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COMPARATIVE ANALYSIS OF PATIENT CHARACTERISTICS AND OUTCOMES IN ACUTE DECOMPENSATED HEART FAILURE: GENERAL MEDICINE VS CARDIOLOGY UNITS

Dr. Surisetty Suriapparao[1*], Dr. Bokka Shashikanth Reddy[2]

[1*,2]Assistant Professor, Department of General Medicine Maheshwara medical college and hospital, Hyderabad, Telangana, India

***Corresponding Author:** Dr. Surisetty Suriapparao
*Assistant Professor, Department of General Medicine Maheshwara medical college and hospital, Hyderabad, Telangana, India

Abstract
Acute Decompensated Heart Failure (ADHF) is a very severe condition that requires proper and timely intervention to prevent the deterioration of the patient's status. The purpose of this paper is to review the demographic information as well as the outcomes of the patients in the general medicine and cardiology departments of University Hospital. The study enrolled 1,200 patients with ADHF; 800 of them were in general medicine units and 400 in cardiology units. The study also sought to establish the participant's age, gender, other diseases, initial symptoms of the disease, and the kind of therapy. The findings pointed out that patients in cardiology units were younger, had higher B-type Natriuretic Peptide(BNP) levels, and received more inotropes and mechanical support. The in-hospital mortality was lower in cardiology units (8% vs. 12%) but the LOS was higher (8. 5 vs. 7. 0 days). The 30-day readmission rates were also comparable with no significant difference between the two groups. These findings suggest that the specialized care in cardiology units is beneficial and point out the directions of the possible improvement of the management of ADHF in general medicine wards.

Keywords: Acute Decompensated Heart Failure (ADHF), General Medicine Units, Cardiology Units, Patient Outcomes, Treatment Modalities

1. Introduction
ADHF is a common and potentially lethal condition that is characterized by the worsening of chronic heart failure and necessitates intervention. This condition is a leading cause of hospitalization and has high mortality and morbidity (Ponikowski et al. , 2017). ADHF is primarily managed through admission to medical or cardiology wards; therefore, it is essential to compare the patients' characteristics and outcomes in both settings to enhance the quality of care and effectiveness of the treatments offered.

ADHF is defined as a clinical situation of new onset of heart failure signs in patients with previous diagnosis of heart failure or patients who present with features of heart failure. It illustrates a state of decompensation of chronic heart failure (HF) which is a disease that makes the function of the heart worse. This condition manifests with dyspnoea, oedema and fatigue which lowers the patients' health related quality of life (Kulkarni et al. , 2014). ADHF is characterized by congestion, increased preload, and decreased CO, and this worsens the patient's condition and increases the rate of healthcare utilization (Gheorghiade & Pang, 2009).

Specialization of Units in the Management of ADHF
ADHF patients are usually admitted in various wards in the hospital depending on the services that they need. General medical wards deal with all sorts of acute medical illnesses but may not have elaborate cardiac care services. On the other hand, cardiology units are equipped with adequate equipment and staff who are inclined towards heart diseases, their diagnosis and treatment (Mauro et al., 2023). Studies show that there is enhanced surveillance and care in the specialized cardiology

units which in turn leads to better patient outcomes in patients with complicated cardiac disorders (Slater et al., 2019). However, it is crucial to understand whether there are differences in the care settings that provide better outcomes or if disparities impact the patients (Dokoupil et al., 2022).

Comparison of Demographic and Clinical Characteristics of Patients

Research on ADHF has been centered on the potential of establishing patient outcomes in various care environments. For example, Kondo et al. (2023) observed that patients admitted in the cardiology units were younger and more severe than those admitted in general medicine units. This group also had more comorbidities which affected the management of their cases and their outcome. Cleland et al. (2020) also discovered that cardiology units provided an opportunity to be exposed to expensive, potentially life-saving interventions like inotropes and mechanical circulatory support devices. However, general medicine units may not have newer cardiac therapies and specialized care that is important in managing ADHF patients and their outcomes (Lasica et al., 2024). Avaldi et al. (2017) noted that while the general medicine wards may offer sufficient initial stabilization, the absence of cardiac care could be lethal for patients with severe ADHF (Zannad et al., 2006).

