Research Paper

Improving Respiratory Status Among Patients With Acute Heart Failure by Implementing Nursing Guidelines

Suzan Shawky Botros[1*], Ahmed Abdel–Galeel[2], Mogedda Mohamed Mehany[1]

1. Department of Critical Care and Emergency Nurrsing, Faculty of Nursing, Heart Hospital, Assiut University, Asyut, Egypt.
2. Department of Cardiovascular Medicine, Faculty of Medicine, Heart Hospital, Assiut University, Asyut, Egypt.

Use your device to scan and read the article online

Citation Shawky Botros S, Abdel–Galeel A, Mohamed Mehany M. Improving Respiratory Status Among Patients With Acute Heart Failure by Implementing Nursing Guidelines. Journal of Research & Health. 2026; 16(1):71-82. http://dx.doi.org/10.32598/JRH.16.1.2664.1

http://dx.doi.org/10.32598/JRH.16.1.2664.1

Article info:
Received: 29 Mar 2025
Accepted: 14 Jul 2025
Publish: 01 Jan 2026

ABSTRACT

Background: Patients with acute heart failure (AHF) often experience pulmonary congestion, leading to tachypnea, orthopnea, and hypoxia. Nursing guidelines play a crucial role in relieving pulmonary congestion and improving respiratory function. Thus, this study aimed to improve respiratory status among patients with AHF by implementing a nursing guideline at Heart Hospital.

Methods: A quasi-experimental research design was utilized in this study. This study (August 2023-September 2024) included 100 patients randomly assigned to intervention (n=50) and control (n=50) groups. The control group received routine care, while the intervention group received nursing guidelines focused on respiratory support, active range of motion, early mobilization, and 6-minute walk test. Patients with comorbid chronic obstructive pulmonary disease (COPD), coma (unconsciousness), pregnancy, or stroke were excluded. The data collection tool was a patient assessment tool (demographic data and arterial blood gases [ABG]), a respiratory assessment tool (chest examination, chest sound assessment, and dyspnea scale), and a patients' outcomes tool (complication, mortality, and length of stay). Data were analyzed utilizing SPSS software, version 22, with statistical significance set at $P<0.05$.

Results: Compared to the control group, the intervention group showed significant respiratory improvement in arterial O_2 saturation (SaO_2), accessory muscle use, crepitation, and chest infection ($P=0.041$, 0.004, 0.008, 0.026), as well as in complications, mortality, and length of stay ($P=0.026$, 0.023, 0.009).

Conclusion: Nursing guidelines may improve respiratory outcomes in AHF; further multi-setting studies are recommended to confirm findings.

Keywords: Respiratory status, Acute heart failure (AHF), Nursing guideline

*** Corresponding Author:**
Suzan Shawky Botros, PhD.
Address: *Department of Critical Care and Emergency Nurrsing, Faculty of Nursing, Heart Hospital, Assiut University, Asyut, Egypt.*
Phone: *+201 (098) 892469*
E-mail: *Suzan_ibrahim@nursing.aun.edu.eg*

Introduction

Acute heart failure (AHF) is a growing global public health concern affecting approximately 64 million people. Its prevalence is increasing due to aging populations, improved survival after myocardial infarction, and advances in evidence-based therapies. Despite progress, AHF remains associated with high mortality, reduced functional capacity, and substantial healthcare costs [1].

AHF is a clinical syndrome characterized by typical symptoms (e.g. dyspnea, ankle swelling, and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles, and peripheral edema). Many patients progress to dyspnea at rest, including at night [2].

Management of AHF includes diuretics, vasodilators, and cardiac glycosides. According to the American Heart Association (AHA), positioning and light physical exercises may reduce respiratory effort, enhance respiratory muscle function, and improve tissue perfusion and circulation [3]. Breathing exercises are the most common form of non-assisted respiratory training. Deep breathing and active range of motion (ROM) improve respiratory muscle strength, circulation, and help reduce dyspnea in patients with AHF [4].

