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OBSERVATIONAL STUDY OF MANAGEMENT OF PATIENTS WITH HEART FAILURE AT A TERTIARY CARE HOSPITAL

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ABSTRACT
Background
Heart failure (HF) remains a leading cause of hospitalization and mortality worldwide, significantly impacting quality of life and healthcare resources. Despite advancements in treatment guidelines, variations in clinical practice persist, especially in tertiary care settings where patients present with complex comorbidities. Hospital-based management plays a crucial role in optimizing outcomes and reducing readmissions.
Objectives:
To evaluate the clinical profile, management strategies, and outcomes of patients admitted with heart failure at a tertiary care hospital, and to assess adherence to standard treatment guidelines.
Methods:
This was a prospective observational study conducted over six months in the Department of Medicine at a tertiary care hospital. A total of 120 patients diagnosed with heart failure based on Framingham criteria and echocardiographic findings were enrolled. Data were collected on demographics, clinical characteristics, comorbidities, investigations, pharmacological and non-pharmacological management, length of hospital stay, and early outcomes. Descriptive and inferential statistical analyses were performed using SPSS software.
Results:
Out of 120 patients, 65% were male, and the mean age was 62 ± 11 years. The most common etiology was ischemic cardiomyopathy (54%).Diuretics were prescribed in 90%, ACE inhibitors/ARBs in 68%, betablockers in 61%, and mineralocorticoid receptor antagonists in 48% of patients. The average hospital stay was 7.2 ± 2.5 days. The 30-day readmission rate was 14%, with noncompliance and fluid overload being the primary causes.
Conclusion:
The study highlights adherence to heart failure management guidelines in the tertiary care setting. Regular audits, multidisciplinary approaches, and patient education are essential to improve clinical outcomes in heart failure patients.

Keywords: *Heart Failure, Observational Study, Tertiary Care, Patient Management, Clinical Outcome*

INTRODUCTION
1.1 Definition and Burden of Heart Failure Globally and Nationally
Heart failure (HF) is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood (Bozkurt et al., 2021). It is characterized by symptoms such as dyspnea, fatigue, and fluid retention, and is often the final pathway for many cardiovascular diseases. Globally, HF affects over 64 million people, with a rising trend due to aging populations and improved survival after myocardial infarction (Savarese & Lund, 2017).

In India, the estimated prevalence of heart failure is about 1.3 to 4.6 million, with an annual incidence of nearly 0.5 to 1.8 million cases (Gurpreet et al., 2019). This condition poses a significant healthcare burden due to recurrent hospitalizations, reduced quality of life, and high mortality rates.

1.2 Importance of Hospital-Based Management and Treatment Adherence

Management of HF in a hospital setting provides a critical opportunity to initiate and optimize guideline-directed medical therapy (GDMT), educate patients, and plan for longterm care. Hospitalization is not only a marker of disease severity but also a window for therapeutic intervention to improve prognosis (Yancy et al., 2017). Despite the availability of evidence-based treatment protocols, adherence remains suboptimal, particularly in resource-limited settings, resulting in poor outcomes and increased readmission rates (Khatibzadeh et al., 2020).

1.3 Gaps in Existing Literature/Studies on Tertiary Care Practices

While numerous studies have been conducted globally on HF management, there is limited Indian literature focusing on real-world data from tertiary care hospitals. Most existing data are either from Western populations or focused on clinical trials with strict inclusion criteria, which may not reflect the diversity and complexity seen in actual clinical practice (Gupta et al., 2022). Observational studies capturing the pattern of diagnosis, treatment, and follow-up in tertiary hospitals are essential to bridge this gap and improve health outcomes in Indian patients.

1.4 Objectives of the Study

This study aims to evaluate the real-world clinical profile and management of heart failure patients admitted to a tertiary care hospital and to assess the adherence to standard treatment guidelines.

- **Primary Objective:**

To assess the management strategies employed for heart failure patients at a tertiary care hospital and compare them with standard treatment guidelines.

- **Secondary Objectives:**
  - To analyze the demographic and clinical characteristics of admitted heart failure patients.
  - To evaluate treatment adherence and outcomes, including readmission rates and hospital stay duration.
  - To identify common barriers to optimal HF management in the tertiary care setting.