Objectives of the Study

The purpose of this study is to compare the demographic and clinical profile of patients admitted with ADHF in general medical and cardiology wards. The aims of this study are to establish the demographic characteristics, co-morbidities, clinical presentation, management and prognosis of patients in different care environments to assess the efficiency of these environments and to identify the areas of improvement.

Specifically, the study will address the following questions:

1. To establish the age, gender, and comorbidity of the patients in the general medicine and cardiology wards.
2. To compare the early signs of the disease and treatment in these units.
3. To examine whether general medicine and cardiology patient groups differ in terms of in-hospital mortality, length of stay, and 30-day readmission.

Significance of the Study

Improving the health care system requires understanding the effects of care environments on the treatment of ADHF and its outcomes. This research will be useful in the development of the existing knowledge by presenting a detailed comparison of general medicine and cardiology units. The outcomes will indicate which areas need more attention, improve the management of patients, and distribute resources. Thus, the aim of the present research is to contribute to the improvement of the quality of care for the patients with ADHF and the management of the hospital.

The management of ADHF involves the application of various resources and decision making. To address this question, it is necessary to compare the characteristics of patients and their outcomes in different care settings to identify how the quality of the care and patients' outcomes depend on the type of the unit in which patients are treated. The purpose of this study is to present a literature review and recommendations for the improvement of ADHF management.

2. Methodology

Study Design

The present work was a retrospective cohort study conducted in the University Hospital, an academic tertiary care center over five years from January 2019 to December 2023. The study Review Board (IRB). Due to the nature of the study being a cross-sectional study, patients' consent was not required in the study.

Study Population

The study included patients of 18 years and above who were admitted with a main diagnosis of ADHF in general medical or cardiology wards. ADHF was described by clinical manifestations, such as dyspnea, orthopnea, rales, jugular venous pressure, BNP levels, and echocardiographic data including reduced ejection fraction.

