Quality improvement project

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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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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), real-world implementation in Pakistani tertiary care hospitals remains inconsistent. Discharge practices are often fragmented, lacking structured documentation, comprehensive therapy optimization, and proper follow-up planning. These gaps lead to high rates of 30-day readmissions and poor post-discharge outcomes. In cardiology department of Ayub Teaching Hospital, Abbottabad, the need for a standardized and systematic approach to discharge planning for HF patients was identified as a critical quality improvement priority.

Objectives: The primary aim of this project was to develop and implement a structured, evidence-based discharge checklist for heart failure patients in cardiology department of Ayub teaching hospital. The objectives were To standardize the discharge process based on international guidelines (ESC 2023 and NICE NG106);To improve the documentation of key clinical parameters ;To enhance prescription of guideline-directed medical therapy (GDMT);To ensure appropriate patient education and timely post-discharge follow-up;To reduce 30-day heart failure-related readmission rates

Materials and Methods: A retrospective baseline audit was conducted from 01 July 2024 to August 30, 2024, involving 125 patients admitted with a primary diagnosis of heart failure. Key discharge elements were evaluated, including documentation of HF type, NYHA class, left ventricular ejection fraction (LVEF), completeness of GDMT, loop diuretic dosing, patient education, follow-up planning, and discharge communication with primary care providers. A standardized discharge checklist was then developed using the NICE NG106 and ESC 2023 guidelines.[3,4] In the first Plan-Do-Study-Act (PDSA) cycle, the checklist was piloted in cardiology unit from September 10 to 24, 2024. During this phase, 28 patients with heart failure were discharged using the checklist. House officers and residents were trained in its use, and compliance was monitored daily. Post-intervention data were collected and compared with baseline figures. Chi-square statistical analysis was applied to assess significance.

Results: Implementation of the checklist led to significant improvements in all assessed discharge parameters. The documentation of HF type increased from 59.2% to 85.7%, NYHA class and LVEF from 52.8% to 82.1%, and complete GDMT prescription from 40.8% to 67.8%. Patient education documentation improved from 31.2% to 60.7%, and planned follow-up within 14 days rose from 37.6% to 78.5%. Communication with primary care providers increased from 26.4% to 57.1%. The 30-day HF-related readmission rate showed a downward trend, decreasing from 33.6% to 25.0%. All improvements, except readmission (which was preliminary), were statistically significant ($p < 0.05$).

Conclusion: The introduction of a standardized discharge checklist significantly improved discharge documentation, GDMT prescription, patient education, and care coordination for heart failure patients. The intervention showed early promise in reducing readmission rates and demonstrated the feasibility of integrating evidence-based guidelines into routine clinical practice, even in resource-limited settings. Hospital-wide implementation and longer-term follow-up are now underway to sustain and expand these improvements. This QIP highlights how simple, structured interventions can yield meaningful improvements in quality of care and patient outcomes.

Keywords: Heart failure, Discharge checklist, Quality improvement, Guideline-directed medical therapy (GDMT), Hospital readmissions, Patient education, Care transitions, ESC 2023, NICE NG106, Heart failure management, Continuity of care.

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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)[1,2], 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[6,7], 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 rehospitalization.

Aim Statement

This project aims to develop and implement a structured discharge checklist for heart failure patients to improve discharge quality and care coordination. It seeks to enhance documentation, ensure safer prescribing, and facilitate timely follow-up planning. The ultimate goal is to support better continuity of care and reduce the risk of avoidable complications after discharge.

Baseline Measurement (Pre-Intervention Audit)

A retrospective audit was conducted in the Department of cardiology at Ayub Teaching Hospital, Abbottabad, over a two-month period 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:

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%**

Clinical Parameter	Patients Meeting Criteria (n-125)	Percentage (%)
Loop diuretic dose clearly documented	88	**70.4%**
Patient education documented (verbal or written)	39	**31.2%**
Follow-up plan within 14 days documented	47	**37.6%**
Discharge summary sent to primary care provider	33	**26.4%**
30-day readmission rate for HF-related causes	42	**33.6%**

The audit revealed considerable variability in discharge practices, with key clinical and educational components often omitted or inconsistently recorded. Notably, less than half of the patients were discharged on full GDMT, and a third were readmitted within 30 days, underscoring the urgent need for a structured discharge intervention.

