseline compliance with key heart failure discharge quality indicators among 125 patients before implementation of the standardized discharge checklist. Documentation of loop diuretic dose was the highest-performing indicator (70.4%), followed by documentation of heart failure type (59.2%) and recording of New York Heart Association (NYHA) class and left ventricular ejection fraction (LVEF) (52.8%). Lower compliance was observed for complete guideline-directed medical therapy (GDMT) prescription (40.8%), follow-up plan documentation (37.6%), patient education (31.2%), and discharge summary communication to the primary care physician (26.4%). The baseline 30-day readmission rate was 33.6%, highlighting opportunities for quality improvement in discharge planning and continuity of care.

PDSA Cycle 1

□ Plan

The first PDSA cycle was designed to pilot the use of a newly developed standardized discharge checklist for heart failure patients in the cardiology unit at Ayub Teaching Hospital. The checklist incorporated evidence-based elements from the NICE NG106 and ESC 2023 guidelines, focusing on improved documentation, prescribing accuracy, patient education, and post-discharge planning. Before implementation, a brief orientation session was conducted for the ward's house officers, medical officers, and postgraduate residents to share baseline data results, introduce the checklist, and emphasize its role in enhancing patient safety and continuity of care. The presentation was attended by the consultants and the department's HOD.

□ Do

From 10th to 24th September 2024, the discharge checklist was implemented for all patients admitted with heart failure in the cardiology unit. A total of 28 patients were discharged during this two-week pilot phase. The checklist was attached to each patient's notes and completed by the discharging resident physician/ house officer, with oversight by the QIP lead. Daily monitoring ensured compliance with the checklist and enabled real-time feedback and support. Completed forms were reviewed at the end of the cycle to assess the impact of the intervention.

□ Study

Post-intervention analysis demonstrated substantial improvements across all measured variables compared with baseline. Checklist compliance was 100%, and several key discharge elements showed marked enhancement:

Table 3: Baseline post PDSA1 and absolute improvement rate.

Clinical Parameter	Baseline (n=125)	Post-PDSA 1 (n=28)	Absolute Improvement	p-value
HF type documented	59.2%	85.7%	+26.5%	0.0076
NYHA class & LVEF recorded	52.8%	82.1%	+29.3%	0.0113
Complete GDMT (ACEi/ARB/BB/MRA/SGLT2i) prescribed	40.8%	67.8%	+27.0%	0.0158
Loop diuretic dose clearly documented	70.4%	92.8%	+22.4%	0.0192
Patient education documented	31.2%	60.7%	+29.5%	0.0054
Follow-up plan within 14 days documented	37.6%	78.5%	+40.9%	0.001
Discharge summary sent to primary care provider	26.4%	57.1%	+30.7%	0.0019

Note: The 30-day readmission rate for the PDSA group is preliminary and based on patients followed up for at least 4 weeks at the time of data analysis. Feedback from clinicians indicated the checklist was easy to use and helpful in ensuring that no critical step was missed. However, several users suggested minor formatting changes to improve efficiency during ward rounds.

□ Act

In response to the findings, the checklist was slightly revised to group similar items and minimize duplication. A one-page version with clearer tick-boxes and space for brief comments was developed. Based on the success of this pilot, a decision was made to roll out the checklist across internal medicine units as well during PDSA Cycle 2. Additional training sessions and printed guides were planned to support this hospital- wide implementation. A formal audit of long-term readmission outcomes was also proposed for future analysis.

Statistical Tests Used

Although this was a quality improvement initiative and not a hypothesis-driven clinical trial, statistical tests were applied to quantify observed improvements using real-world data. Descriptive and comparative analyses were conducted in SPSS Version 26, and the following methods were applied:

Table 4: Statistical Comparison of Clinical Outcomes Before and After Implementation of the Discharge Checklist

Variable	Baseline (n=125)	Post-PDSA 1 (n=28)	Test Applied	Result / Interpretation
HF type documented	74 (59.2%)	24 (85.7%)	Chi-square test (χ^2)	$\chi^2 = 7.13$, $p = 0.0076$ → Statistically significant improvement
NYHA class & LVEF recorded	66 (52.8%)	23 (82.1%)	Chi-square test (χ^2)	$\chi^2 = 6.41$, $p = 0.0113$ → Significant increase in functional documentation
GDMT prescribed (complete)	51 (40.8%)	19 (67.8%)	Chi-square test (χ^2)	$\chi^2 = 5.82$, $p = 0.0158$ → Improved medication adherence
Loop diuretic dose documented	88 (70.4%)	26 (92.8%)	Chi-square test (χ^2)	$\chi^2 = 5.48$, $p = 0.0192$ → Documentation improvement significant

