ORIGINAL ARTICLE

THE RATE AND TIME TO FIRST READMISSION IN PATIENTS DISCHARGED WITH A DIAGNOSIS OF ACUTE DECOMPENSATED HEART FAILURE ADMITTED TO THE CARDIOLOGY DEPARTMENT, AYUB TEACHING HOSPITAL, ABBOTTABAD

Saad Shams, Mohammad Imran Khan✉, Rukhshanda Afsar, Fatima Javed*, Zia Ullah Khan, Aftab Ahmad, Mati Ullah Khan

Department of Cardiology, Ayub Medical College Abbottabad-Pakistan
*Department of Health Govt of Khyber Pakhtunkhwa Pakistan

Background: Admission for heart failure poses a significant risk of readmission. Evaluating readmission rates in settings lacking chronic disease management programs could provide valuable insights to advocate for the establishment of such services. **Methods:** This study focused on patients admitted to the Cardiology Department of Ayub Medical Teaching Institute with acute decompensated heart failure. After excluding patients based on exclusion criteria, demographic and clinical data were recorded, including symptoms, signs, discharge medications, and readmission status within 6 months. Patients not readmitted were contacted via telephone at 1, 3, and 6 months. Readmission rates and time to first readmission or death were documented. **Results:** A total of 222 patients were enrolled, with 60% being males. All patients exhibited pulmonary congestion, with 85% classified as NYHA Class III or IV. Comorbidities included hypertension (59%), history of myocardial infarction (45.49%), and diabetes (38.28%). Within 6 months, 21% of patients were readmitted, and 13% died before readmission, resulting in an overall death or readmission rate of 34% at 6 months. No significant differences were observed between readmitted and non-readmitted patients regarding sex, age, creatinine levels, haemoglobin levels, sodium levels, or ejection fraction. Utilization of guideline-directed medical treatment was low. **Conclusion:** The high rate of readmission or death among patients admitted with acute decompensated heart failure underscores the necessity for implementing multidisciplinary care to closely monitor these patients.

Keywords: Acute Decompensated Heart Failure; Readmission; Heart failure

INTRODUCTION

Heart failure is a clinical syndrome characterized by the heart's inability to provide sufficient blood flow to meet metabolic requirements or accommodate systemic venous return.[1] It has become a global epidemic, affecting an estimated 64.3 million people worldwide.[2] Heart failure imposes a significant burden on healthcare systems, leading to high rates of morbidity, mortality, and poor quality of life.[3]

Hospitalization for heart failure is a pivotal event in its natural history, signalling a worsened prognosis. Despite the availability of evidence-based treatment modalities, hospitalized heart failure patients continue to experience high post-discharge mortality and rehospitalization rates.[4] Factors contributing to hospital readmissions in heart failure are multifactorial, with recent past admissions being strong predictors.[5] Approximately 22% of heart failure patients experience potentially preventable readmissions shortly after discharge, resulting in high costs and a bleak prognosis.[6] Factors such as suboptimal care,[7] comorbidities, and poor compliance[8] also contribute to the risk of rehospitalization.

Several studies have demonstrated a decrease in 30-day readmission rates following the implementation of the Hospital Readmission Reduction Program (HRRP), indicating improved care outcomes.[9,10] However, Ayub Medical Teaching Hospital lacks an organized multidisciplinary heart failure management program. We hypothesize that readmission rates for patients with Acute Decompensated Heart Failure (ADHF) in our community are notably high.

The objective of this study is to determine the rate and time to first readmission in patients discharged with a diagnosis of acute decompensated heart failure from the cardiology department at Ayub Teaching Hospital, Abbottabad. If the readmission rates for heart failure are found to be unacceptably high, it would strengthen the case for establishing a multidisciplinary heart failure care team. To our

knowledge, such a study has not been conducted at our hospital before.

MATERIAL AND METHODS

This descriptive case study was conducted in the Cardiology department of Ayub Teaching Hospital, Abbottabad, between April and August 2023. Inclusion criteria comprised patients of both genders aged 20–80 years presenting with acute decompensated heart failure and an ejection fraction of less than 50%. Excluded from the study were patients who developed acute heart failure due to ST-elevation myocardial infarction (STEMI) or non-ST-elevation myocardial infarction (NSTEMI), and those requiring ventilatory or intensive care unit admission. Patients with aortic stenosis, aortic regurgitation, mitral stenosis, or mitral regurgitation were also excluded.

