

## OUTCOMES OF HOSPITALIZED PATIENTS WITH ATRIAL FIBRILLATION IN NORTH INDIA: IN-HOSPITAL MORTALITY AND LENGTH OF STAY ANALYSIS

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### ABSTRACT

**Background:** Atrial fibrillation (AF) is the most common sustained arrhythmia worldwide and is associated with significant morbidity and mortality. While its long-term complications, such as stroke and heart failure, are well described, less attention has been given to short-term in-hospital outcomes, particularly in low- and middle-income countries. This study aimed to evaluate in-hospital mortality and length of stay among AF patients admitted to a North Indian tertiary care center. **Materials and Methods:** This prospective observational study included 150 consecutive patients with electrocardiographically confirmed AF admitted between November 2022 and October 2023. Clinical characteristics, comorbidities, and echocardiographic findings were recorded. Primary outcomes were in-hospital mortality and mean hospital stay. Associations of comorbidities, including chronic kidney disease (CKD) and heart failure with reduced ejection fraction (HFrEF), with adverse outcomes were analyzed using descriptive and comparative statistics. **Result:** The mean age of the cohort was  $64.8 \pm 13$  years, with a slight male predominance (54%). Overall, nine patients (6.0%) died during hospitalization. The leading causes of death were ischemic stroke (3 cases), sepsis with multi-organ failure (3 cases), and progressive heart failure with cardiogenic shock (3 cases). Mortality was significantly higher in patients with HFrEF (11.5%) and CKD (8.9%) compared to those without these conditions. The mean hospital stay was  $6.1 \pm 2.6$  days (range 3–15), with prolonged admissions observed in patients with CKD, HFrEF, and infections ( $p < 0.05$ ). **Conclusion:** Hospitalized AF patients in North India experience a substantial in-hospital mortality (6%) and an average stay of six days, with worse outcomes among those with renal impairment and reduced ejection fraction. These findings underscore the importance of early risk stratification and optimized comorbidity management in improving short-term outcomes and reducing healthcare burden in AF hospitalizations.

## INTRODUCTION

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia encountered in clinical practice, with a global prevalence estimated at 1–2% in the general population and significantly higher rates in elderly individuals.<sup>[1]</sup> Beyond its well-recognized association with stroke and systemic thromboembolism, AF is increasingly understood to adversely impact hospitalization outcomes, including mortality, length of stay, and healthcare costs.<sup>[2,3]</sup> Patients admitted with AF often present with comorbid conditions such as heart failure, coronary artery disease, chronic kidney disease, or sepsis,

which further contribute to adverse short-term outcomes.<sup>[4]</sup>

In-hospital mortality among AF patients varies substantially across regions and clinical settings. Large registry data from North America and Europe have reported in-hospital mortality rates of 1–4% among AF admissions.<sup>[5]</sup> However, in low- and middle-income countries, the burden may be higher due to late presentation, suboptimal access to anticoagulation, and limited availability of advanced care.<sup>[6]</sup> Prolonged hospital stay is another important concern, as it not only reflects disease severity and comorbidities but also has implications for healthcare resource utilization.<sup>[7]</sup>

In India, data on short-term outcomes of AF patients are scarce. Most existing studies have focused on epidemiology and risk factor profiling, while limited attention has been paid to in-hospital mortality and length of stay. Understanding these outcomes is crucial for designing region-specific strategies that aim to improve risk stratification, resource allocation, and early intervention.

The present study was conducted to evaluate in-hospital outcomes of patients with AF admitted to a North Indian tertiary care center. Specifically, we aimed to determine the in-hospital mortality rate, mean length of stay, and factors associated with adverse outcomes, including comorbidities and left ventricular function. By addressing this knowledge gap, the study offers valuable insights into the short-term prognosis of AF patients in resource-limited settings.

## MATERIALS AND METHODS

This was a prospective, observational study conducted in the Department of Cardiology at Fortis Escorts Heart Institute, New Delhi, a tertiary care referral center in North India, with a study period extending from November 2022 to October 2023.

**Study Population:** All consecutive adult patients ( $\geq 18$  years) admitted with a diagnosis of atrial fibrillation (AF) during the study period were included. AF was confirmed by 12-lead electrocardiography (ECG) based on the following criteria: irregular RR intervals, absence of distinct P-waves, and presence of fibrillatory baseline waves.

### Inclusion Criteria

- Patients aged  $\geq 18$  years.
- Electrocardiographic confirmation of AF.
- Both new-onset and previously diagnosed AF cases.

### Exclusion Criteria

- Patients with atrial flutter or other supraventricular tachyarrhythmias.
- Patients unwilling to provide consent.