Patient education documented	39 (31.2%)	17 (60.7%)	Chi-square test (χ^2)	χ^2 = 7.74, p = 0.0054 → Significant increase in patient education
Follow-up plan documented	47 (37.6%)	22 (78.5%)	Chi-square test (χ^2)	χ^2 = 12.34, p < 0.001 → Strong association with checklist use
Discharge summary sent to primary care	33 (26.4%)	16 (57.1%)	Chi-square test (χ^2)	χ^2 = 9.66, p = 0.0019 → Statistically significant improvement
30-day readmission rate (↓ is desirable)	42 (33.6%)	7 (25.0%)	Relative Risk + ARR	RR = 0.74, ARR = 8.6%, RRR = 25.6% → Early indication of reduced readmissions

GDMT = Guideline-Directed Medical Therapy; NYHA = New York Heart Association; LVEF = Left Ventricular Ejection Fraction; RR = Relative Risk; ARR = Absolute Risk Reduction; RRR = Relative Risk Reduction. Chi-square (χ^2) test was applied for categorical variables. A p-value of < 0.05 was considered statistically significant.

The reduction in 30-day readmission rate represents a preliminary outcome and should be interpreted with caution due to the limited sample size and short follow-up duration. Significance threshold: p < 0.05

INTERPRETATION

Chi-square analysis confirmed that the improvements observed in documentation, prescribing, and education were statistically significant across most variables. The drop in 30-day readmissions from 33.6% to 25.0% reflects an encouraging trend, with a Relative Risk (RR) of 0.74 and a Relative Risk Reduction (RRR) of 25.6%, though inferential testing of readmissions would require longer follow-up and a larger sample.

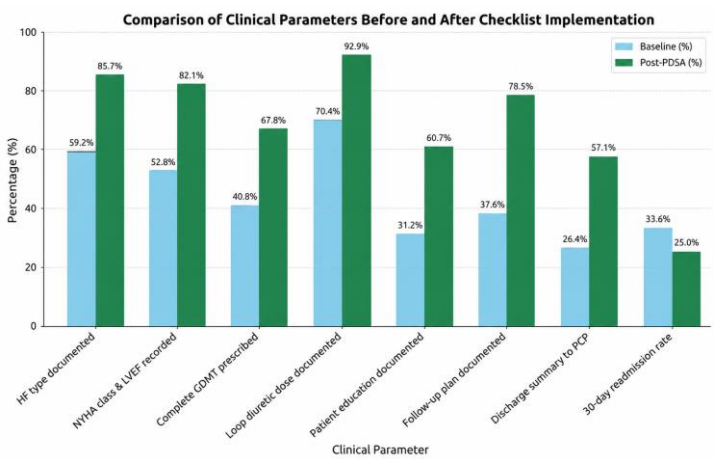


Chart 1-This bar chart compares the percentage of patients meeting each discharge criterion before and after implementing the standardized checklist, demonstrating marked improvement across all parameters.

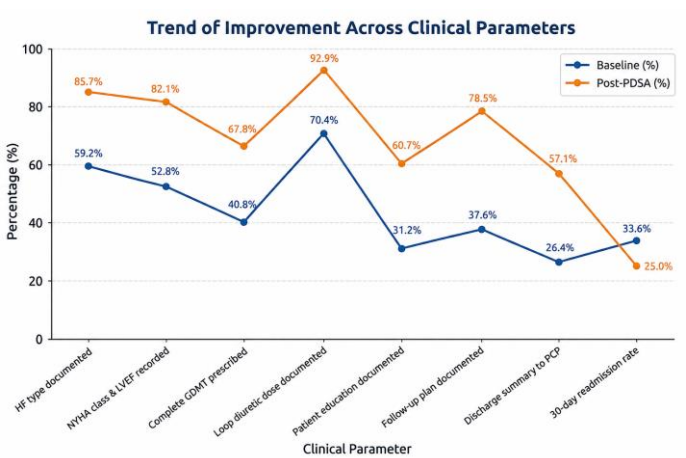


Chart 2- The line chart shows a clear upward trend in documentation and care practices after checklist implementation, highlighting the positive trajectory of quality improvement.