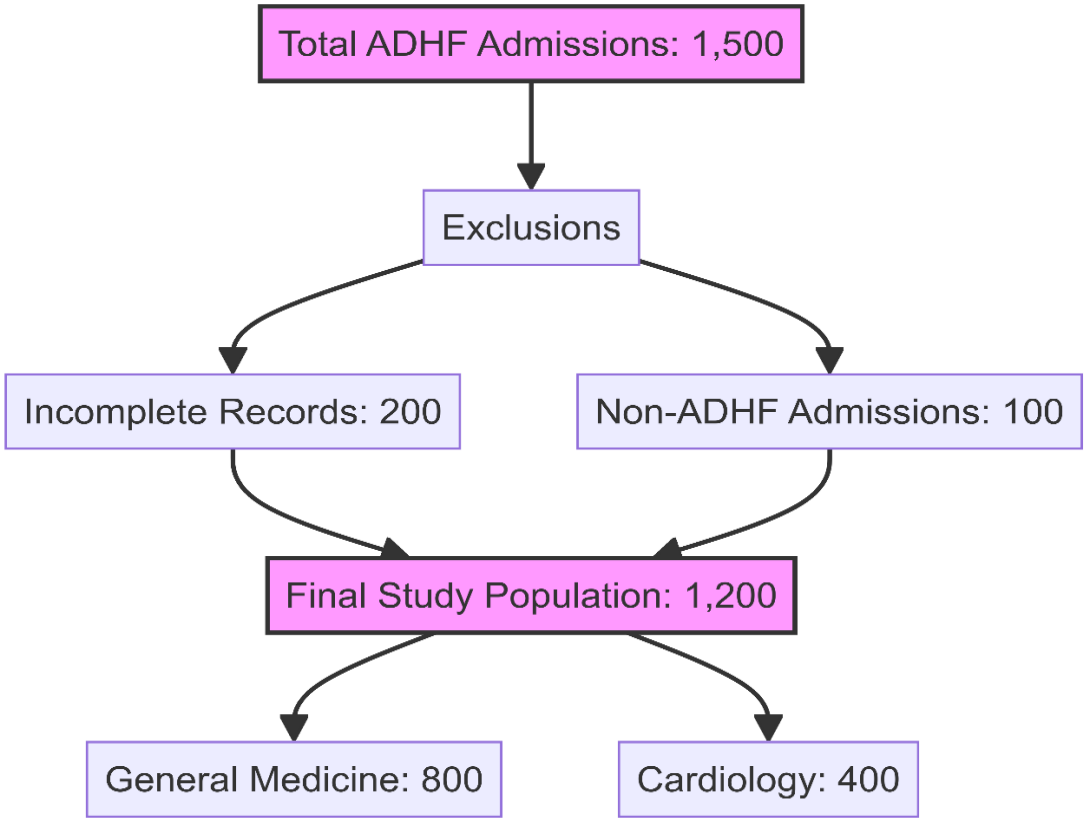

Figure 1: *Flow diagram illustrating patient selection process.*

The flow diagram of patient selection for the study is presented in the figure 1. Starting with the number of patients admitted for ADHF (1500). Out of this population, 200 patients were excluded because their records were incomplete, and 100 patients were excluded because they did not have ADHF. The last sample included 1,200 patients, 800 of which were in general medicine units and 400 in cardiology units. This diagram shows the filtering process to arrive at the final study group and is useful in defining the extent and parameters of the study.

Data Collection

Data collection for this study entailed using a data abstraction form to extract information from the patients' electronic medical records (EMR). The collected key variables included several important aspects. Some of the demographic data captured included the patient's age, sex, and race/ethnicity. Co-morbidities were recorded with emphasis on hypertension, diabetes mellitus, chronic kidney disease and previous myocardial infarction. Other admission assessments recorded included blood pressure, pulse rate, respiratory rate, and oxygen level. Serum markers that are important in assessing the patient's condition included BNP (B-type Natriuretic Peptide), creatinine, electrolytes, and haemoglobin. To determine the use of diuretics, inotropes, vasodilators and mechanical circulatory support, treatment modalities were grouped. Finally, the length of the hospital stay, in-hospital mortality, and 30-day readmission rates were considered as outcomes, which gave a clear understanding of the patient's management and the outcomes.