Nurses play a key role in AHF care, particularly in respiratory assessment, oxygen therapy, fluid balance, and medication management. International guidelines (AHA, ESC) emphasize early assessment, symptom control, patient education, and multidisciplinary collaboration [5, 6]. Evidence-based nursing interventions improve AHF outcomes by ensuring continuous monitoring, fluid management, and support for adherence [7].

AHF is a significant cause of hospitalization, often accompanied by respiratory distress from pulmonary congestion and impaired gas exchange. Respiratory complications increase morbidity and length of stay. Studies [8, 9] have shown that structured nursing guidelines targeting respiratory care can improve outcomes. To address this gap, the current study evaluates the impact of standardized nursing guidelines on respiratory status among patients with AHF, providing evidence for more effective nursing care.

Methods

Study design

A quasi-experimental research design was utilized in this study. Patients were randomly assigned to the intervention and control groups using a computer-generated randomization table in Excel 2016. Due to the nature of the nursing intervention, blinding of patients was not feasible. However, outcome assessors were blinded to group allocation because they collected data solely from coded electronic and written medical records without any group identifiers. This approach was used to minimize assessment bias.

Hypothesis

H1: Patients in the intervention group will show a statistically significant improvement in respiratory status compared to the control group. H2: Patients in the intervention group will show a decrease in complications, length of stay, and mortality compared to the control group

Time and place of study

Data collection was conducted from August 2023 to September 2024, approximately, with a convenient sample of about 100 patients. The data were collected from the emergency department (ED) and the CCU in Assiut Heart Hospital, Egypt.

Data collection

The researcher introduced herself to patients and nursing staff, obtained patients' verbal consent, and explained the study's purpose. Data were collected from patients with AHF in the specified setting over a five-day period, who met the criteria of being aged >18 years, newly admitted patients with AHF, and male and female patients. Patients with comorbid chronic obstructive pulmonary disease (COPD), unconsciousness, pregnancy, or stroke were excluded. Strict inclusion and exclusion criteria were applied. Comorbidities, medication adherence, and heart failure severity (based on New York Heart Association [NYHA] classification) were considered in the analysis. Although socio-economic status was not assessed, its potential impact is acknowledged as a study limitation.

Sample size

A purposive sample of adult patients of both sexes admitted with AHF was selected. Based on the primary outcome (length of hospital stay), the minimum required sample size was 84 participants. To account for potential dropout, the sample was increased to 100 patients (50 per group). The sample size was calculated using G*Power software, version 3.1.9.2, assuming a large effect size (>0.8), with hospital stay estimated at 4.73±0.93 days in the intervention group and 10.11±1.83 in the control group [10] based on previous research. A two-tailed t-test was used for group comparisons. Alpha=0.05, Power=0.95, Effect size=0.8 and Allocation ratio=1

Data collection tools

Three tools were used in this study:

I. Patient assessment tool: The patient assessment tool was designed to determine patients' personal characteristics and consisted of two parts:

Part 1: Demographic data, including the patient's code, gender, and age. Part 2: Arterial blood gases (ABG), including PH, partial pressure of oxygen (PaO_2), partial pressure of carbon dioxide (PaO_2), bicarbonate (HCO_3), and SaO_2, arterial O_2 saturation (SaO_2).

II. Respiratory assessment tool: The respiratory assessment tool was used to assess the respiratory status of the patients [11] and consisted of two parts:

Part 1: Chest examination includes respiratory rate, accessory muscle use, and chest sound assessment. Part 2: Assessment dyspnea scale (position-based rating scale [PRS]) was used to measure dyspnea severity determined by patients self-reporting. This validated tool was adopted from Zhang et al. [12] and consisted of five items: absence of dyspnea at rest (0 points), dyspnea in the supine position (1 point), paroxysmal nocturnal dyspnea (2 points), dyspnea in the semi reclining position (3 points), and orthopnea (4 points), which calculated 10 points.