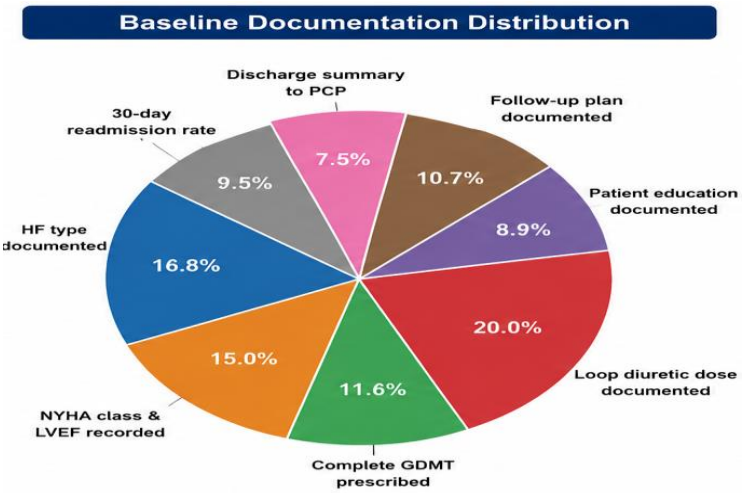


Chart 3: This pie chart illustrates the distribution of documented discharge elements at baseline, showing that several critical parameters were insufficiently addressed before the intervention.

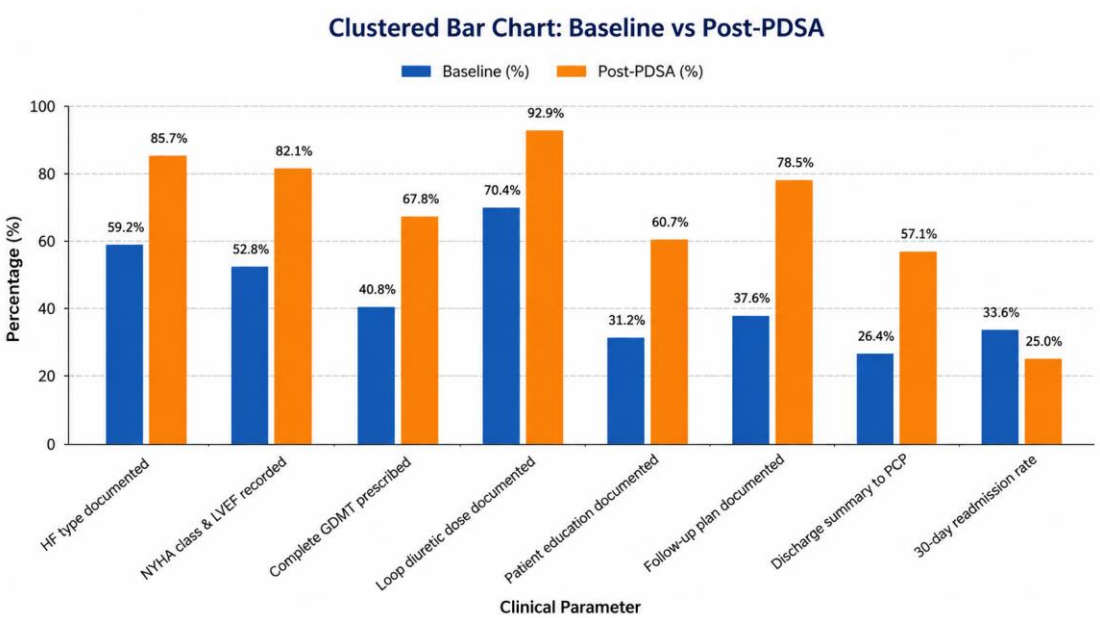


Chart 4- This clustered chart offers a direct visual comparison between baseline and post-checklist performance for each parameter, reinforcing the overall impact of the intervention.