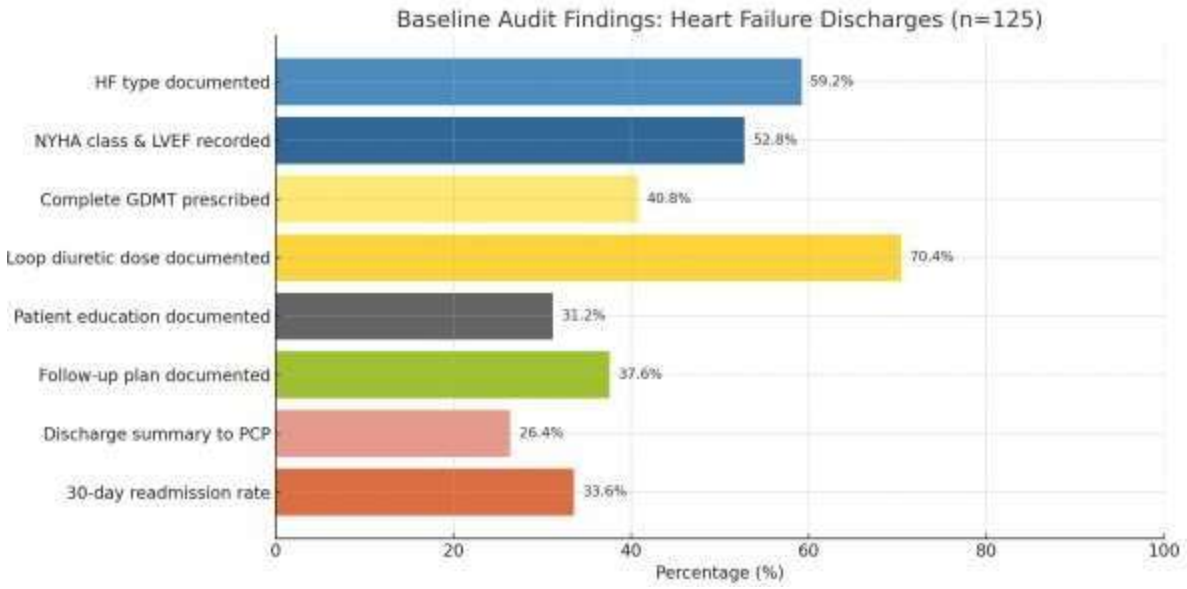

Table 01: Baseline Patient Characteristics

Table 1 presents the demographic and clinical characteristics of the baseline and post-PDSA cohorts. Both groups were broadly comparable in age, sex distribution, and comorbidity burden, reflecting a similar case mix during the study periods. The majority of patients were male, in their mid-60s, and had a high prevalence of cardiovascular risk factors such as hypertension and diabetes mellitus. Ischemic heart disease was the leading underlying etiology of heart failure in both groups. Chronic kidney disease and atrial fibrillation were also common, underscoring the complexity of care required in this population.

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)

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 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. Prior to implementation, a brief orientation session was conducted for the ward's house officers, medical officers, and postgraduate residents to share the results of base line data and to introduce the checklist and emphasize its role in enhancing patient safety and continuity of care. The presentation was attended by the consultants and the HOD of the department.