III. Patients' outcomes tool: Patients' outcomes tool was used to evaluate patients' outcomes and consisted of three parts:

Part 1: Complications included chest infection, arrhythmia, digitalis toxicity, hypokalemia, hyperkalemia, and hyponatremia. Part 2: Length of stay in the coronary care unit (CCU), ED, and hospital. Part 3: Mortality, number of patients transferred to the ward, and number of patients discharged to home in both groups [13, 14]. The study was conducted in three stages.

Preparatory stage

Permission to conduct the study was obtained from the hospital's responsible authorities after an explanation of the aim of the study.

Content validity

The developed tools (I, II part 1, III) were tested for content-related validity by five experts in the field of critical care and emergency nursing and cardiovascular department at Assiut University, and necessary modifications were made.

Pilot study

A pilot study was conducted on 10% of the sample (10 patients) to assess the feasibility, safety, and preliminary effectiveness of the intervention, following approval from hospital administration.

The reliability

The reliability was assessed on the tools using Cronbach's α to assess the consistency and stability of the tools as follows:

"Tool I patient assessment tool: 0.835"; "Tool II respiratory assessment Tool Part 1: 0.850"; "Tool III: 822"

Implementation stage

Both groups

Both groups were assessed for:

Baseline data (age and gender) were collected through patient interviews using Tool I, Part 1. ABG values and chest assessments (chest examination and sounds) were extracted from electronic medical records at admission, day 3, and day 5 using Tool I, Parts 1 and 2. Dyspnea severity was assessed through direct patient interviews and clinical observation using Tool II, Part 2.

Control group

The control group received the routine hospital care in the CCU and the ED.

Intervention group

The intervention group received the AHF nursing guideline as follows:

The AHF nursing guideline was applied by the researcher with assistance from critical care nurses involved in patient care and exercise implementation.

A 2-hour orientation session was provided to the nurses, followed by a competency checklist and observational assessment. A dedicated team of trained critical care nurses was assigned to this group. Nurses adhered to the guidelines under regular supervision to ensure compliance and correct performance. The intervention was delivered twice daily, each session lasting 30 minutes.

Part 1: Respiratory support through

Nurses played a vital role in managing patients requiring respiratory support, including continuous monitoring of respiratory patterns, administering oxygen when SpO_2 <90%, and initiating non-invasive ventilation when clinically indicated. Proper positioning (e.g. high-Fowler's position) was maintained to improve oxygenation.

Serum electrolytes, particularly sodium and potassium, were routinely monitored; baseline values were obtained before the intervention, with follow-up tests conducted to identify imbalances. Nurses also supported medication administration, monitored responses, reported adverse effects, and reinforced adherence.

Patients were encouraged to perform deep breathing and coughing exercises for 15 minutes, twice daily, to reduce dyspnea and prevent respiratory complications (e.g. atelectasis) [15].

Part 2: Warm-up activities and active range of motion (AROM)

Warm-up and AROM exercises were individualized and low-intensity, designed to remain within safe exertion limits to avoid cardiovascular strain. Each session began with 5–10 minutes of warm-up activities to prepare patients for exercise [16]. These included:

Arm circles and shoulder rolls: Performed in a standing or seated position by extending arms and making small circles for 30 seconds in each direction, followed by shoulder rolls forward and backward (30 seconds each). Purpose: To loosen shoulder joints and enhance blood flow.

Ankle and wrist rotations: While seated, participants rotated ankles and wrists in circular motions for 30 seconds each. Purpose: To reduce joint stiffness and enhance mobility. Deep breathing with gentle stretching: Involved slow inhalation through the nose while raising the arms, followed by exhalation while lowering them.

Heel-toe taps: Performed while seated or standing, alternately tapping the heel then toe of each foot for 1–2 minutes. Purpose: To improve circulation in the lower limbs. Neck and side stretching: Included gentle tilting of the head side to side and overhead arm stretches with side bending. Purpose: To relieve upper-body tension.