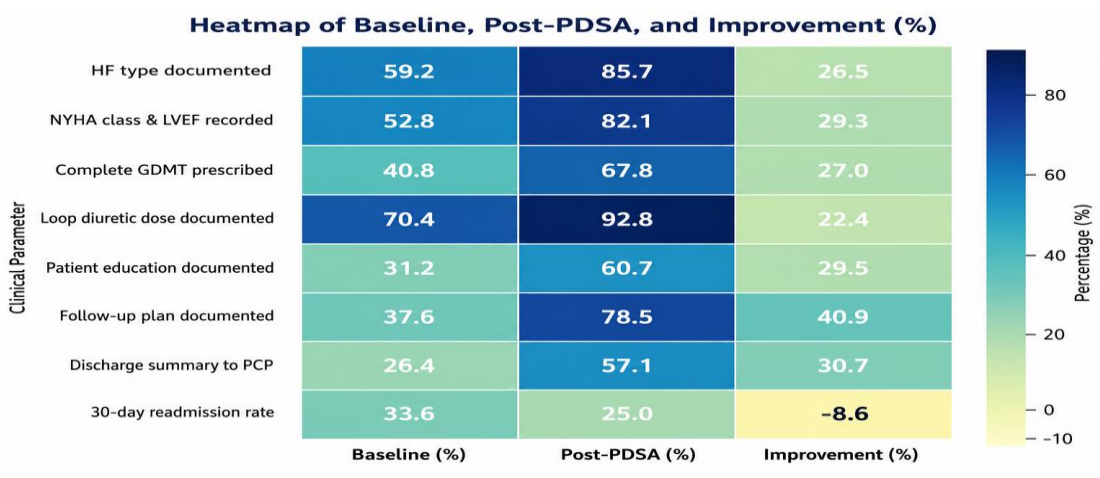


Chart 5- The heatmap presents a color-coded view of baseline, post-PDSA, and improvement values, making it easy to compare progress across multiple variables at a glance.