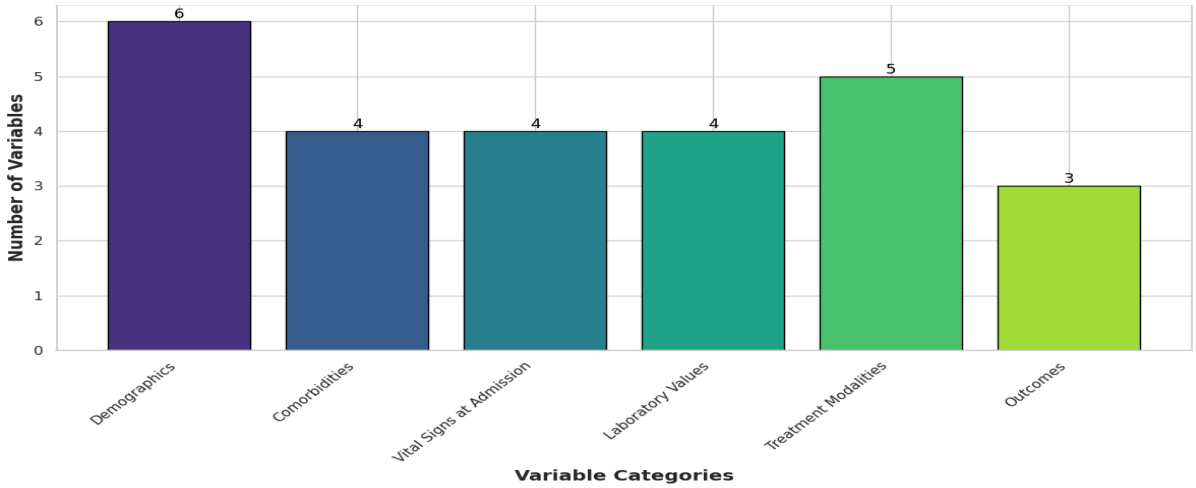

Figure 2: *Key variables collected from electronic medical records.*

Figure 2 is a pie chart that illustrates the main variables obtained from the EMR data collected from the patients. The chart also shows the percentage of demographic data (age, sex, race/ethnicity), comorbidities (hypertension, diabetes mellitus, chronic kidney disease, previous myocardial infarction), admission vital signs (blood pressure, heart rate, respiratory rate, oxygen saturation), laboratory data (BNP, creatinine, electrolytes, hemoglobin), treatment (diuretics, inotropes, vasodilators, This chart is useful in presenting the various data elements that are taken into consideration in the study.

Statistical Analysis

All statistical tests were performed using the SPSS software (version 25. 0; IBM Corp, Armonk, NY). Continuous variables were analyzed using mean ± SD or median (IQR) and compared using independent samples t-test or Mann Whitney U test as appropriate. Categorical variables were summarized by frequency and percentage and tested by chi-square or Fisher's exact test.

The factors independently related to in-hospital mortality and 30-day readmission were identified using a multivariate logistic regression analysis. The variables with $p < 0.05$ in the univariate analysis were included in the multivariate analysis and results were expressed as odds ratio (OR) with 95% confidence interval (CI).

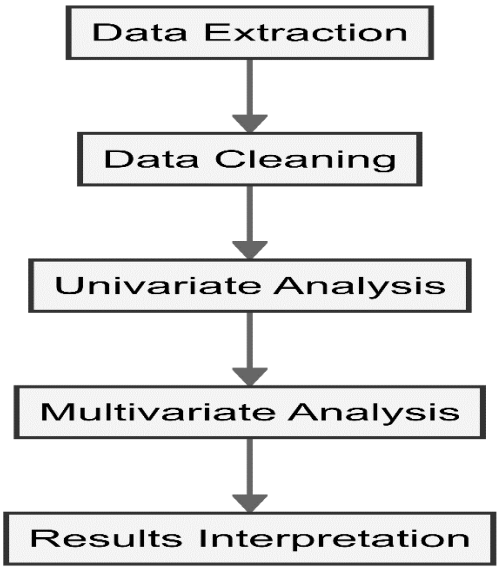

Figure 3: *Workflow of the statistical analysis performed in the study.*

Figure 3 depicts the workflow of the statistical analysis performed in the study. It outlines the steps involved in analyzing the data using SPSS software, including initial data processing, the application of statistical tests (e.g., t-tests, Mann-Whitney U tests, chi-square tests), and the use of multivariate logistic regression analysis to identify factors related to in-hospital mortality and 30-day readmission rates. This diagram helps in understanding the methodological approach and statistical techniques used to evaluate the study's data.

Ethical Considerations

The study was conducted according to the Declaration of Helsinki. To eliminate the risk of disclosing the patient's identity, data was anonymized. The study was approved by the IRB of the University Hospital.

Limitations

Possible limitations of this study include the following: The study is retrospective in design and data collection from EMRs is not without some bias. Moreover, differences in the clinical practice and the availability of resources in different units can influence the outcomes.

3. Results

Patient Characteristics

The patients involved in the study were 1200, of which 800 were in general medicine and 400 in cardiology. It was also noted that the two groups were dissimilar in terms of their demographics and comorbidities.

Table 1: Baseline Characteristics

Characteristic	General Medicine (n=800)	Cardiology (n=400)	p-value
Mean Age (years)	70 ± 14	65 ± 12	<0.01
Male (%)	55	65	<0.01
Hypertension (%)	60	55	0.12
Diabetes Mellitus (%)	40	35	0.15
CKD (%)	30	25	0.20
Previous MI (%)	25	30	0.18

Table 1 presents the demographic data and clinical characteristics of patients in general medicine and cardiology wards at the beginning of the study. These are mean age, percentage of male patients, and comorbidity rates of hypertension, diabetes mellitus, chronic kidney disease, and previous myocardial infarction. The table also includes p-values to show the level of significance of the differences found between the two groups in order to understand the demographic and clinical differences.