□ Do

From **10th to 24th September 2024**, the discharge checklist was implemented for all patients admitted with heart failure in 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 checklist compliance and allowed 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 when compared to the baseline data. Checklist compliance was 100%, and several key discharge elements showed marked enhancement:

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 prescribed (ACEi/ARB/BB/MRA/SGLT2i)	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
30-day readmission rate (for observation only)	33.6%	25.0%*	**-8.6% (early trend)**	—*

*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 make it more efficient 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:

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)	$\chi^2 = 7.74$, $p = 0.0054$ → Significant increase in patient education
Follow-up plan documented	47 (37.6%)	22 (78.5%)	Chi-square test (χ^2)	$\chi^2 = 12.34$, $p < 0.001$ → Strong association with checklist use
Discharge summary sent to primary care	33 (26.4%)	16 (57.1%)	Chi-square test (χ^2)	$\chi^2 = 9.66$, $p = 0.0019$ → 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

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 for readmissions would require a longer follow-up and larger sample.

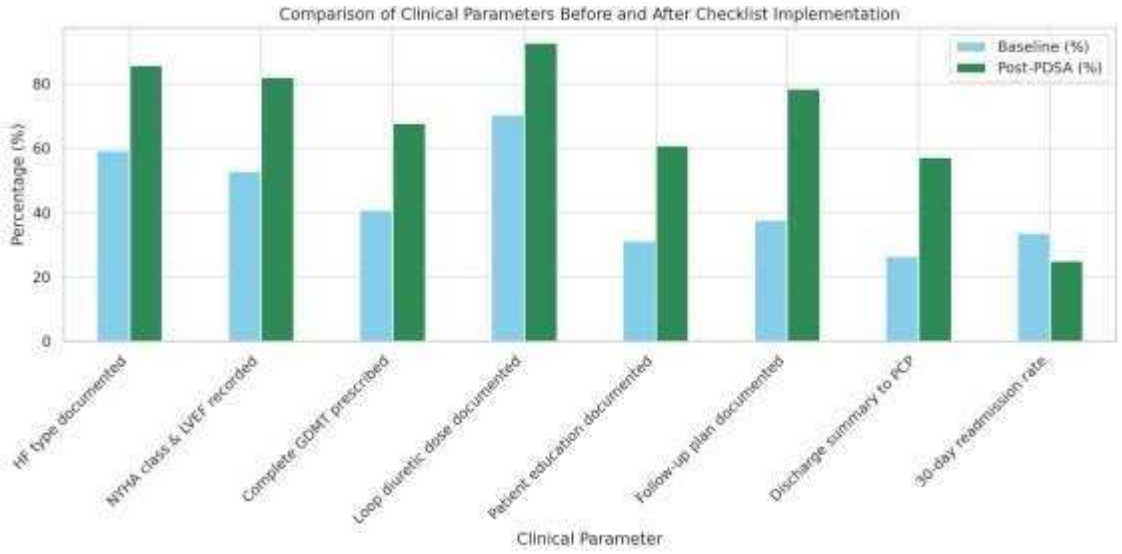

Chart 1-This bar chart compares the percentage of patients meeting each discharge criterion before and after implementing the standardized checklist, demonstrating marked improvement across all parameters.