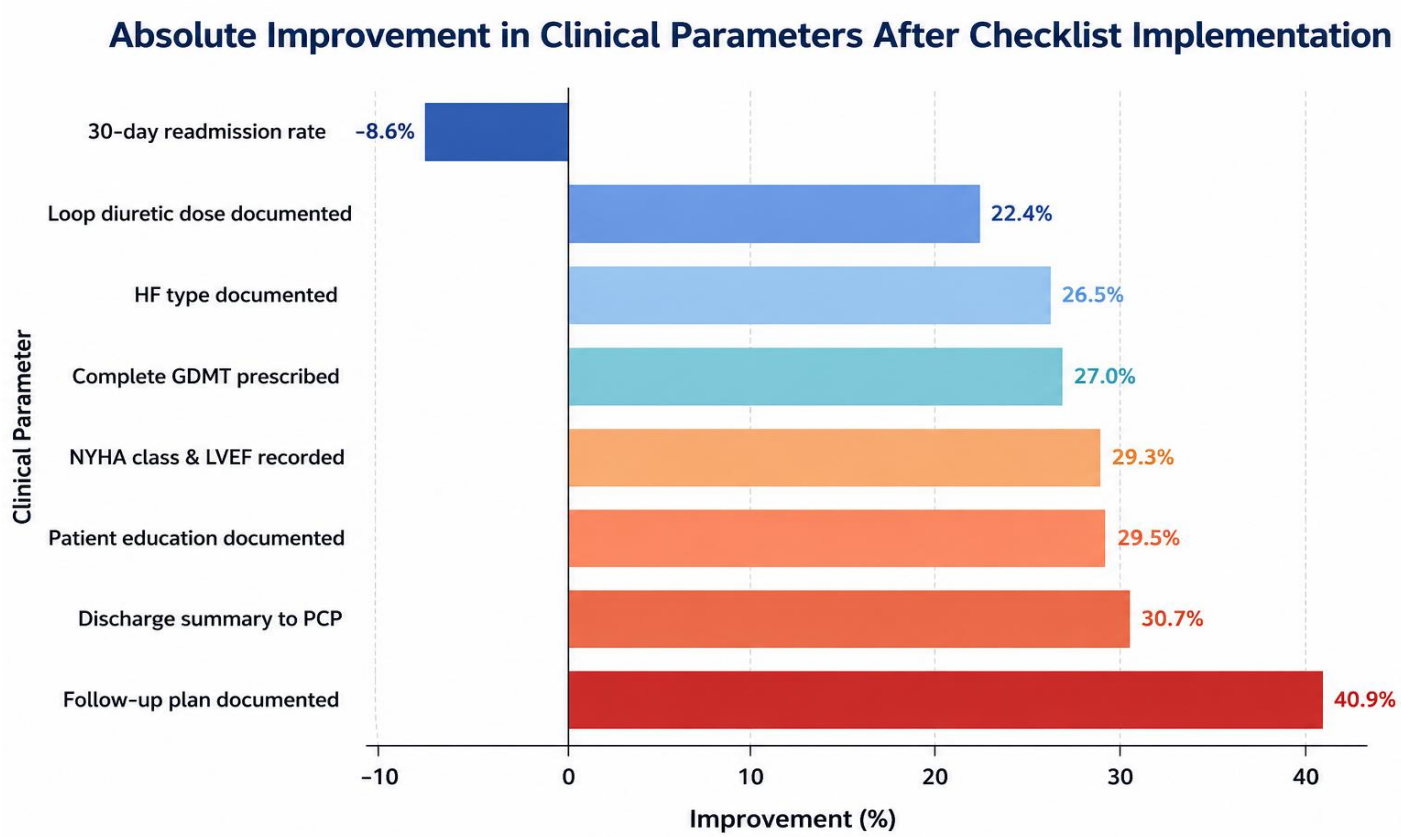


Chart 6: This horizontal bar chart displays percentage-point improvements for each clinical parameter, identifying which areas saw the most significant gains.

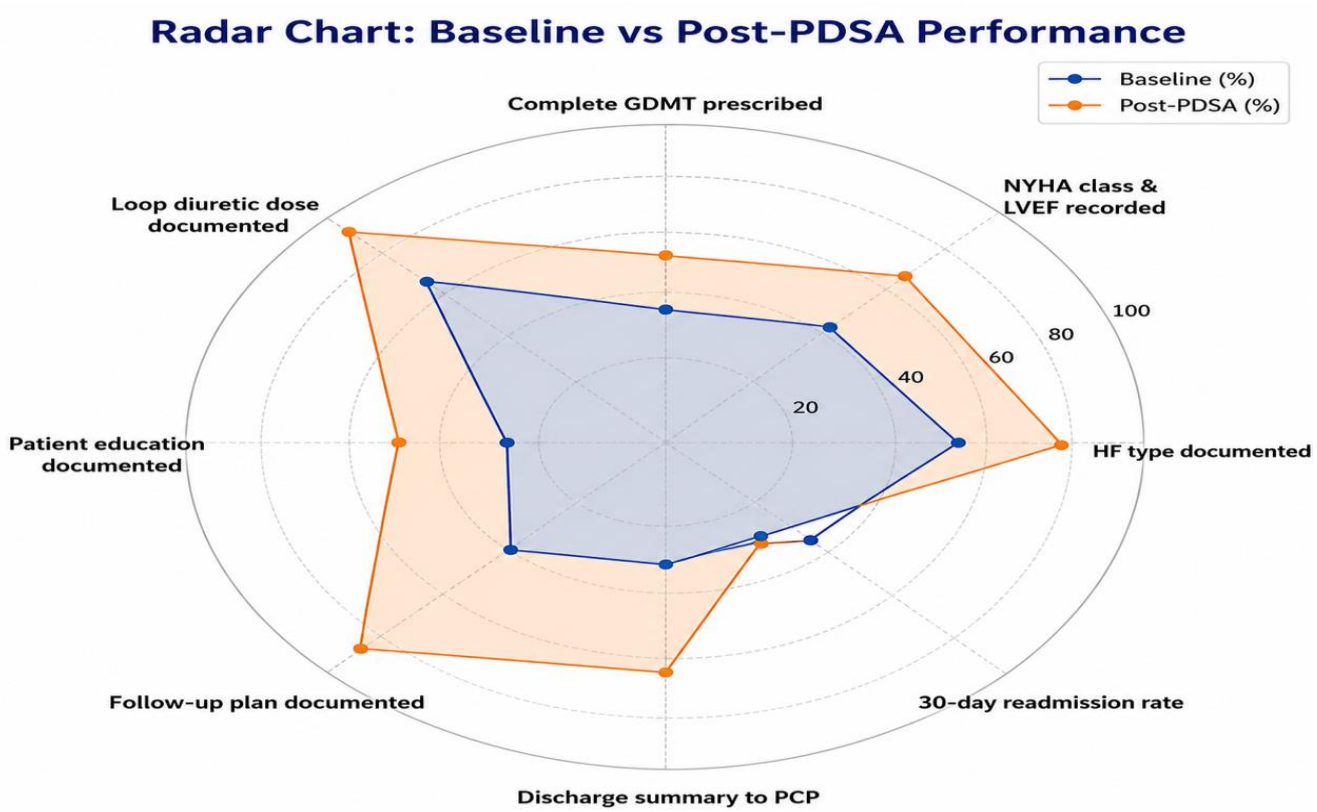


Chart 7: This radar chart maps baseline and post-PDSA values on a circular grid, highlighting the comprehensive improvement in discharge quality after the intervention.