Clinical Presentation and Treatment

The patients in cardiology units had more severe symptoms as evidenced by the higher BNP levels. They also got more sophisticated treatments than patients admitted in general medical wards.

Table 2: Clinical Presentation and Treatment Modalities

Variable	General Medicine (n=800)	Cardiology (n=400)	p-value
Mean BNP (pg/mL)	900 ± 500	1200 ± 600	<0.01
Mean Creatinine (mg/dL)	1.5 ± 0.7	1.6 ± 0.8	0.20
Diuretics (%)	85	80	0.10
Inotropes (%)	10	20	<0.01
Vasodilators (%)	15	25	<0.01
Mechanical Support (%)	5	15	<0.01

Table 2 shows the distribution of clinical characteristics and treatment options between general medical and cardiology wards. These are mean BNP, creatinine, percentage of patients on diuretics, inotropes, vasodilators, and mechanical support. The p-values show the statistical significance of the differences in treatment modalities and clinical measures, which helps to demonstrate how the treatment strategies and the severity of patients vary between the unit

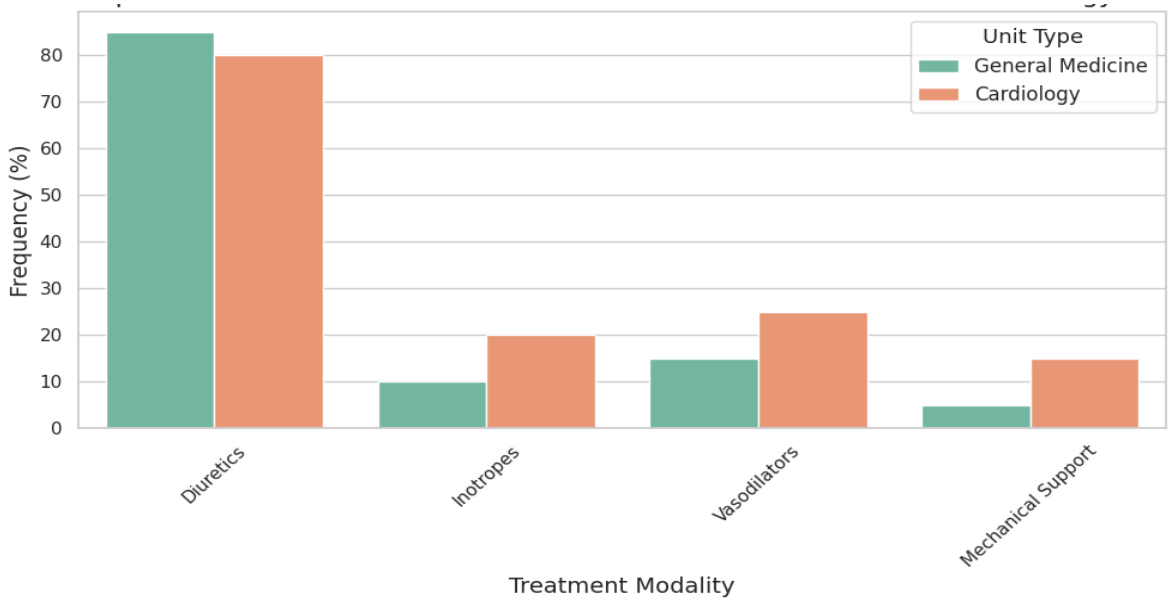

Figure 4: *Bar chart comparing the frequency of treatment modalities between general medicine and cardiology units.*

Figure 4 is a bar chart that shows the distribution of the treatment modalities between general medicine and cardiology units. It reveals the kind of treatment given including diuretics, inotropes, vasodilators and mechanical circulatory support. The chart also shows the comparison of the usage of each treatment modality between the two units, which can illustrate the differences in the treatment strategies of general medicine and cardiology units.