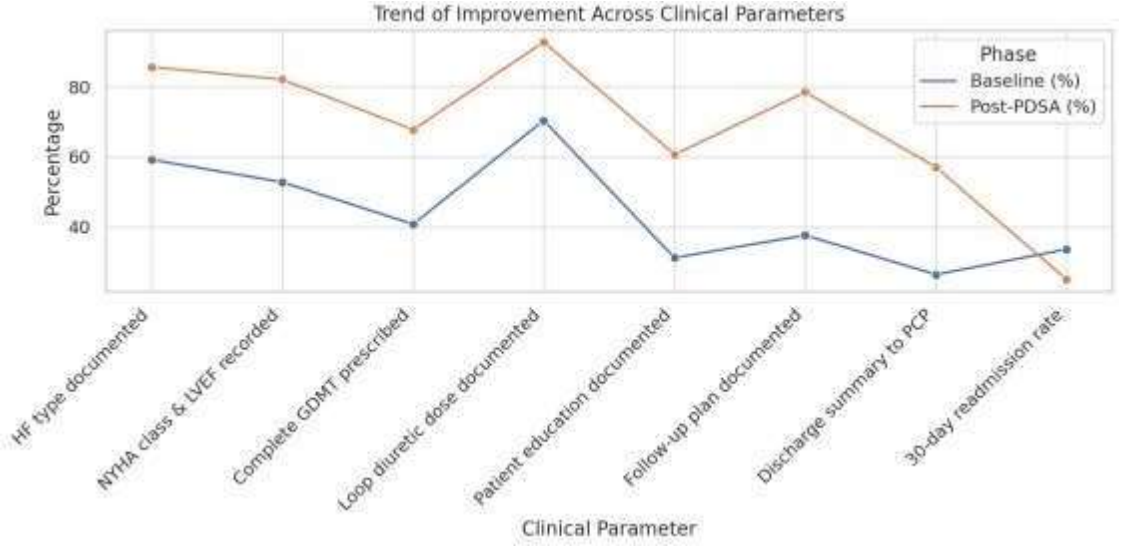

Chart 2- The line chart shows a clear upward trend in documentation and care practices after checklist implementation, highlighting the positive trajectory of quality improvement.

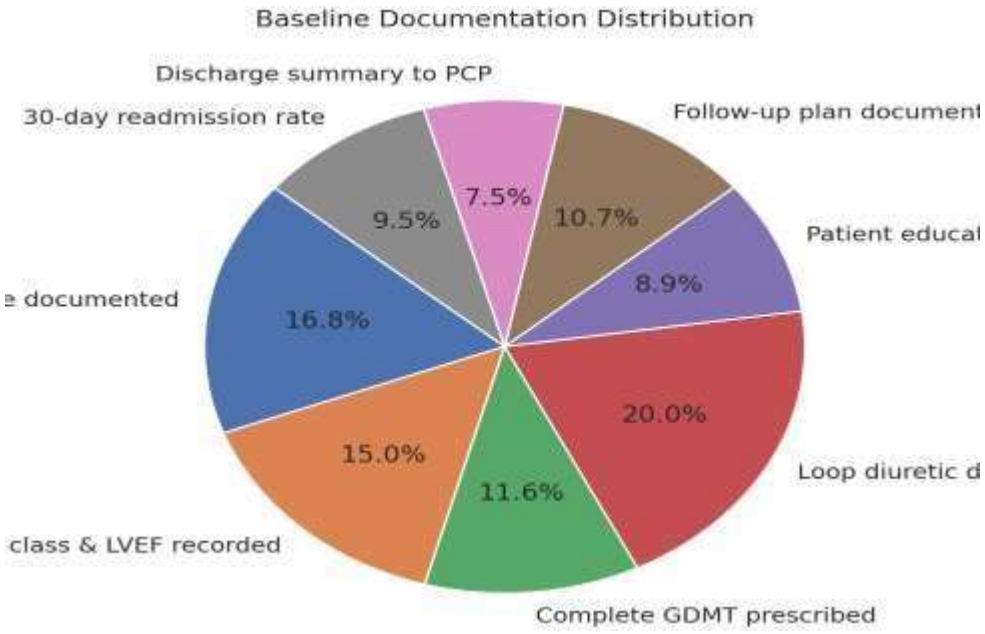

Chart3- This pie chart illustrates the distribution of documented discharge elements at baseline, showing that several critical parameters were under-addressed before the intervention.