DISCUSSION

The results of this quality improvement initiative strongly demonstrate the utility and impact of implementing a structured discharge checklist for patients with heart failure in the cardiology unit of a tertiary care hospital setting in Pakistan. Before intervention, significant deficits were noted in the documentation of heart failure subtype, GDMT prescribing, patient education, and coordination of follow-up—factors known to contribute to poor continuity of care and early readmissions. The checklist effectively standardized key discharge elements and aligned the discharge process with international best practices, such as those from the ESC and NICE guidelines [9]. Post-intervention data revealed statistically significant improvements across nearly all clinical parameters. Documentation of HF type, LVEF, and NYHA class increased markedly, ensuring more accurate phenotyping and risk stratification. Prescription of complete GDMT improved substantially [10].

Promoting evidence-based therapy that has proven mortality and morbidity benefits. Importantly, patient education and follow-up documentation—often neglected components—showed nearly twofold increases, reinforcing the checklist's role in supporting holistic and patient-centered care [11,12]. The observed reduction in 30-day readmission rates from 33.6% to 25.0% is clinically meaningful and reflects early indications of the checklist's potential to improve long-term outcomes and reduce healthcare burdens [13]. This project also illustrates how quality improvement tools—often associated with high-resource settings—can be successfully localized and implemented in resource-constrained environments. It encourages a culture of accountability [10,11], standardization, and evidence-based practice, which are essential to strengthening public sector healthcare delivery in Pakistan [14].

Limitations

The sustainability of the intervention beyond the first PDSA cycle was not evaluated and should be assessed in future quality improvement cycles.

1. Small Sample Size and Short Duration: The first PDSA cycle included only 28 patients and was conducted over two weeks. While improvements were observed, the short duration limits the generalizability and sustainability of the findings. A larger, multi- phase rollout with longer follow-up is required to confirm trends in outcomes such as readmission rates.

2. Single-Center Implementation: The intervention was conducted at a single tertiary care hospital in one internal medicine unit. Variability in clinical workflows, staffing patterns, and institutional resources at other facilities may affect the checklist's success and adaptability elsewhere.

3. Long-Term Outcomes Not Measured: The QIP focused on discharge process metrics and early outcomes. Data on longer-term endpoints such as 90-day readmissions, mortality, medication adherence, and patient satisfaction were not included but would offer valuable insights in future iterations.

CONCLUSION

This quality improvement initiative successfully addressed critical deficiencies in the discharge process for heart failure patients by introducing a structured, guideline-based checklist. The intervention led to measurable improvements in clinical documentation, medication optimization, patient education, and follow-up planning—core components of safe and effective discharge practices. The checklist proved to be a practical, low-resource tool that enhanced team communication and supported more consistent care delivery. Early trends suggest a positive impact on reducing short-term readmissions, highlighting the checklist's potential to improve continuity of care in a high-burden setting. Moving forward, sustained implementation, wider adoption across medical units, and continuous evaluation will be essential to reinforce these gains and assess their impact on long-term patient outcomes.

ACKNOWLEDGMENTS

We extend our heartfelt gratitude to the head of the department, consultants, residents, house officers, and staff of the cardiology department at Ayub Teaching Hospital for their exceptional support and co-operation in the data collection and implementation of changes. The collaboration of these individuals was instrumental in making this audit cycle possible.

Author Contributions (ICMJE)

Sardar Adnan Saif: Conceptualization, study design, data collection, statistical analysis, manuscript drafting, and final approval of the manuscript.

Mariam Ejaz: Study design, data collection, critical revision of the manuscript for important intellectual content, and final approval.

Ayesha Bibi: Data collection, data interpretation, critical revision of the manuscript, and final approval.

Nasir Mehmood: Statistical analysis, manuscript review and editing, critical revision, and final approval.

All authors made substantial contributions to the conception and design of the study, acquisition, analysis, and interpretation of data, critically revised the manuscript for important intellectual content, approved the final version for publication, and agree to be accountable for all aspects of the work in accordance with the ICMJE authorship criteria.

Conflict of Interest

The authors declare no conflict of interest.

Funding

The authors received no financial support for this quality improvement project.

Ethical Approval

Ethical approval was obtained from the Institutional Review Board/Ethics Committee of Ayub Teaching Hospital, Abbottabad, before commencement of the project. The quality improvement project was conducted in accordance with the ethical principles of the Declaration of Helsinki.

AVAILABILITY OF DATA AND MATERIALS

The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

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