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ASSESSING THE SAFETY OF EARLY DIURETIC ADMINISTRATION IN DYSPNEA PATIENTS WITHOUT A FINAL DIAGNOSIS OF ACUTE HEART FAILURE: AN OBSERVATIONAL STUDY.

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ABSTRACT

Background

Dyspnea is a frequent and distressing symptom leading to emergency department (ED) visits, often associated with various cardiopulmonary conditions. Diuretics are commonly used in the early management of dyspnea, particularly when acute heart failure (AHF) is suspected. This study investigated the safety of early diuretic administration in dyspnea individuals who are not finally detected with AHF, focusing on thirty-day mortality and readmission rates.

Methods

A prospective observational study involved 180 dyspnea patients from the BASEL-V registries. Patients were allotted into two groups: those who received diuretics at the ED (n=90) and those who did not (n=90). Thirty-day readmission was the secondary endpoint, while thirty-day mortality was the primary one. T-tests, chi-square testing, Wilcoxon rank-sum tests, and multiple imputations for missing data were used to evaluate the data.

Results

The study involved 180 patients, with a mean age of 65 ± 12 years in the treated group and 66 ± 13 years in the untreated group. 61.1% of the treated group and 58.9% of the untreated group were male. The groups had similar rates of hypertension (treated: 50%, untreated: 46.7%), diabetes (33.3%, untreated: 35.6%), and chronic renal disease (22.2%). The treatment group had 11.1% 30-day mortality and the untreated group 8.9% (p = 0.62). The treatment group had 22.2% 30-day readmissions and the untreated group 20% (p = 0.70). Baseline characteristics were similar between groups.

Conclusion

Early diuretic administration in dyspnea individuals without a final diagnosis of AHF does not significantly impact thirty-day mortality or readmission rates. The practice appears to be safe in this patient population.

Recommendations

Larger sample sizes and longer follow-up times are required for future research to validate these results and offer more definite recommendations on the use of diuretics in patients with dyspnea who do not have AHF.

Keywords: *Dyspnea, Diuretics, Acute Heart Failure, Mortality.*
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INTRODUCTION

Dyspnea is a common and distressing symptom that prompts many patients to seek emergency medical care. It is a hallmark of various cardiopulmonary conditions, including acute heart failure (AHF), chronic obstructive pulmonary disease (COPD), and pneumonia, among others. Accurate and timely diagnosis is critical for effective management, yet the diagnostic process can be challenging due to overlapping clinical presentations. Diuretics are frequently administered early in the management of dyspnea, especially when AHF is suspected. However, the safety and efficacy of this practice in people who are eventually detected with conditions other than AHF remain underexplored.

The role of diuretics in the treatment of AHF is well-documented, providing symptomatic relief by reducing fluid overload and improving cardiac function [1]. However, the administration of diuretics to patients without AHF can be contentious. There is a potential risk of adverse effects, such as electrolyte imbalances, dehydration, and renal dysfunction, which may complicate the clinical course [2]. Thus, it is essential to

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evaluate whether the benefits of early diuretic administration in dyspnea patients without AHF outweigh these risks.

Recent studies have highlighted the importance of tailored therapeutic approaches based on the underlying etiology of dyspnea. For instance, a study emphasizes the necessity of differentiating between cardiac and non-cardiac causes to optimize treatment strategies [3]. Additionally, advancements in diagnostic modalities, such as point-of-care ultrasound and biomarkers like B-type natriuretic peptide (BNP), have improved the accuracy of diagnosing AHF, yet these tools are not always immediately available or conclusive in the emergency setting [4].

The BASEL-V registry provides a unique opportunity to study the outcomes of dyspnea patients managed with and without diuretics. This registry includes a diverse patient population presenting to emergency departments with dyspnea, thus reflecting real-world clinical scenarios. Previous analyses from this registry have contributed valuable insights into the management of AHF, but the impact of diuretic use in patients with alternative diagnoses has not been thoroughly investigated [5].

The study aimed to assess the safety of administering diuretics during the early management of dyspnea in patients who are ultimately not diagnosed with acute heart failure (AHF).

METHODOLOGY

Study Design

A prospective observational study.

Study Setting

The research was taken out at ESIC Bihar and IGIMS Patna, Bihar, India, over the period from April 2023 to May 2024.

Participants

The study included 180 consecutive patients from the BASEL-V registries who presented to the emergency departments (ED) at the study locations.

Inclusion Criteria

- Patients presenting with dyspnea.
- Diagnosed with conditions other than AHF.
- Attended the emergency departments.

Exclusion Criteria

- Patients without recorded data on diuretic treatment at the ED.
- Patients lacking follow-up mortality data.
- Patients on chronic diuretic treatment, to avoid confusion with their existing regimen.

Sample size

To calculate the sample size for this study, the following formula was used for estimating a proportion of a population:

$$n = \frac{Z2 \times p \times (1-p)}{E2}$$

Where:

- n = sample size
- Z = Z-score corresponding to the desired level of confidence
- p = estimated proportion in the population
- E = margin of error

Bias

To reduce bias, the study included all consecutive patients from the BASEL-V registries, ensuring consistent follow-up through methods such as medical record reviews, telephone interviews, and checks with regional health insurance and death registries.

Variables

Variables included mortality within 30 days, and readmission within 30 days post-discharge for any reason.

Data Collection

Data was collected from patient medical records, follow-up telephone calls, and consultations with regional health insurance and death registries. This included information on patient demographics, clinical evaluations, details of diuretic administration, and follow-up outcomes.