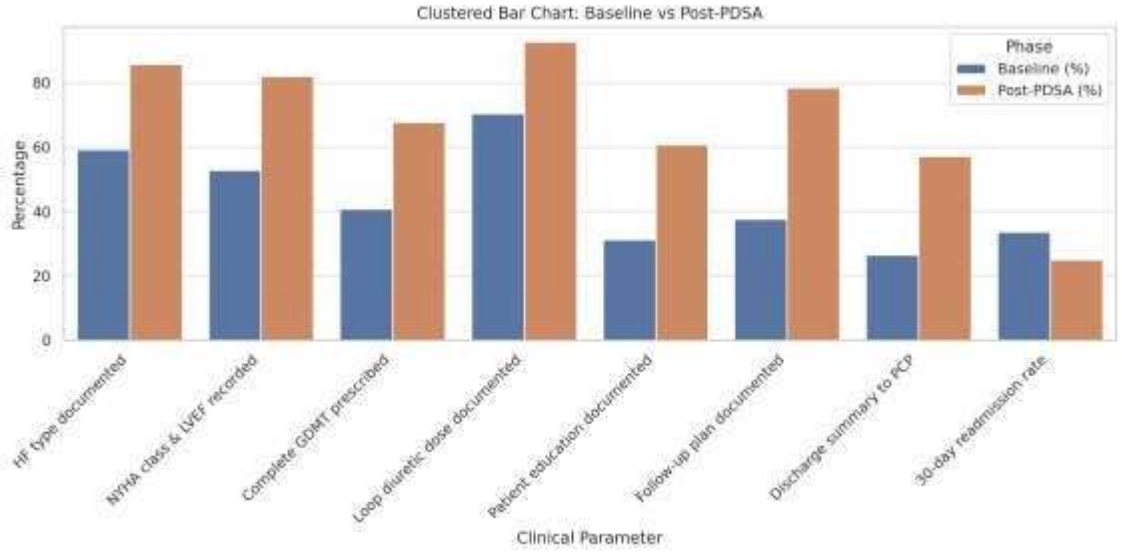

Chart 4- This clustered chart offers a direct visual comparison between baseline and post-checklist performance for each parameter, reinforcing the overall impact of the intervention.

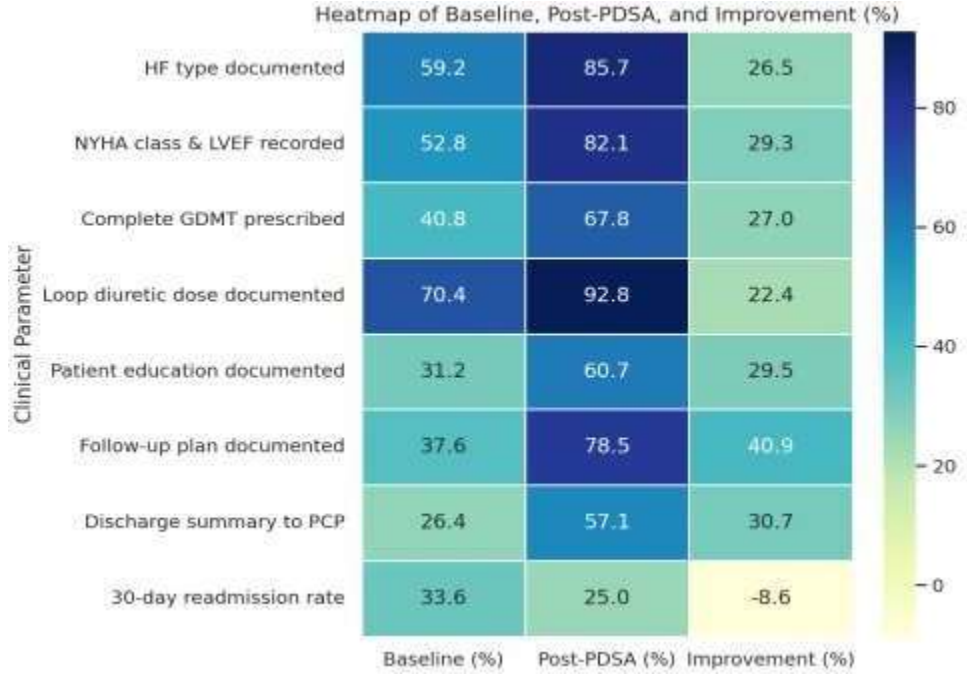

Chart 5- The heatmap presents a color-coded view of baseline, post-PDSA, and improvement values, making it easy to compare progress across multiple variables at a glance.