Patients meeting the inclusion criteria and surviving to discharge were included in the study, totalling 222 patients. Basic demographics, medical history, physical examination findings, NYHA classification of shortness of breath, echocardiographic data, and discharge medications were recorded. Patients were provided with a contact number for reporting any unplanned hospitalizations elsewhere, and instructed to retain their unique admission numbers for traceability. All first readmissions were documented, and patients not readmitted were contacted via telephone at 1, 3, and 6 months to assess their status. Time since index admission was recorded for all readmissions.

Data were analyzed using SPSS 22.0. Quantitative variables were described as means, while categorical variables such as gender, comorbidities, NYHA class, and readmissions were presented as frequencies and percentages. Data were stratified by relevant variables, and the significance between percentages was determined using two-proportions t-test and chi-square test

RESULTS

A total of 222 patients admitted to the cardiology department with ADHF constituted the study cohort, all of whom survived to discharge. Sixty percent were males, and baseline characteristics revealed a significant prevalence of hypertension (59%), diabetes (38.28%), history of myocardial infarction (45.49%), and current smoking (8.5%). Peripheral oedema was present in 70% of patients, with over 85% experiencing NYHA Class III or IV shortness of breath. Echocardiography revealed an EF of 30% in 51% of patients, with 96% requiring intravenous diuretics on admission. Atrial fibrillation and uncontrolled hypertension were also observed in 9.5% and 25% of patients, respectively. During the 6 months

of follow up 13% of patients died and 21% of patients were readmitted. 18% of patients could not be contacted and the rest (40%) were not admitted. Table-1 presents the baseline characteristics of all patients at index admission. The discharge medications summary is shown in Table 2. Majority were discharge on loop diuretic (92.34%) followed by Beta blockers. Table-3 gives data about readmitted patients. Of the readmitted patients 20.5% were on an ACE-I, 25.6% were on Sacubitril/Valsartan and only half of the patients were on beta blockers Table-4.

Gender wise breakup is given in Table 5. Gender did not confer a risk of death or hospitalization. (p=0.1031) as depicted in Table 5. Outcomes also did not differ based on the Ejection fraction. or age groups. There were no differences in the mean age, creatinine level, ejection fraction, Sodium levels, average Haemoglobin or systolic blood pressure between the patients who were readmitted and those who were not readmitted Table-6.

Only hypertension had a significant effect on the rate of readmission. Readmission rate was more in hypertensive patients. 71.7% readmitted patients had hypertension. All other comorbidities didn't affect the rate of readmission significantly.

The combination of Chronic Kidney Disease and Coronary Artery disease showed the highest re-admission rate with 41% of such patients getting readmitted. The rate of re-admission from other pre-specified comorbid subgroups varied from 12–24%.

Table-1: Baseline characteristics on index admission

Parameters (n= 222)	Value
Mean Age (yrs)	62.43
Males (%)	60.36
Females (%)	39.64
Hypertension (%)	59.00
Diabetes Mellitus (%)	38.28
History of Acute Myocardial Infarction (%)	45.49
Smokers (%)	8.5
History of Percutaneous Coronary Intervention (%)	0.45
History of CABG (%)	0
Impaired Renal Functions on First Admission Cr > 1.5) (%)	22.97
Patients with Oedema on First Admission (%)	69.36
NYHA Class II (%)	4.50
NYHA class III (%)	74.32
NYHA class IV (%)	21.17
Patients with LVEF 40-45% (%)	14.41
Patients with LVEF 30-40% (%)	44.14
Patients with LVEF Less than 30% (%)	51.35
Patients with Hb less than 10mg/dl on first admission (%)	10.36
Patients with Atrial Fibrillation (%)	9.45
Patients requiring Inpatient IV Diuretic (%)	96.84
patients with BP less than 100 systolic (%)	15.31
patients with BP more than 100 systolic (%)	74.77
Uncontrolled HTN on Admission (sys > 140 or dia > 90) (%)	24.77

Table-2: Guideline-directed medical treatment on discharge at index admission.

Guideline Directed Medical Treatment	%	No. out of 222
ACE-I	31.53	70
Betablockers	66.66	148
Loop Diuretics	92.34	205
Valsartan-Sacubitril	24.32	54
SGLT2	23.42	52
Digoxin	16.66	37
Ivabradine	2.7	6
Mineralocorticoid	44.14	98

Table-3: Characteristics of readmitted patients.