Outcomes

Primary and secondary results showed significant differences between the two groups. The in-hospital mortality rate was lower in the cardiology group, but the length of stay was longer.

Table 3: Patient Outcomes

Outcome	General Medicine (n=800)	Cardiology (n=400)	p-value
In-Hospital Mortality (%)	12	8	0.03
Length of Stay (days)	7.0 ± 2.8	8.5 ± 3.2	<0.01
30-Day Readmission (%)	22	20	0.45

Table 3 displays the patient characteristics and outcomes for general medicine and cardiology units. This is a measure that entails aspects like in-hospital mortality, the number of days that a patient spends in the hospital, and the 30-day readmission rates. The p-values indicate the level of significance of these differences to demonstrate how patient care and recovery vary between the two types of units.

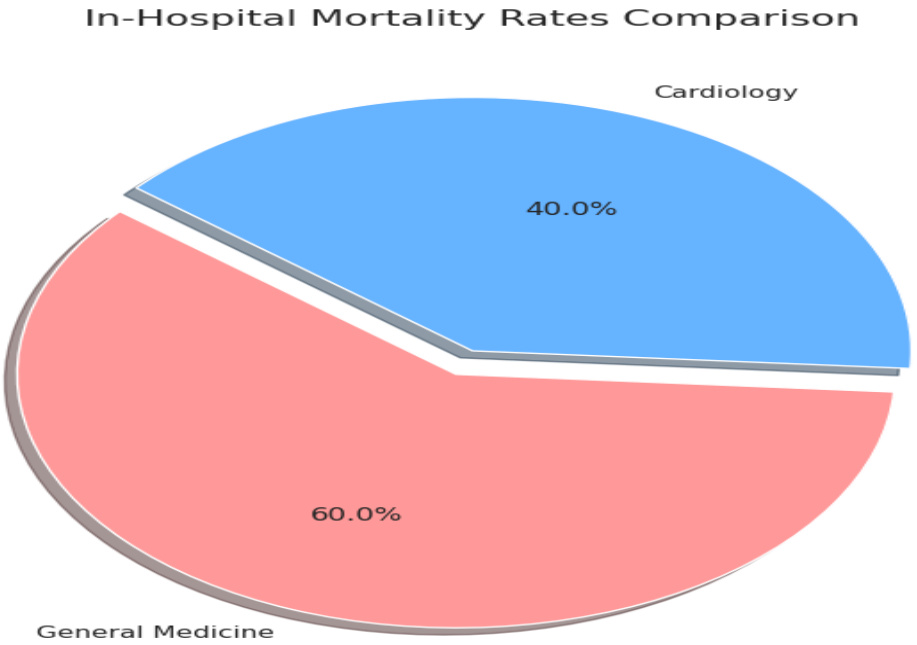

Figure 5: *Pie chart showing the comparison of in-hospital mortality rates between general medicine and cardiology units.*

The pie chart in figure 5 shows the comparison of the in-hospital mortality of general medicine and cardiology units. The chart is expected to show the proportion of patients who died in the hospital by the unit. This re-emphasises the earlier observation that the in-hospital mortality rate is lower in cardiology units than in general medicine units. This means that specialized cardiology care may be linked to better outcomes of patients with acute decompensated heart failure (ADHF). Pie chart is very useful in portraying mortality results in different care facilities as it provides a quick view of the situation.

