



International Medicine

<https://www.theinternationalmedicine.com>



Original Research

Clinical Profile and Predictors of In-Hospital Mortality in Patients with Acute Heart Failure in a Tertiary Care Hospital

Dr. Firoz Memon¹, Hansraj Gajbhiye²

¹Professor, Department of General Medicine, Shri Rawatpura Sarkar Institute of Medical Sciences and Research, Raipur, Chhattisgarh, India

²Associate Professor, Department of General Medicine, Shri Rawatpura Sarkar Institute of Medical Sciences and Research, Raipur, Chhattisgarh, India

Received: 28 Feb 2025 / Accepted: 20 Apr 2025

Abstract

Background: Acute heart failure (AHF) is a major cause of hospitalization and in-hospital mortality worldwide. Early identification of high-risk patients is essential for improving outcomes. This study aimed to evaluate the clinical profile and predictors of in-hospital mortality among patients admitted with AHF in a tertiary care hospital. **Methods:** A prospective observational study was conducted in the Department of Medicine and Cardiology of a tertiary care hospital over 18 months. A total of 220 patients admitted with a diagnosis of AHF were included. Clinical, biochemical, electrocardiographic, and echocardiographic parameters were recorded. Patients were followed until discharge or in-hospital death. Multivariate logistic regression was used to identify independent predictors of mortality. **Results:** The mean age was 62.4 ± 13.8 years, and 58% were male. The most common etiologies were ischemic heart disease (46.8%), hypertensive heart disease (28.2%), and dilated cardiomyopathy (15.9%). Overall in-hospital mortality was 14.5%. Significant predictors of mortality included systolic blood pressure <100 mmHg (OR 3.8), serum creatinine >2.0 mg/dL (OR 4.6), serum sodium <130 mEq/L (OR 3.2), LVEF $<30\%$ (OR 3.9), presence of cardiogenic shock (OR 6.7), and elevated NT-proBNP levels (OR 2.8). **Conclusion:** AHF is associated with substantial in-hospital mortality. Hypotension, renal dysfunction, hyponatremia, severe LV dysfunction, and cardiogenic shock are strong predictors of adverse outcomes. Early risk stratification may improve clinical decision-making and survival.

Keywords: Acute heart failure, in-hospital mortality, predictors, ejection fraction, cardiogenic shock, renal dysfunction

Introduction

Acute heart failure (AHF) represents a rapid onset or worsening of symptoms and signs of heart failure, requiring urgent medical attention and hospitalization. It is a leading cause of morbidity and mortality globally, especially among the elderly population. Despite advances in diagnostic and therapeutic strategies, AHF continues to be associated with high in-hospital mortality rates ranging from 4% to 15%.

The clinical course of AHF is highly heterogeneous, influenced by underlying etiology, comorbidities, hemodynamic status, and response to therapy. Identifying predictors of mortality during hospitalization is crucial for early risk stratification and targeted management.

Common risk factors associated with poor outcomes include advanced age, renal dysfunction, hypotension, hyponatremia, reduced left ventricular ejection fraction (LVEF), and elevated natriuretic peptide levels. However, the relative contribution of these factors varies across populations.

This study aims to evaluate the clinical profile of patients with AHF and identify independent predictors of in-hospital mortality in a tertiary care setting.

Address for Correspondence Dr. Firoz Memon Professor, Department of General Medicine, Shri Rawatpura Sarkar Institute of Medical Sciences and Research, Raipur, Chhattisgarh, India

DOI: 10.5455/im.58794128

This is an Open Access article under the terms of the Creative Commons Attribution-Noncommercial 4.0 International License (<https://creativecommons.org/licenses/by-nc/4.0/>)

Materials and Methods

Study Design and Setting

A prospective observational study was conducted in a tertiary care teaching hospital over a period of 18 months.

Study Population

Patients aged ≥ 18 years admitted with a diagnosis of acute heart failure based on Framingham criteria and echocardiographic evidence were included.

Exclusion Criteria

- Acute myocardial infarction as primary diagnosis

- End-stage renal disease on dialysis
- Congenital heart disease
- Terminal malignancy

Data Collection

Detailed history, clinical examination, and investigations were recorded, including:

- Vital signs (blood pressure, heart rate, oxygen saturation)
- Laboratory parameters (CBC, renal function tests, electrolytes, NT-proBNP)
- ECG findings
- Echocardiography (LVEF, wall motion abnormalities)

Outcome Measure

Primary outcome was in-hospital mortality.

Statistical Analysis

Data were analyzed using SPSS software. Continuous variables were expressed as mean $\pm$ SD and categorical variables as percentages. Univariate and multivariate logistic regression analyses were performed to identify predictors of mortality. $p < 0.05$ was considered statistically significant.

