

## PREDICTORS OF MORTALITY AT 1 YEAR AFTER DISCHARGE IN HEART FAILURE PATIENTS- A STUDY FROM TERTIARY CARE IN SOUTH INDIA

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### ABSTRACT

#### BACKGROUND

Heart Failure (HF) is a leading cause of hospitalisation and death across the globe. An idea about predictors of mortality can help physician in patient prognosis as well as decision making about the type and intensity of care of hospitalised patients.

The aim of the present study is to identify clinical factors that predict mortality at one year post discharge in HF patients.

#### MATERIALS AND METHODS

A single centre observational study included 327 patients with HF. Patient mortality at one year follow up was identified and was correlated with various clinical factors including gender, anaemia, renal malfunction, ejection fraction <40% and NYHA class IV. Cox regression analysis was applied to identify relative risk of each clinical factor.

#### RESULTS

The one year post discharge mortality rate was 8.2%. NYHA Class IV, EF <40% and male gender were identified as strong predictors of mortality while anaemia and renal malfunction were reported as moderate predictors of mortality.

#### CONCLUSION

The study further confirms the significant mortality rates in HF patients even at one year follow up. We suggest that patients at high risk such as those with NYHA class IV, EF <40% and male gender be treated with more intensive treatment plans.

#### KEYWORDS

Heart Failure, Mortality, Predictors, Anaemia, NYHA Class.

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#### BACKGROUND

Heart failure is one of the major causes of mortality, morbidity and impaired quality of life in India. Furthermore, the prevalence of HF is common across the globe with around 1-2% of general population affected with it.<sup>1</sup> Over the past 2 decades, various advances have been made in the treatment of Chronic Heart Failure (CHF). Although, these interventions have improved survival and reduced the rate of HF progression. The majority of patients still require hospitalisation for CHF during the disease progression.<sup>2</sup>

Despite the use of vasoactive agents, intensive therapy and haemodynamic monitoring in the majority of patients, these high mortality rates are observed. The mortality rate for CHF patients is highest in early post discharge period

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compared to six month post discharge mortality rate, which was 26% in a community cohort study.<sup>3</sup> Previous study reported that post discharge subsequent risks of death are 8.9% to 10.3% (within 60 days) and 18.7% (within 6 months), respectively.<sup>4,5</sup> However, there is a dearth of information regarding the parameters, which affect one year mortality after hospital discharge.

Due to rapidly changing symptoms, haemodynamic and laboratory parameters, risk assessment can be challenging in the setting of acute or chronic HF. Identifications of mortality predictors based on an assessment of the patient's survival can help in improving the clinical decisions making process and can assist the physicians to explore aggressive pharmacologic or device interventions.

The present study was aimed to identify clinical factors that predicted post discharge one year mortality in Indian patients to develop a practical risk prediction tool that could be applied in routine clinical practice.

#### MATERIALS AND METHODS

This study was a single centre observational study conducted at a tertiary care hospital of South India. The objective of the study is to identify the risk factors for



mortality in heart failure patients after one year from hospital discharge. Male or female patients above 18 years of age, clinically diagnosed with HF who gave consent for the study were included. Diagnosis of HF was established based on validated clinical criteria from the ESC guidelines for the diagnosis of HF reduced ejection fraction<sup>6,7</sup> and the Framingham criteria.<sup>8</sup> Excluded patients were those who had comorbid noncardiac conditions causing ID (iron deficiency) (e.g., haemorrhoids, malignancy, etc.) or confounding assignment of aetiology for fluid overload (e.g., end-stage renal failure, dialysis-dependent renal failure), as well as patients with specific aetiologies (e.g., congenital heart disease), who would be expected to follow a different natural history compared with a 'typical' HF patient. All participants underwent thorough history (including dietary history) and clinical evaluation, blood sampling and comprehensive transthoracic echocardiography using standardised equipment (Vivid 7 from General Electric Company). Patients were characterised as having normal ejection fraction (EF ≥50%) or mild (EF 45-50%), moderate (EF 31-44%) or severe (EF ≤30%) left ventricle systolic dysfunction. Renal disorder was defined as creatinine level more than 1.5 mg/dL in men and more than 1.2 mg/dL in women. Anaemia was defined as haemoglobin less than 13.5 mg/dL in men and less than 12 mg/dL in women. Informed consent was obtained from all patients. NYHA classification was used to assess the severity of heart failure at the time of hospitalisation.<sup>9</sup> The primary outcome used for the study was overall mortality from worsening HF. Telephonic follow up was done.