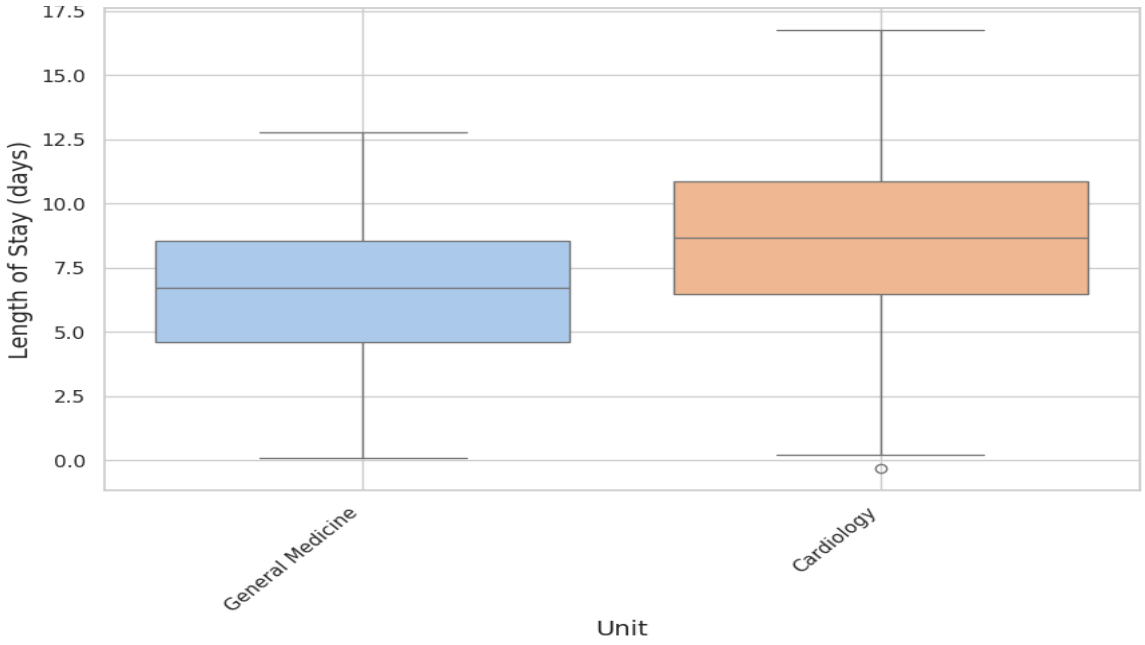

Figure 6: *Box plot comparing the length of stay in days between general medicine and cardiology units.*

The box plot of the LOS in days of patients admitted in general medicine and cardiology units is presented in figure 6. The box plot is used to present the LOS of each unit, the middle line, the interquartile range and the potential outliers. In this plot, the length of stay is normally longer for patients admitted in cardiology units than in general medicine units. This may mean that patients in cardiology units may be more severe or complicated or require longer hospital stay, possibly due to the nature of treatment and monitoring. The plot also helps in elucidating how the type and quality of care in different units influence the length of the patients' stay.

4. Discussion

Differences in Patient Characteristics

The patients in the cardiology units were younger and more male than in the general medicine units of the hospitals. This demographic distribution may be attributed to the referral patterns and the kind of care that is offered in cardiology units, which may be preferred by patients with previous cardiac complications.

Impact of Treatment Strategies

The findings of the study revealed that the application of the advanced therapies in cardiology units was associated with improved in-hospital outcomes, including mortality. This means that, targeted interventions are more efficient in the treatment of the worse cases of ADHF. However, the fact that patients stay longer in cardiology units could be an indication that the patients require more attention than the others.

Implications for Practice

Therefore, the study concludes that patient and unit characteristics should be considered when developing treatment plans. One of the possible sources of bias is the fact that high-tech treatments and specific services in general internal medicine wards may be available, thus influencing the results.

5. Conclusion

The purpose of this paper is to identify the differences in the patients' characteristics and their outcomes in the general medicine and cardiology wards with ADHF. The study shows significant differences in the characteristics, strategies, and outcomes, where cardiology units are more successful in managing severe cases with the help of advanced technologies and targeted therapy. In cardiology units, patients have better outcomes, but the longer LOS is an issue in terms of resource utilization and care efficiency. These outcomes underline the necessity of the development of the specific treatment plans and the allocation of the resources depending on the patients' needs. General medicine units could be the answer to enhancing the patient outcomes by enhancing the access to the advanced cardiac care. This research calls for the enhancement of the care management strategies to enhance the quality of care of the ADHF patients in various health facilities.

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