### Data Collection

A detailed clinical evaluation was performed upon admission, including a review of the patient's history, presenting complaints, comorbid conditions, and a physical examination. Investigations included:

- Electrocardiography (12-lead ECG): to confirm AF diagnosis.
- Echocardiography (2D and M-mode): to assess left ventricular ejection fraction (LVEF), left atrial size, valvular heart disease, and presence of intracardiac thrombus. Patients were categorized as heart failure with reduced ejection fraction (HFrEF, LVEF  $\leq 40\%$ ) and heart failure with preserved ejection fraction (HFpEF, LVEF  $> 40\%$ ).

- Laboratory tests: hemoglobin, renal function (serum creatinine, creatinine clearance), thyroid profile, HbA1c, and electrolytes.
- Chest radiography: for evaluation of cardiomegaly or pulmonary pathology.

### Outcome Measures

#### The primary outcomes were:

- In-hospital mortality, including causes of death (e.g., stroke, sepsis, cardiogenic shock).
- Length of hospital stay, measured in days from admission to discharge or death.

Secondary analyses examined the association of comorbidities (hypertension, diabetes, coronary artery disease, chronic kidney disease, thyroid disorders, and heart failure subtype) with mortality and length of stay.

**Ethical Considerations:** The Institutional Ethics Committee of Fortis Escorts Heart Institute, New Delhi, approved the study protocol. Written informed consent was obtained from all participants. Patient confidentiality was strictly maintained.

**Statistical Analysis:** All data were analyzed using SPSS version 25.0 (IBM Corp, Armonk, NY, USA). Continuous variables were expressed as mean  $\pm$  standard deviation (SD), while categorical variables were expressed as frequencies and percentages. Group comparisons were performed using the independent samples t-test or Mann–Whitney U test for continuous variables, and the Chi-square test or Fisher's exact test for categorical variables. Logistic regression analysis was used to evaluate predictors of in-hospital mortality. A p-value  $< 0.05$  was considered statistically significant.

## RESULTS

A total of 150 patients with atrial fibrillation (AF) were included in the analysis. The mean age was  $64.8 \pm 13.0$  years, with a slight male predominance (54%). Baseline comorbidities included hypertension (68%), heart failure (65.3%), diabetes mellitus (50%), coronary artery disease (46.7%), chronic kidney disease (37.3%), thyroid disorders (34.7%), and valvular heart disease (31.3%).

**In-Hospital Mortality:** During the hospital stay, nine patients (6.0%) died. The leading causes of death were ischemic stroke (3 cases), sepsis with multi-organ failure (3 cases), and progressive heart failure with cardiogenic shock (3 cases). Mortality was disproportionately higher in patients with multiple comorbidities, particularly those with chronic kidney disease (CKD) and heart failure with reduced ejection fraction (HFrEF). Patients with left ventricular ejection fraction (LVEF)  $\leq 40\%$  had a mortality rate of 11.5%, compared to 3.2% among those with preserved LVEF ( $p < 0.05$ ).

**Table 1: In-hospital mortality stratified by comorbidities**

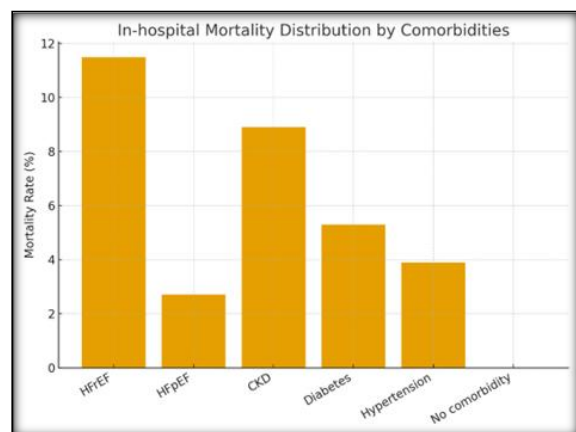
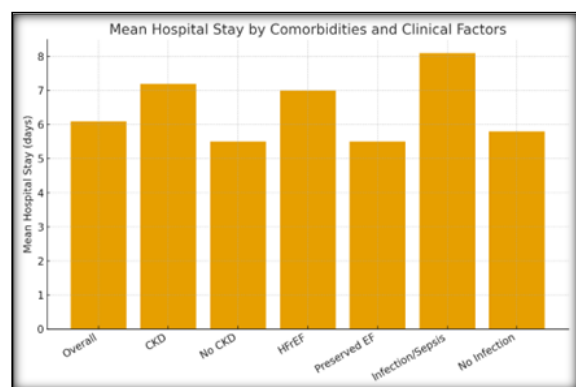
Comorbidity	Total n	Deaths (n)	Mortality rate (%)
Heart failure (HFrEF)	61	7	11.5
Heart failure (HFpEF)	37	1	2.7
Chronic kidney disease	56	5	8.9
Diabetes mellitus	75	4	5.3
Hypertension	102	4	3.9
No major comorbidity	18	0	0.0

**Length of Hospital Stay:** The mean hospital stay was  $6.1 \pm 2.6$  days (range: 3–15 days). The majority of patients (72.0%) stayed  $\leq 7$  days, while 28.0% had

prolonged hospitalization ( $>7$  days). Patients with prolonged stay were more likely to have CKD, HFrEF, or concurrent infections.