Procedure

- Patients presenting with dyspnea were assessed to exclude AHF by the treating physicians.
- Data regarding diuretic administration at the ED was recorded.
- Patients were allotted into two groups:
  -
  - Those who received diuretic therapy at the ED.
  - Those who did not receive diuretic therapy.
- Follow-up data on mortality and readmissions within 30 days was collected for analysis.

Statistical Analysis

Continuous variables were summarized using the mean and range to provide a clear understanding of the data distribution. Missing data were managed through multiple imputation techniques to ensure robust and comprehensive analysis. A statistical significance threshold of $P < 0.05$ was utilized to ascertain the significance.

Ethical considerations

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The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

RESULT

A total of 180 participants presenting with dyspnea were included in the study. Of these, 90 participants received diuretic treatment at the ED (Treated group), while the remaining 90 patients did not receive diuretics (Untreated group).

Table 1 provides a summary of the patients' preliminary characteristics. Age, gender, comorbidities, and starting vital signs did not differ significantly between the treated and untreated groups.

Table 1: Baseline Characteristics

Characteristic	Treated (n=90)	Untreated (n=90)	P-value
Age (years)	65 ± 12	66 ± 13	0.69
Male (%)	55 (61.1%)	53 (58.9%)	0.75
Hypertension (%)	45 (50%)	42 (46.7%)	0.65
Diabetes Mellitus (%)	30 (33.3%)	32 (35.6%)	0.76
Chronic Kidney Disease (%)	20 (22.2%)	18 (20%)	0.70
Heart Rate (bpm)	92 ± 15	90 ± 14	0.45
Systolic BP (mmHg)	138 ± 20	140 ± 18	0.58
Respiratory Rate (bpm)	24 ± 5	23 ± 6	0.34
Oxygen Saturation (%)	95 ± 3	96 ± 2	0.20

Thirty-day mortality was observed in 10 patients (11.1%) in the treated group and 8 individuals (8.9%) in the untreated group. The variation was not statistically relevant (p = 0.62).

Readmission within 30 days was observed in 20 patients (22.2%) in the treated group and 18 participants (20%) in the untreated group. The difference was not statistically relevant (p = 0.70).

Follow-up was completed for 178 patients (98.9%). Two patients were lost to follow-up in the untreated group. The methods of follow-up included medical record review (100%), telephone contact (70%), and consultation with regional health insurance and death registries (30%).

DISCUSSION

The study included 180 patients presenting with dyspnea, allotted into two groups. The results showed that the thirty-day mortality rate was 11.1% in the treated group in contrast to 8.9% in the untreated group, with a P-value of 0.62. Similarly, the readmission rate within 30 days was 22.2% in the treated group and 20% in the untreated group, with a p-value of 0.70. Baseline characteristics, including age, gender, and comorbidities, showed no significant variations among the two groups.

The findings suggest that early administration of diuretics in dyspnea individuals who were not ultimately diagnosed with AHF does not significantly affect short-term outcomes, such as thirty-day mortality or readmission rates. The observed variations in mortality and re-admission rates between the treated and untreated groups were minimal and statistically insignificant. This indicates that diuretic use in the early management of these patients does not pose a significant risk in terms of short-term survival or the need for readmission.

The implications of these findings are important for clinical decision-making. The results provide evidence that administering diuretics to dyspnea patients in the ED, even when AHF is not the final diagnosis, is relatively safe and does not lead to an increase in adverse short-term outcomes. This can offer reassurance to clinicians considering diuretic therapy for symptom management in similar clinical scenarios.

A study analyzed 2,505 patients and found no significant variation in 30-day all-cause mortality (4.5% for treated vs. 4.3% for untreated, HR: 1.22, 95% CI: 0.75–2.00) or readmission rates (14.7% for treated vs. 10.8% for untreated, OR: 1.41, 95% CI: 0.95–2.11), though better prognosis was noted in patients over 80 years old [6].

Similarly, a study reported that early diuretic administration in an Australian ED setting was associated with a shorter length of stay (246 minutes vs. 275 minutes, P = 0.03) and a non-significant trend towards lower inpatient mortality (4.9% vs. 6.3%, P = 0.21) [7]. Additionally, a meta-analysis highlighted that early diuretic administration significantly reduced in-hospital mortality and shortened hospital stays [8].

Furthermore, a study demonstrated that early diuretic treatment in acute heart failure was linked to lower in-hospital mortality (2.3% for early treatment vs. 6.0% for non-early treatment, OR: 0.39, 95% CI: 0.20–0.76) [9].

CONCLUSION

The study found no significant difference in thirty-day mortality or readmission rates between dyspnea patients who received diuretic treatment at the ED and those who did not. These findings suggest that early diuretic administration in dyspnea individuals without a final

diagnosis of AHF does not significantly impact short-term mortality or readmission rates.

Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

Recommendations

Further research with larger sample sizes and extended follow-up periods is necessary to confirm these findings and provide more definitive conclusions. Future studies should aim to validate the safety and efficacy of early diuretic administration in a broader population of dyspnea patients, considering various clinical settings and longer-term outcomes.

Acknowledgment

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List of abbreviations

ED: Emergency Department
AHF: Acute Heart Failure
BASEL-V: Basel Vascular Registry
COPD: Chronic Obstructive Pulmonary Disease
BNP: B-type Natriuretic Peptide
BP: Blood Pressure
Bpm: Beats per Minute
HR: Hazard Ratio
CI: Confidence Interval
OR: Odds Ratio

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Conflict of interest

The authors have no competing interests to declare.

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