

Clinical Characteristics of Acute Heart Failure Patients

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Background: Hospitalized heart failure (HHF) is a challenging clinical entity in cardiology. Data on HHF patients from the Middle East is scarce. Observational studies may provide an initial insight that could improve disease management and guide the design of future clinical trials.

Objective: To evaluate the management, in-hospital mortality, and one-year readmission predictors of HHF patients admitted to the coronary care unit.

Setting: Coronary Care Unit, Salmaniya Medical Complex, Bahrain.

Design: A Prospective Study.

Method: Two hundred forty-five HHF patients were included in the study. Clinical data during hospitalization and upon discharge were recorded from 1 January 2012 to 31 March 2012. Follow-up was extended for 12-months for readmissions with heart failure (HF).

Result: One hundred seventy (69%) were males, and the mean age was 64 years. The main causes of HF decompensation were non-compliance 59 (24%), myocardial ischemia 51 (21%) and hypertensive crisis 39 (16%). Comorbidities included were systemic hypertension, 179 (73%), hyperlipidemia, 166 (68%), and diabetes mellitus, 161 (64%). The mean left ventricular ejection fraction (EF) was 34%. In-hospital mortality rate was 9.4%. Patients who were taking angiotensin receptor blockers (ARB) before admission had reduced in-hospital mortality. Upon discharge, 213 (87%) patients were taking renin-angiotensin system blockers, 170 (69%) were taking beta-blockers, and 66 (27%) were taking mineralocorticoid receptor antagonist (MRA). The rate of readmission with HF was 47% at one year.

Conclusion: HHF patients in this study have multiple comorbidities and an increased in-hospital mortality. In-hospital mortality-related variables and predictors of HF readmission should be verified in a larger population and employed in clinical practice, as these factors might help to improve patient outcome.

< 60 ml/min, history of coronary artery disease (CAD) and atrial fibrillation (Afib), causes of decompensation, basic hemodynamic parameters (admission heart rate (HR) and blood pressure (BP)), hemoglobin and creatinine level, left ventricle ejection fraction (LVEF), medications, length of stay and in-hospital mortality. Upon discharge, basic hemodynamics (discharge HR and BP) and medications were documented. Compliance to medications was verified by reviewing the chart, follow-up visits, and central hospital pharmacy dispensary desk information. During the follow-up period, only some of the HHF patients were seen. Within each hospitalization, the same variables were traced. Ethical approval of the institute was obtained.

Statistical Analysis

P-value of <0.05 was considered significant. Frequencies, as well as differences between groups, were analyzed using Pearson's chi-squared test or Fisher's exact test. The analysis was done using Student's t-test. Multivariable logistic regression (MLR) was performed to determine the predictors of readmission with heart failure and in-hospital mortality.

RESULT

The mean age was 64.5±13.5 years. One hundred seventy (69%) patients were male. HTN was the most common comorbidity, 179 (73%), followed by hyperlipidemia, 166 (68%), and DM, 161 (64%). CAD was seen in more than half of the patients, 127 (52%), more than one-third had renal impairment, 80 (33%) and one-fifth had Afib, 54 (22%). Twenty-four (10%) patients sustained a stroke, see table 1. The mean left ventricular ejection fraction (EF) was 34% (HF with reduced EF 60%, HF with preserved EF 16%, and HF with midrange EF 24%), see figure 1.

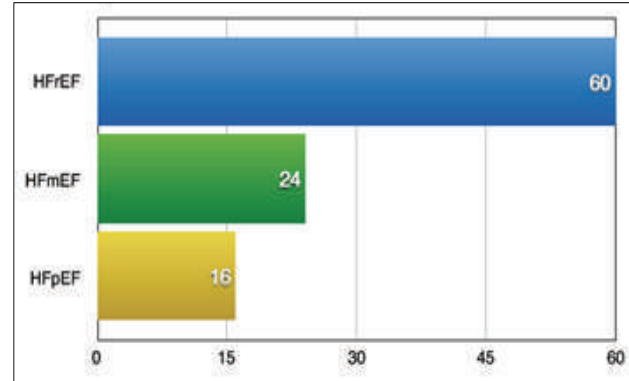


Figure 1: Distribution of Enrolled Patients Based on Their Ejection Fraction

Precipitating Causes of Decompensation

The causes of decompensation were as follows: non-defined, non-adherence to medications, myocardial ischemia and hypertensive crisis, see table 2.