Parameters (n=46)	Value
Mean Age	62.72
Males (%)	56.41
Females (%)	43.59
Readmitted within 30 days (%)	46.15
Readmitted within 30-60 days (%)	25.64
1 Readmission more than 60 days (%)	28.21
Hypertension (%)	58.97
Diabetes (%)	41.02
Patients with history of Acute Myocardial Infarction	47.82
Patients with history of Percutaneous coronary Intervention (%)	2.63
Patients with history Of CABG (%)	00.00
Patients with impaired renal functions Cr > 1.5	23.07
Noncompliant with all Medications	17.94
Average Weight gain of all patients readmitted compared to discharge weight	2.92kg
Admission from outpatients (%)	38.46
Admission from Emergency Department (%)	61.54

Table-4: Guideline directed medical treatment of patients on re-admission.

Guideline Directed Medical Treatment on Re-admission	%
Patients on Angiotensin converting enzyme inhibitors (%)	20.51
Patients on Angiotensin receptors blockers (%)	2.56
Patients on Sacubitril/Valsartan (%)	25.64
Patients on Betablockers (%)	53.84
Patients on Mineralocorticoid Inhibitors (%)	51.28
Patients on SGLT 2 Inhibitors (%)	20.51

Table-5: Gender distributions of re-admitted patients.

Sex	n	Re-admitted or dead (%)	p value	Not contactable (%)	Not readmitted (%)
Males	135	30	0.1031	23	47
Women	87	40		13	47

Table-6: Average age, Creatinine, EF, Sodium levels, Hb, and Systolic BP of patients admitted vs not admitted.

Parameter	Dead or readmitted	Not readmitted	Not contactable
AGE (mean)	62.12	62.33	61.51
CREATININE (mean)	1.34	1.34	1.3
EF (mean)	29.36	29.36	28
SODIUM (mean)	132.34	132.34	132.65
Hb (gm/dl) (mean)	12.71	12.8	12.7
SYSTOLIC BP (mean)	125.9	125.9	126.3

DISCUSSION

Our study revealed that patients with heart failure receiving treatment and follow-up as part of routine care have a high rate of rehospitalization or death within 6 months, totalling 34%. Specifically, we observed an overall readmission rate of 21%, with 46% readmitted within 30 days, 25% between 30–60 days, and 21% after 60 days. This aligns with previous findings indicating that hospitalization for heart failure carries a grave prognosis. For instance, a study of 40,000 patients with a history of heart failure hospitalization reported a 5-year mortality rate of 75%.[11] While our study's readmission rates were somewhat lower, they still underscore the considerable burden of heart failure management in routine care settings. Large-scale studies have reported higher readmission rates, with 44% of patients readmitted within 6 months.[12] Similarly, research comparing multidisciplinary care to usual care found a 45.7% readmission rate within 90 days for patients under usual care.[13] Another study reported a 47% 90-day readmission rate for patients hospitalized for acute decompensated heart failure.[14]

Regarding risk factors associated with heart failure, our study found a notable prevalence of hypertension (59%), history of myocardial infarction (45.49%), and diabetes (38%). These findings are consistent with previous research showing varying prevalence rates for ischemic heart disease across different populations, [15,16,17] with hypertension occurring in 76% of cases [18] and diabetes in 40%.[19]

While previous studies identified factors such as noncompliance, low haemoglobin levels, and higher NYHA class as significantly associated with rehospitalization,[20] our study did not find any significant differences in these factors between patients who were readmitted and those who were not. However, we observed that self-declared non-compliant patients and those patients with comorbidities such as coronary artery disease and chronic kidney disease were associated with increased readmission rates. The average length of hospital stays in our study (3–6 days) was shorter than the global average (5 to 10 days), indicating potential variations in healthcare practices.[21]

Efforts to prevent hospitalization in heart failure have become a crucial aspect of heart failure management worldwide.[22] Multidisciplinary care programs, including outpatient services led by specialist heart failure nurses, have been shown to reduce mortality and hospital readmissions.[23,24] These programs typically involve patient education, discharge planning, timely follow-up appointments, and tailored discharge instructions. Studies have demonstrated that patient education combined with

follow-up interventions, such as home visits and timely appointments, can significantly reduce readmission rates.[25,26] However, our study revealed gaps in the utilization and up-titration of guideline-directed medical therapy (GDMT) for heart failure, with low adherence to recommended medications such as ACE inhibitors, beta-blockers, and mineralocorticoid antagonists.