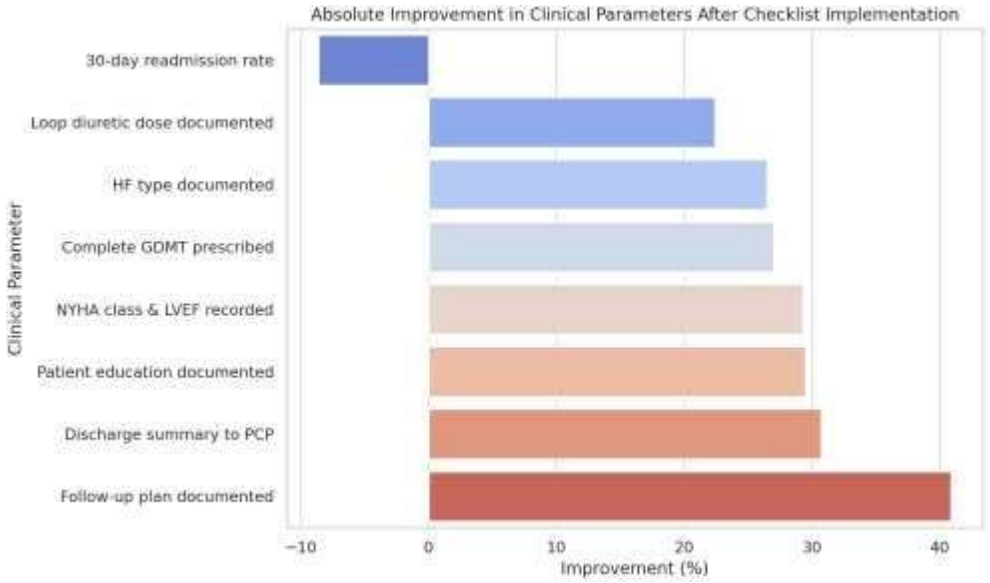

Chart 6- This horizontal bar chart displays the percentage point improvements for each clinical parameter, identifying which areas saw the most significant gains.

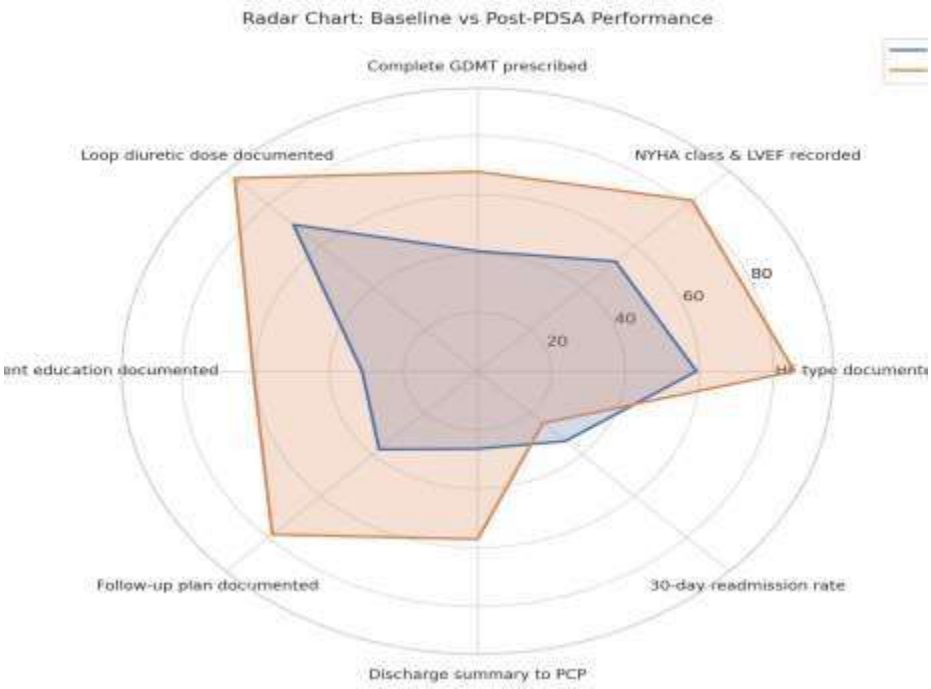

Chart 7- This radar chart maps baseline and post-PDSA values on a circular grid, highlighting the comprehensive enhancement in discharge quality after intervention.