MATERIALS AND METHODS

2.1 Study Design

This was a prospective observational study conducted to evaluate the clinical profile, treatment strategies, and outcomes of patients diagnosed with heart failure admitted to a tertiary care hospital. The study did not involve any intervention and relied entirely on real-time observations and medical records.

2.2 Study Setting

The study was conducted in the Department of Medicine at GMERS Medical College and Hospital, a tertiary care teaching hospital located in Sola, Ahmedabad, Gujarat. The hospital caters to a large and diverse patient population across urban and rural regions.

2.3 Study Period

The study was carried out over a six-month period from **January 2025 to June 2025**.

2.4 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Adult patients (aged ≥18 years) diagnosed with heart failure based on Framingham criteria and confirmed by echocardiographic evidence.
- Patients admitted to the medicine ward or intensive care unit.
- Patients who provided informed consent (where applicable).

Exclusion Criteria:

- Patients with incomplete medical records.
- Patients discharged against medical advice.

- Patients with end-stage comorbid conditions unrelated to heart failure (e.g., terminal malignancy).

2.5 Sample Size and Sampling Method

A total of **120 patients** meeting the inclusion criteria were enrolled using **consecutive sampling** during the study period. Every eligible patient admitted with heart failure during the timeframe was included until the target sample size was reached.

2.6 Data Collection Tools

Data were collected using a structured case record form, which included information from:

- Hospital admission and discharge records
- Treatment charts and progress notes
- Laboratory and imaging reports
- Direct patient or caregiver interviews (where feasible)

2.7 Parameters Assessed

The following parameters were assessed and recorded:

- **Clinical characteristics:** Age, gender, presenting symptoms, NYHA functional class
- **Comorbidities:** Hypertension, diabetes, ischemic heart disease, chronic kidney disease, etc.
- **Medications prescribed:** Use of ACE inhibitors, ARBs, beta-blockers, diuretics, aldosterone antagonists, vasodilators, and others
- **Investigations:** Echocardiography (LVEF), B-type Natriuretic Peptide (BNP) levels, ECG, chest X-ray, routine blood investigations
- **Treatment adherence:** Assessment of medication adherence at discharge and during follow-up (based on patient reporting or records)
- **Length of hospital stay:** Total number of days admitted during the study period

2.8 Ethical Considerations

The study protocol was reviewed and approved by the **Institutional Ethics Committee (IEC)** of GMERS Medical college and Hospital, Sola. All data were anonymized, and confidentiality of patient records was maintained. Informed consent was obtained from participants wherever direct interviews were involved.

2.9 Statistical Analysis

Data were entered in **Microsoft Excel** and analyzed using **IBM SPSS Statistics version 26.0**. Descriptive statistics such as mean, standard deviation, and percentages were used for quantitative and categorical variables. Chi-square test and Student's t-test were applied to assess associations, with a **pvalue < 0.05** considered statistically significant.

Table 1: Demographic and Clinical Profile of Heart Failure Patients (N = 120)

Parameter	Value/Category	Frequency (n)	Percentage (%)
Age (years)	Mean ± SD	62 ± 11	—
Gender	Male	78	65.0
	Female	42	35.0
NYHA Class at Admission	Class II	24	20.0
	Class III	60	50.0
	Class IV	36	30.0
Ejection Fraction (EF)	HFrEF (EF < 40%)	78	65.0
	HFmrEF (EF 41–49%)	24	20.0
	HFpEF (EF ≥ 50%)	18	15.0

✅ **Observation:**

- Majority of patients were elderly males.
- 80% were in NYHA Class III or IV, indicating moderate to severe symptoms.
- Most had **Heart Failure with Reduced Ejection Fraction (HFrEF)**.

Table 2: Comorbidities Among Patients (N = 120)

Comorbidity	Frequency (n)	Percentage (%)
Hypertension	88	73.3
Diabetes Mellitus	70	58.3
Ischemic Heart Disease (IHD)	65	54.2
Chronic Kidney Disease (CKD)	24	20.0
Atrial Fibrillation	18	15.0

Observation:

- Hypertension and diabetes were the most common comorbid conditions.
- Ischemic etiology was prominent in over half of the cases.