Table 2: Factors Identified as Precipitating Factors for HHF

Factors Identified as Precipitating Cause of HHF	Our Data (N=245)	Gulf Care (N=5,005)	EFICA (N=581)	EHFS-II (N=3M580)	OPTIMIZE-HF (N=48,612)
Ischemia	21	27	42	30	14.7
Poor Compliance	24	21.2	7	22	11.1
Infection	11	15	20	17.6	-
Hypertension	16	8.2	8	-	10.7
Undefined	30	14	8	-	-

diuretics (furosemide) in boluses form, 29 (12%) had the furosemide as continuous infusions. One hundred seven (44%) received intravenous nitrates and 10 (4%) received inotropes. Twenty-four (10%) were mechanically ventilated. The rate of renin-angiotensin system (RAS) blockers, beta-blockers and mineralocorticoid receptor antagonist (MRA) had increased at discharge compared to the rate at initial hospitalization. The rest of the medications are shown in table 3.

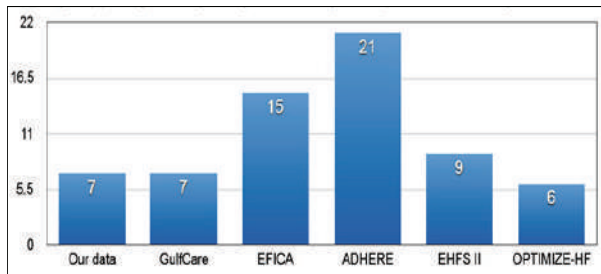


Figure 3: Length of Stay in Days in Our Study Compared to Other Registries

Table 3: Percentage of Admission and Discharge Cardiac Medications in the Registries

	Our Data (N=245)		Gulf Care (N=5,005)		EFICA (N=581)		ATTEND (n=1,110)		EHFS-II (N=3M580)		OPTIMIZE-HF (N=48,612)	
	A	D	A	D	A	D	A	D	A	D	A	D
ACE Inhibitors	69	61	43	61	42	57	18	26	55	71.1	40	53
ARB	17	26	13	17	3	3	38	46	9.3	10.4	12	12
B Blockers	31	69	44	71	13	21	26	64	43.2	61.4	53	64
Loop Diuretics	98	86	58	94	87	79	44	84	-	-	61	-
MRA	13	27	17	43	18	19	24	58	28.1	47.5	-	7
Digitalis	6	7	17	25	16	17	16	28	26.6	31	23	-

At one year, 115 (47%) patients had at least one readmission with heart failure. The following readmission predictors were identified by multiple logistic regression, including HR of ≥ 78 bpm at discharge (AOR) 2.36 (95% CI 1.37–4.07; $p=0.05$), diabetes mellitus (AOR) 1.88 (95% CI 1.01–3.24; $p=0.05$) and CAD (AOR) 1.81 (95% CI 1.04–3.40; P -value= 0.05).

DISCUSSION

The mean age was 65+14 years, which was similar to other studies in developing countries⁶. Patients in heart failure studies in North America, Europe, and Japan tended to be older²⁻⁵. The regional age variation is well-known and can be partially explained by the prevalence of underlying risk factors in different societies.

Male predominance is almost a universal trend except in the Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients with Heart Failure (OPTIMIZE-HF)⁵. Females constitute a large proportion of heart failure population in the United States⁵.

Precipitating causes for decompensation for heart failure could reflect underlying etiology. Myocardial Ischemia represented 21% of the incidents, much less than reported in other studies²⁻⁵. Administration of therapeutic heparin in 63% of the patients could indicate that myocardial ischemia is under-reported. Comorbidities can increase the risk of myocardial ischemia in this population. Underutilization of coronary angiograms and non-invasive workups (such as coronary computed tomography angiogram or dobutamine echocardiogram) for myocardial ischemia during the initial admission might explain our findings.

In our study, HTN triggered 16% of the acute heart failure episodes. HHF is a common presentation of hypertensive crisis in Bahrain^{8,9}. DM was seen in 64% of patients. Across the spectrum of cardiovascular diseases, diabetes amplifies

We found a median length of stay beyond seven days to be closely related to in-hospital mortality¹. Studies with lower hospital stay have lower mortality¹. Variables of mortality, such as age, HR >100 bpm at admission, CAD, and non-cardiac morbidities are similar to other studies¹⁸⁻²⁴. Our findings of reduced mortality with prior ARB therapy was similar to a study from Japan⁴. Readmission predictors in our study were as follow: HR of ≥ 78 bpm at discharge, DM and CAD. Predicting readmission is more challenging than predicting mortality due to HHF.

The limitation of this study was the small size sample. Bahrain has 1.2 million inhabitants. With an estimated heart failure prevalence of 2.5%, the total number of patients in Bahrain with this disease would be approximately 30,000. A sample of 245 patients has a 95% confidence level and 6.24 CI representative ability. In addition, the quality of documentation needs to be improved.

CONCLUSION

Our patients are relatively younger than those from the studies in North America, Europe, and Japan, and they had several comorbidities. In-patient mortality and 12-month readmission rates were 9.4% and 47%, respectively.

Author Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflicts of Interest: None.

Competing Interest: None.

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