Standardized Discharge Checklist for Heart Failure Patients

Ayub Teaching Hospital, Abbottabad

Guidelines Used: NICE NG106 & ESC 2023

1. Patient Assessment

- ☐ Diagnosis confirmed (HFrEF / HFpEF / HFmrEF)
- ☐ Documented NYHA class and LVEF
- ☐ Stable for ≥48 hours (clinical, vitals, renal profile)
- ☐ Latest ECG, echo, renal function, BNP reviewed

2. Medications Optimized

- ☐ ACEi/ARB/ARNI initiated or adjusted (HFrEF)
- ☐ Beta-blocker continued/started (if eligible)
- ☐ MRA prescribed if indicated
- ☐ SGLT2 inhibitor prescribed (e.g. dapagliflozin)
- ☐ Loop diuretic dose reviewed
- ☐ Updated medication list provided with clear instructions

☐ Patient counselled on purpose, side effects, and adherence

3. Education & Self-Management

☐ Diagnosis and cause explained to patient/caregiver
☐ Daily weight monitoring taught
☐ Fluid restriction advised (if needed)
☐ Salt intake & diet discussed
☐ Activity level guidance given
☐ Red flags (e.g., weight gain, dyspnea) explained
☐ Written educational material provided

4. Follow-Up & Handover

☐ Follow-up booked within 7–14 days
☐ Referral to heart failure nurse/specialist (if available)
☐ Primary care physician notified with full discharge summary
☐ Summary includes: HF type, EF, NYHA class, meds, follow-up

5. Devices & Comorbidities

☐ CRT/ICD eligibility assessed (EF ≤35%, post-optimization)
☐ Comorbidities addressed:
☐ AF
☐ Diabetes
☐ CKD
☐ Iron deficiency (check ferritin, TSAT)
☐ Consider referral to cardiac rehab

6. End-of-Life Considerations (if applicable)

☐ Discussed advanced care planning / DNACPR
☐ Referral to palliative care team (if needed)

Discharging Doctor: _____

Nurse/Counsellor: _____

Patient/Caregiver Informed: ☐ Yes ☐ No

Date: _____

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 cardiology unit of 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[1,2].Post-intervention data revealed statistically significant improvements across nearly all clinical parameters. Documentation of HF type, LVEF, and NYHA class saw a marked increase, ensuring more accurate phenotyping and risk stratification. Prescription of complete GDMT improved substantially[3-5]. promoting evidence-based therapy that has proven mortality and morbidity benefits. Importantly, patient education and follow-up documentation—often neglected components—showed nearly two-fold increases, reinforcing the checklist's role in supporting holistic and patient-centered care. 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[6-8].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[12-16].

Limitations

Despite the encouraging results, this project had several limitations that must be acknowledged:

1. **Small Sample Size and Short Duration**: The first PDSA cycle included only 28 patients and was conducted over a two-week period. 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 influence the success and adaptability of the checklist 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 as well, and continuous evaluation will be essential to reinforce these gains and explore their effect on long-term patient outcomes.

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Availability of data and materials

The datasets analyzed during the current study are available from the corresponding author on reason

Authors Contribution

Concept & Design of Study; Sardar Adnan Saif[1]

Drafting & Data Analysis-Sardar Adnan Saif[1], Mariam Ejaz[2], Ayesha Bibi[3], Nasir mehmood[4]

Critical Review: Mariam Ejaz[2], Ayesha Bibi[3]

Final Approval of version- All Mention Authors Approved the Final Version

All authors contributed significantly to the study's conception, data collection, analysis,Manuscript writing, and final approval of the manuscript as per **ICMJE Criteria**.

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