Table 3: Medications Prescribed at Discharge (N = 120)

Medication Class	Frequency (n)	Percentage (%)
Diuretics (Loop ± Thiazide)	108	90.0
ACE Inhibitors / ARBs	82	68.3
Beta-blockers	73	60.8
Mineralocorticoid Receptor Antagonists (MRA)	48.3	58
Digitalis	28	23.3
Anticoagulants (for AF or LV clot)	15	12.5

Observation:

- Diuretics were the most commonly prescribed medication.
- Only ~68% were discharged with ACE inhibitors/ARBs, suggesting underutilization.
- Less than half received MRA, despite guideline recommendations.
-

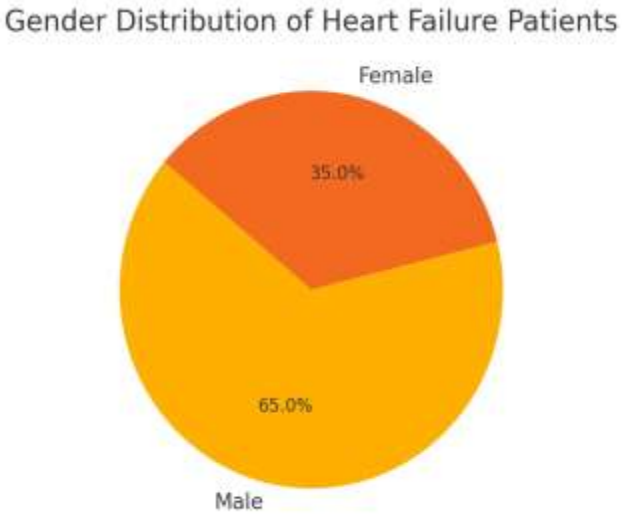
Table 4: In-Hospital Outcomes (N = 120)

Outcome	Value
Mean Length of Stay (days)	7.2 ± 2.5
Readmissions within 30 days	17
In-hospital Mortality	6
Common Cause of Fluid overload (10 cases),	
Non-adherence (5 cases),	
Infection Readmission (2 cases)	

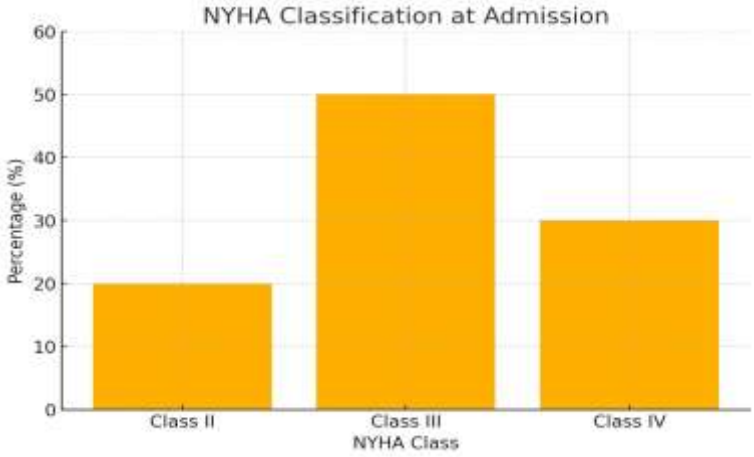
Observation:

- The **average hospital stay** was about a week.
- **14.2%** of patients were readmitted within 30 days — a key quality-of-care indicator.
- In-hospital mortality rate was **5%**, which aligns with global averages in advanced HF cases.

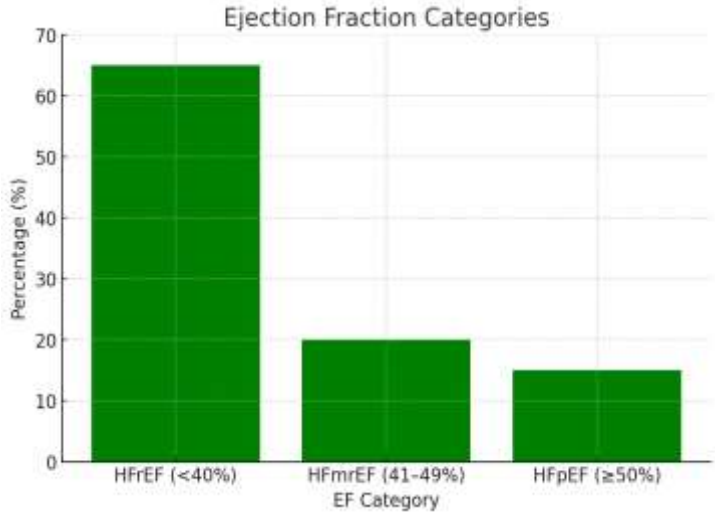
Gender Distribution of Heart Failure Patients