**Statistical Analysis**

Categorical factors are displayed as frequencies and rates and continuous variables measured as means ± SD. We assessed the relationship between baseline variables and mortality using a Cox proportional hazards survival model (SPSS for Windows, version 10.0.5). Hazard ratios (relative risk (RR)) with 95% Confidence Intervals (CI) demonstrate the risk of death when a variable is present.

**RESULTS**

A total of 327 patients were observed for this study. Mean age of the patients was 54.39 years, which included 235 (71.86%) males. Patients with NYHA classification II/III and IV comprised of 35.2% and 20.2% of the total study population, respectively. Anaemia was observed in 223 (68.2%) patients, which included 166 men and 57 women. Renal malfunction was observed in 78 (23.8%) patients and EF <40% was seen in 288 (88%) patients. The baseline demographic and clinical characteristics of all the patients is summarised in Table 1.

**One Year Mortality**

A total of 27 (8.25%) patients with heart failure were reported dead at the time of one year follow up after hospital discharge. Patients with NYHA class IV heart failure were found to be the most vulnerable. Out of the 66 patients with

NYHA class IV, 41% patients died at 1 year follow up suggesting high relative risk of 2.62 (1.103-1.764).

Males were found to be more affected than female as 8.5% of the males died at one year as compared to 7.6% of females (RR: CI 95%; 1.11 (0.48-2.55)).

Ejection fraction less than 40% was also found to be a strong predictor of one year mortality in heart failure patients as 8.7% of such patients died at one year after discharge (RR: CI 95%; 1.77 (0.43-7.23)). All the predictors of mortality are summarised in Table 2.

Total Number of Patients	N=327
Age	54.39 years
Males	235 (71.86%)
Hypertension	126 (38.53%)
Chronic smoker	58 (17.7%)
Chronic alcohol use	20 (6.1%)
History of angina	
NYHA class II or III	115 (35.2%)
NYHA class IV	66 (20.2%)
Anaemia	223 (68.2%)
Renal malfunction	78 (23.8%)
EF <40%	288 (88%)

**Table 1. Patient Demographics and Baseline Clinical Characteristics**

Predictor	Patients Affected	Mortality	RR (95% CI)
Anaemia	223	17 (7.62%)	0.79 (0.37-1.67)
Renal malfunction	78	5 (6.4%)	0.72 (0.28-1.85)
EF <40%	288	25 (8.7%)	1.77 (0.43-7.23)
NYHA class IV	66	27 (41%)	2.62 (1.103-1.764)
Male gender	235	20 (8.5%)	1.11 (0.48-2.55)

**Table 2. Predictors of One Year Mortality**

**DISCUSSION**

The after discharge mortality rate of 8.2% observed in the study is comparable with other similar observations.<sup>4,5</sup> The mortality rate for cardiac heart failure patients is less at one year post discharge as compared to early post discharge mortality rate of 26% as reported in a community sectional study.<sup>1</sup> Different risk factors were identified in the study that can effectively detect patients at higher and lower risk for post discharge clinical events in this analysis. Variables associated with death at one year included male gender, anaemia, renal malfunction, ejection fraction <40% and NYHA class IV. Factors strongly associated with one year mortality were NYHA class IV, EF <40% and male gender. The findings of the study are similar to earlier published predictors of mortality observed in the OPTIMIZE-HF trial,<sup>9</sup> OPTIMIZE-CHF trial<sup>10</sup> and ESCAPE trials.<sup>5</sup>

Even after extensive advances in the treatment, patients suffering with HF remains at a high risk of complications including mortality and frequent hospitalisation. The ability to identify risk factors for individual patients can improve decision making and discharge plans.

Patients determined to be at higher risk may potentially benefit from closer follow up and/or referral to HF disease

management, heart transplantation evaluation and/or evaluation for left ventricular assist device.

### Limitations of the Study

Interpretations of these data are limited by the retrospective nature of this analysis. Outside the context of a randomised controlled trial, definitive cause and effect relationships cannot be established. During follow up at 1 years after post discharge, 27 patients were died with either anaemia alone or renal disorder alone or both anaemia and renal disorder.

### CONCLUSION

The study further confirms the significant mortality rates in HF patients even at one year follow up. We suggest that patients at high risk such as those with NYHA class IV, EF <40% and male gender be treated with more intensive treatment plans.

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