Results

Baseline Characteristics

- Total patients: 220
- Mean age: 62.4 ± 13.8 years
- Male: 58% ($n = 128$)
- Female: 42% ($n = 92$)

Etiology of AHF	
Etiology	Percentage
Ischemic heart disease	46.8%
Hypertensive heart disease	28.2%
Dilated cardiomyopathy	15.9%
Valvular heart disease	6.4%
Others	2.7%

Clinical Features

- Dyspnea (92%)
- Pedal edema (74%)
- Orthopnea (68%)
- Raised JVP (61%)
- Pulmonary edema (39%)

Laboratory and Echocardiographic Findings

- Mean LVEF: $38.6 \pm 12.4\%$
- Serum creatinine >2 mg/dL: 31%
- Hyponatremia (<130 mEq/L): 27%
- Elevated NT-proBNP: 78%

Outcomes

- Survivors: 188 (85.5%)
- Non-survivors: 32 (14.5%)

Predictors of In-Hospital Mortality		
Variable	Odds Ratio	Significance
SBP <100 mmHg	3.8	$p < 0.01$
Serum creatinine >2 mg/dL	4.6	$p < 0.001$
Sodium <130 mEq/L	3.2	$p < 0.01$
LVEF $<30\%$	3.9	$p < 0.01$
Cardiogenic shock	6.7	$p < 0.001$
High NT-proBNP	2.8	$p < 0.05$

Discussion

This study demonstrates that in-hospital mortality in AHF remains significant at 14.5%, consistent with previous studies reporting mortality between 10-15%.

Ischemic heart disease was the leading cause, reflecting the increasing burden of coronary artery disease in developing countries. Hypotension and cardiogenic shock were the strongest predictors of mortality, highlighting the importance of hemodynamic instability as a key determinant of outcomes.

Renal dysfunction emerged as a major independent predictor, likely due to cardiorenal syndrome, which worsens fluid overload and limits therapeutic options. Hyponatremia also showed strong association with poor outcomes, reflecting neurohormonal activation and severe disease state.

Reduced LVEF ($<30\%$) remained an important echocardiographic predictor, consistent with prior studies showing that severe systolic dysfunction correlates with worse prognosis.

Elevated NT-proBNP levels were significantly associated with mortality, supporting its role as a biomarker of ventricular stress and severity. Early identification of these predictors can help clinicians triage patients to intensive care, optimize therapy, and potentially reduce mortality.

Conclusion

Acute heart failure continues to be associated with high in-hospital mortality. Key predictors include hypotension, renal dysfunction, hyponatremia, reduced ejection fraction, elevated NT-proBNP, and cardiogenic shock. Early risk stratification using these parameters can improve clinical outcomes and guide intensive management strategies.

Limitations

- Single-center study
- Moderate sample size
- Lack of long-term follow-up
- Biomarker variability not serially assessed

References

1. McDonagh TA, Metra M, Adamo M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J*. 2021;42(36):3599-3726.
2. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA guideline for heart failure management. *Circulation*. 2022;145:e895-e1032.
3. Savarese G, Lund LH. Global public health burden of heart failure. *Card Fail Rev*. 2017;3(1):7-11.
4. Gheorghiade M, Filippatos G. Acute heart failure syndromes. *Eur Heart J*. 2016;37:600-608.
5. Mebazaa A, Yilmaz MB, Levy P, et al. Recommendations on pre-hospital & early management of acute heart failure. *Eur J Heart Fail*. 2015;17:544-558.
6. Ponikowski P, Voors AA, Anker SD, et al. 2016 ESC heart failure guidelines. *Eur Heart J*. 2016;37:2129-2200.
7. Greene SJ, Butler J, Albert NM, et al. Medical therapy and outcomes in acute heart failure. *J Am Coll Cardiol*. 2018;72:3052-3062.
8. Chioncel O, Mebazaa A, Harjola VP, et al. Clinical profile and outcome of acute heart failure. *Eur J Heart Fail*. 2017;19:21-30.
9. Yancy CW, Jessup M, Bozkurt B, et al. ACC/AHA heart failure guideline update. *J Am Coll Cardiol*. 2017;70:776-803.
10. Storrow AB, Jenkins CA, Self WH, et al. Acute heart failure outcomes in ED patients. *Circulation*. 2014;130:525-534.
11. Sreekumar A, Sahu AK, Aggarwal P, et al. Troponin I as predictor of mortality in acute heart failure. *Cureus*. 2023;15:e48760.
12. Cortés M, Lumpuy-Castillo J, et al. Biomarkers in acute heart failure prognosis. *Int J Mol Sci*. 2025;26:986.
13. Ramos DA, Acosta OA, et al. Risk factors for in-hospital mortality in acute heart failure. *JRSM Cardiovasc Dis*. 2025;14:20480040251408954.
14. Tsuchihashi-Makaya M, et al. Clinical characteristics and outcomes in acute decompensated heart failure. *Circ J*. 2019;83:1205-1212.
15. Miro O, et al. Prognostic stratification in acute heart failure. *Eur J Emerg Med*. 2018;25:12-19.
16. Collins SP, et al. Hyponatremia in acute heart failure outcomes. *Am J Med*. 2017;130:102-109.
17. Ueda P, et al. Renal dysfunction and mortality in heart failure. *Kidney Int*. 2018;94:701-709.
18. Jhund PS, McMurray JJV. Biomarkers in heart failure. *Eur Heart J*. 2016;37:329-340.
19. Metra M, Cotter G, Davison BA, et al. Predictors of worsening renal function in acute heart failure. *J Am Coll Cardiol*. 2012;59:75-83.
20. Chioncel O, et al. Contemporary outcomes in acute heart failure registries. *Eur J Heart Fail*. 2020;22:1313-1321.