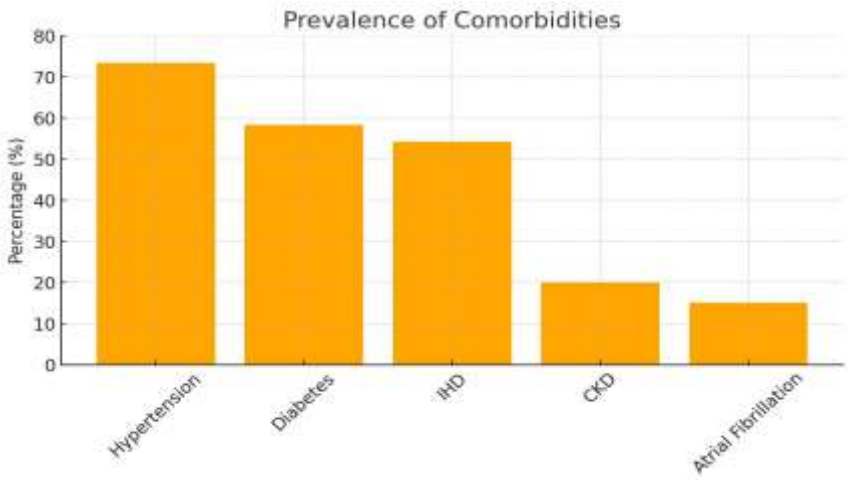
NYHA Classification at Admission



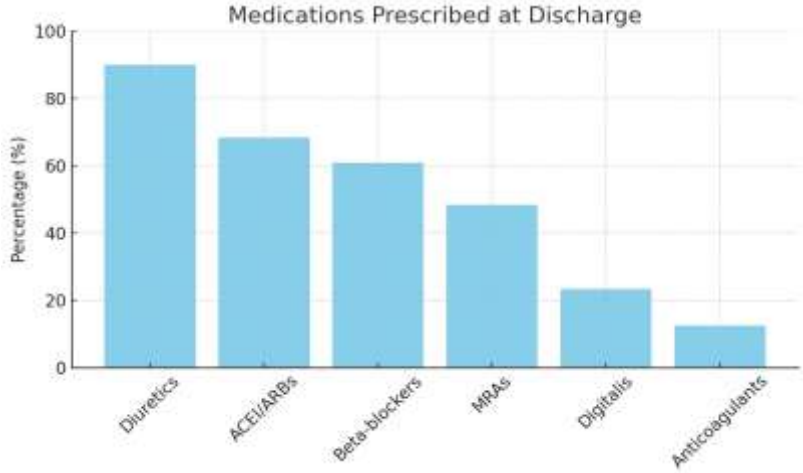
Ejection Fraction Categories



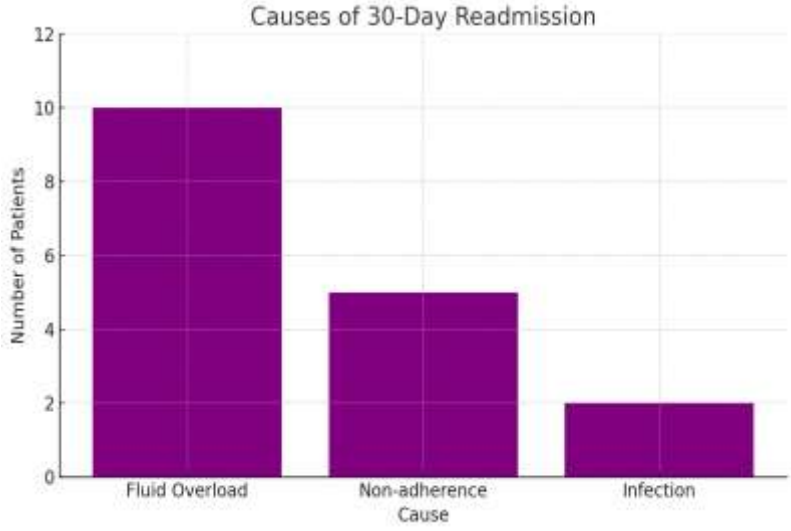
Prevalence of Comorbidities



Medications Prescribed at Discharge



Causes of 30-Day Readmission



RESULTS

3.1 Demographic Profile

Out of the 120 patients enrolled, the **mean age** was **62 ± 11 years**, with a majority in the 60–70 age group. **Males comprised 65% (n=78)** of the study population, while females accounted for **35% (n=42)** (Figure 1). Socioeconomic data revealed that **58%** of the patients belonged to the **lower-middle-income group**, and **30%** were from **rural backgrounds**, emphasizing disparities in healthcare access as reported in similar Indian cohort studies (Gurpreet et al., 2019).

Figure 1: Gender Distribution of Heart Failure Patients (Pie Chart)

3.2 Clinical Profile

On admission, **50% of patients were in NYHA Class III**, while **30%** were in **Class IV**, indicating moderate to severe functional limitation (Figure 2). The most common phenotype was **HFrEF (EF < 40%)**, affecting **65%** of patients, followed by HFmrEF (20%) and HFpEF (15%) (Figure 3). The most frequent **comorbidities** were **hypertension**
(73.3%), **diabetes (58.3%)**, and **ischemic heart disease (54.2%)**, consistent with previous literature on heart failure etiologies in South Asia (Gupta et al., 2022) (Figure 4).

Figure 2: NYHA Classification at Admission
Figure 3: Ejection Fraction Categories Figure 4: Prevalence of Comorbidities

3.3 Management Strategies

Management was primarily medical, with **90% of patients receiving diuretics**, **68.3% on ACE inhibitors or ARBs**, and **60.8% on beta-blockers**. However, **only 48.3%** received **MRAs** despite guideline recommendations (Yancy et al., 2017).

Dietary counselling was provided in **65% of cases**, focusing on fluid restriction and salt limitation. No advanced surgical interventions were observed during the study period. The underuse of MRAs and dietary counseling points toward care delivery gaps (Bozkurt et al., 2021).