**Table 2: Hospital stay duration and associated factors**

Factor	Mean stay (days) $\pm$ SD	p-value
Overall population	$6.1 \pm 2.6$	—
With CKD (n=56)	$7.2 \pm 2.8$	0.02
Without CKD (n=94)	$5.5 \pm 2.4$	
HFrEF (LVEF $\leq 40\%$ ) (n=61)	$7.0 \pm 2.7$	0.01
Preserved EF (n=89)	$5.5 \pm 2.3$	
Infection/Sepsis (n=15)	$8.1 \pm 2.9$	$<0.01$
No infection (n=135)	$5.8 \pm 2.4$	

**Figure 1: In-hospital mortality distribution by comorbidities****Figure 2: Mean hospital stay by comorbidity (CKD, HFrEF, Infection)**

## DISCUSSION

This prospective observational study evaluated short-term outcomes among 150 patients admitted with atrial fibrillation (AF) to a tertiary care center in North India. The key findings were an in-hospital mortality rate of 6% and a mean length of stay of 6.1 days, with adverse outcomes strongly associated with

comorbidities such as chronic kidney disease (CKD) and heart failure with reduced ejection fraction (HFrEF).

**In-hospital Mortality:** The mortality rate observed in our cohort (6%) is higher than that reported in large Western registries of AF. The ORBIT-AF registry from the United States documented a one-year mortality of 4%, with in-hospital mortality during admissions substantially lower.<sup>[8]</sup> Similarly, data from the European Euro Heart Survey reported hospital mortality rates of 1–3%.<sup>[9]</sup> In contrast, studies from low- and middle-income countries have demonstrated higher mortality, reflecting later presentation, limited access to advanced therapies, and greater burden of comorbidities.<sup>[6,10]</sup> Our findings align with these reports, emphasizing the need for early detection and aggressive management of high-risk patients in resource-limited settings.

Within our study, mortality was disproportionately higher in patients with HFrEF (11.5%) and CKD (8.9%) compared to those without these conditions. This observation is consistent with evidence that impaired renal function and reduced left ventricular ejection fraction are independent predictors of death in hospitalized AF patients.<sup>[4,11]</sup>

**Length of Stay:** The mean length of stay in our study was 6.1 days, similar to Asian cohorts from the GARFIELD-AF registry, where hospital stays ranged between 5 and 7 days.<sup>[7]</sup> Factors contributing to prolonged hospitalization in our cohort included CKD, HFrEF, and concurrent infections. Wong et al. previously demonstrated that comorbidities, particularly heart failure and renal dysfunction, are major drivers of longer admissions in AF patients.<sup>[12]</sup> These findings underscore the importance of optimizing comorbidity management to reduce hospitalization burden.

**Clinical Implications:** The high mortality and extended hospital stays observed in this cohort highlight the need for targeted strategies to improve short-term outcomes in Indian AF patients. Early risk

stratification using clinical scores, optimization of heart failure therapy, and better integration of infection control and renal care may reduce adverse outcomes. Furthermore, systematic follow-up after discharge could help prevent rehospitalizations, which remain common in this population.

**Limitations:** This was a single-center study with a modest sample size, which may limit generalizability. The study focused only on in-hospital outcomes and did not capture long-term mortality or readmissions. Despite these limitations, the findings provide valuable real-world insights into AF-related hospital outcomes in the Indian setting, an area with limited prior data.

## CONCLUSION

In this prospective study of hospitalized patients with atrial fibrillation at a North Indian tertiary care center, the in-hospital mortality rate was 6% and the mean hospital stay was 6.1 days. Mortality was strongly associated with comorbidities, particularly chronic kidney disease and heart failure with reduced ejection fraction, while these conditions, along with infection, also contributed to prolonged hospitalization. These findings emphasize that AF-related hospitalizations in India are characterized by high risk and resource utilization, especially in the presence of coexisting comorbidities. Early risk stratification, aggressive management of heart failure and renal dysfunction, and improved infection control measures may help reduce short-term mortality and hospital stay. Region-specific strategies are needed to optimize care and outcomes for AF patients in resource-limited settings.

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