Transition from hospital-based treatment to ongoing ambulatory care has many essential steps. None of which exist in our hospital. Studies have shown that specialized inpatient heart failure treatment cannot prevent acute events post-discharge including death if the outcomes of excellent inpatient treatment are not maintained during ambulatory care. 95% of our patients on their index admission were in NYHA class III or IV. On discharge from their index admission, 98% of our patients had improved to NYHA class II. The majority of them had lost weight. Our patients still showed a 21% readmission and a 13% mortality rate over 6 months, strikingly similar to the results of a 20-year-old Euro heart failure survey program of 2003 when chronic disease management programs were not widely established, which showed a 24% readmission rate and a 13.5% mortality rate over 12 weeks.[27]

A pioneering study by McDonald K *et al* showed that patients who were stable at discharge with freedom from intravenous diuretics for two days and on maximally up-titrated disease-modifying drugs showed a 25.5% mortality rate in patients undergoing usual care compared to only 7.8% in patients subjected to multidisciplinary care. Multidisciplinary care included inpatient and outpatient education and close telephonic and clinical follow-up.[28]

The rate of GDMT usage was low in our patients with 56% patients on Angiotensin-converting enzyme inhibitors (ACE-I) or Sacubitril/Valsartan (ARNI) combination and 66% on betablockers (BB). 44% on Mineralocorticoid antagonists (MRA) and only 24% on Sodium Glucose cotransporter 2 inhibitors (SGLT2I) at discharge following index admission. On readmission 65% were taking either ACE-I, Angiotensin Receptor blockers (ARB), or ARNI, 51% were taking MRA and 53% were taking BB. Only 20% were taking SGLT2 inhibitors. Current guidelines recommend inpatient initiation of GDMT in patients admitted with acute decompensated heart failure. There are however still barriers to initiation and up-titration of inpatient GDMT which vary from socioeconomic (affordability), patient-related barriers (hypotension, bradycardia, reduced renal function, etc.), tolerability and side effects, or simply inertia on the part of clinicians.[29] Previous data derived from real-world registries show similar gaps between real-world vs clinical trial data. Data from CHAMP-HF, one such registry showed in 2018, ACE/ARB/ARNI

usage of 27%, BB usage of 33%, and MRA in 67% of patients.[30] Medication up-titration which has been shown to improve outcomes,[31] is another important aspect of ambulatory care in patients with heart failure which cannot be undertaken in a timely fashion as a part of usual care. None of our patients underwent any dose up titration of their GDMT. A meta-analysis of studies involving nurse-led up titration of beta blockers and angiotensin-converting enzyme inhibitors found that patients enrolled in such programs were 21% less likely to be readmitted and 34% less likely to die.[32] Early follow-up likewise has been shown to lower the risk of 30-day readmission rates.[33] A substantial body of evidence points to the usefulness of disease management programs in reducing readmission and mortality. Such disease management programs combine patient education, early follow-up, telemonitoring, and promotion of self-care activities including exercise and dietary advice.[34–37]

One limitation of our study is the inability to account for 18% of the study population, potentially affecting the accuracy of our findings. Additionally, despite efforts to track acute readmissions through telephone calls, some hospitalizations may have been missed, particularly for patients admitted to other hospitals within our catchment area. Another limitation of the study worth mentioning was the lack of an active intervention arm which would have compared the results of patents managed in heart failure clinic and usual care.

CONCLUSION

Patients with chronic heart failure managed outside of chronic disease management programs face a high risk of readmission or death, coupled with suboptimal utilization of guideline-directed medical therapy. Given the suboptimal outcomes of patients followed up as a part of usual care, our study opens up an opportunity to study the outcomes of these high-risk patients in a disease management program. Improved outcomes of heart failure patients followed up in a disease management program would make a strong case for developing such a program in our hospital.

AUTHORS' CONTRIBUTION

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Address for Correspondence:
Dr. Mohammad Imran Khan, Chairman Department of Medicine, Ayub Medical College, Abbottabad-Pakistan
Cell: +92 336 884 1999
Email: sidharat1@gmail.com