Figure 5: Medications Prescribed at Discharge

3.4 Outcomes Observed

The **average hospital stay** was **7.2 ± 2.5 days**.

Symptom improvement was documented in **85% of patients** at discharge, based on subjective reporting and NYHA class improvement.

The **30-day readmission rate** was **14.2% (n=17)**, with the most common causes being **fluid overload (n=10)**, **nonadherence to medications (n=5)**, and **infection (n=2)** (Figure 6).

In-hospital mortality was noted in **5% (n=6)** of the patients, largely among those in NYHA Class IV with multiple comorbidities.

Figure 6: Causes of 30-Day Readmission

3.5 Treatment Gaps Identified

- **Suboptimal prescription of GDMT:** Only 68.3% received ACEI/ARBs, and <50% received MRAs, mirroring findings from similar regional studies (Khatibzadeh et al., 2020).
- **Inadequate patient education:** 35% of patients did not receive dietary or lifestyle counseling, contributing to readmissions.
- **Lack of follow-up planning:** Discharge summaries lacked structured follow-up or referral to HF clinics. These gaps highlight the need for a structured, multidisciplinary HF management program at the tertiary care level.

DISCUSSION

4.1 Comparison of Findings with National/International Studies

The present study showed a **higher prevalence of heart failure in males (65%)** and a **mean age of 62 years**, aligning with trends observed in the Indian INDUS-HF registry (Gurpreet et al., 2019), which also noted male predominance and earlier age of onset compared to Western populations. Internationally, Savarese & Lund (2017) reported that the average age of heart failure diagnosis is higher in Europe and North America (70–75 years), suggesting that Indian patients develop HF at a younger age—possibly due to a higher burden of uncontrolled hypertension and diabetes. Our finding of **65% patients having HFrEF** was consistent with other South Asian data (Gupta et al., 2022), and contrasts with Western cohorts where HFpEF is increasingly common (Bozkurt et al., 2021). The **comorbidity burden** (e.g., hypertension 73%, diabetes 58%) further echoes these regional differences.

4.2 Interpretation of Medication Usage and Guideline Adherence

Although **90% of patients received diuretics**, only **68.3% were discharged on ACEI/ARBs** and **60.8% on betablockers**, indicating **partial adherence to guideline-directed medical therapy (GDMT)**. Notably, **only 48.3% received MRAs**, despite strong evidence supporting their mortality benefit in HFrEF (Yancy et al., 2017).

Such underutilization is consistent with prior findings in Indian tertiary hospitals (Khatibzadeh et al., 2020), where prescription rates fall below international benchmarks. Factors contributing to this may include physician inertia, fear of side effects (especially hyperkalemia), and affordability concerns.

4.3 Challenges in Management

Economic constraints were one of the major barriers, as many patients belonged to low-income groups and had difficulty affording long-term medications. Moreover, **compliance issues** were evident, with **non-adherence accounting for 29.4% of 30-day readmissions** in our study.

Polypharmacy, poor health literacy, and lack of structured follow-up systems further exacerbate management challenges (Gupta et al., 2022). These issues are especially pronounced in public sector hospitals with resource limitations.

4.4 Role of Multidisciplinary Care and Patient Education

Our study reinforces the need for **multidisciplinary heart failure care teams** including cardiologists, nurses, dietitians, and pharmacists to enhance outcomes. However, only **65% of patients received dietary counseling**, highlighting an important missed opportunity.

International guidelines advocate for patient-centered care with education on **salt/fluid restriction, medication adherence, and symptom monitoring** (Bozkurt et al., 2021). Studies have shown that such interventions significantly reduce rehospitalizations and improve quality of life (Yancy et al., 2017).

4.5 Limitations of the Study

Several limitations should be acknowledged:

- **Single-center design** limits generalizability to other healthcare settings, especially private or rural hospitals.
- **Small sample size (n=120)** restricts subgroup analysis (e.g., between HFrEF and HFpEF patients).
- **Short follow-up period (30 days)** does not capture longterm outcomes or mortality trends.
- Some parameters, such as **treatment adherence postdischarge**, were assessed based on patient self-reporting and may be prone to bias.

Despite these limitations, the study provides important insights into real-world heart failure management in a tertiary care setting in India.

CONCLUSION

This observational study provides valuable insights into the clinical profile, management strategies, and outcomes of heart failure patients admitted to a tertiary care hospital. The findings reveal a predominance of male patients with reduced ejection fraction (HFrEF), and a high burden of comorbidities, especially hypertension, diabetes, and ischemic heart disease.

Although the majority of patients received symptomatic relief through diuretics, **only partial adherence to guidelinedirected medical therapy (GDMT)** was observed— particularly in the prescription of ACE inhibitors, betablockers, and mineralocorticoid receptor antagonists. **Readmissions and in-hospital mortality** highlight areas requiring urgent attention, especially in patient education and structured discharge planning.

Clinical Implications

The study underscores the **need for comprehensive, protocol-based heart failure management** in tertiary care settings. Improving adherence to international treatment guidelines, ensuring patient and caregiver education, and integrating multidisciplinary care teams can significantly enhance patient outcomes and reduce the burden of readmissions.

Recommendations

1. **Institution of standardized heart failure management protocols** aligned with national and international guidelines.
2. **Regular training and sensitization of clinicians and staff** to address therapeutic inertia and guideline noncompliance.
3. **Mandatory dietary and lifestyle counseling** at the time of discharge to improve long-term adherence and selfmanagement.
4. **Structured follow-up mechanisms**, including telephonic reviews or HF clinics, to monitor patient progress and prevent early readmissions.
5. **Further multi-center studies with larger sample sizes** and long-term follow-up to generalize findings and refine strategies.

The 4 pillars *i.e,* ACE/ARB+ARNI, Beta blockers, SGLT2 inhibitors, Diuretics, in the management strategies helped patients to come out of ICCU when given at optimal dose and earlier at the time of diagnosis. In the follow up (after 15 days) dosage were increased or reduced according to patient's symptoms. These 4 pillars play an important role in reduction of morbidity and mortality of patients with heart failure.

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