AROM

The exercises were divided into two stages based on the patient's position: supine (lying down) and sitting upright in bed or on a chair. In the supine position, the routine included: 1) arm elevation above the head and return to the side position; 2) bilateral leg flexion and extension 3) Arm abduction; 4) heel sliding forward and backward to stimulate lower limb circulation. In the sitting position, the patient performed: 5) forward trunk flexion and return to upright posture; 6) Alternating knee lifts; 7) arm swings forward and backward to promote coordination and chest expansion Vazquez et al. [17]

Part 3: Acute phase and early ambulation program

After weaning from oxygen and resolution of the acute phase, an early ambulation program was initiated. This was followed by patient preparation, assessment of background and exacerbation factors, evaluation of cardiac function and hemodynamics.

Acute phase early ambulation program adopted from Izawa et al. [18] and used by Makita et al. [19]. The acute phase ambulation program consists of six progressive stages based on patient recovery and tolerance:

Stage 1: Complete bed rest; rehabilitation conducted in bed. Stage 2: Sitting upright in the room; bedside rehabilitation; approximately one hour of sitting. Stage 3: Walking up to 40 meters and free movement within the room; bedside rehab; approximately two hours of sitting. Stage 4: Walking up to 80 meters; rehabilitation in the ward; approximately three hours of sitting. Stage 5: Same as Stage 4; continued ward-based rehabilitation. Stage 6: Free ambulation within the ward, including walking 80 meters two to three times daily; rehabilitation in the rehab room; approximately three hours of sitting.

Part 4: 6-minute walk test adopted from Marinho et al. [20].

After the early ambulation program, the six-minute walk test was performed.

Stopwatch; Measuring/trundle wheel to measure distance covered; 30-meter stretch of unimpeded walkway; two cones to mark the distance that needs to be covered; pulse oximeter for measuring heart rate and SpO_2 (optional); terminate exercise if warning signs or symptoms occur, including dizziness, arrhythmias; unusual shortness of breath, or angina and discomfort.

Evaluation stage

All patients with AHF were evaluated within five days and until discharge for complications, length of stay, and mortality using electronic and written medical records, including discharge summaries. Chest infections were assessed via sputum culture reports from electronic records.

Statistical analysis

Data entry and analysis were performed using SPSS software, version 22. Data were presented as numbers, percentages, Mean±SD, medians, and interquartile ranges (IQR). The chi-square and Fisher's exact tests were used to compare qualitative variables. The normality of the quantitative variables was tested with the Shapiro-Wilk test. In case of parametric data, an independent sample t-test was used to compare quantitative variables between groups, and a Mann-Whitney test was used for non-parametric data. Repeated measures analysis of variance (ANOVA) for within-group comparison in each group. Multiple logistic regression was performed to identify risk factors. P considered statistically significant when P<0.05.

Results

Table 1 presents that most of the patients were male. Significant differences in age were observed between groups. Also, it presents that the intervention group had significantly better SaO_2 in the third and fifth days, and these findings confirm Hypothesis 1.

Table 2 presents that the intervention group had significantly less accessory muscle use, improved chest sounds, and lower dyspnea on the fifth day. The statistical significance of these findings confirms Hypothesis 1.

Table 3 presents that the intervention group had lower mortality (10%), fewer chest infections, and shorter hospital stays. Multiple logistic regressions revealed no significant association between age, gender, SaO_2 and mortality (P>0.05). Although males had higher mortality odds, gender was not a significant predictor (odd ratio [OR]=1.683; 95% confidence interval [CI], 0.515%, 5.501%; P=0.389).

Discussion

AHF is a growing global health problem, affecting millions annually and associated with high morbidity and mortality. Despite advances in evidence-based pharmacological and device therapies, its overall prognosis remains poor [21].

The present study showed that the mean age of patients was 55.76±10.51 in the control group, while the intervention group had a slightly lower mean age of 50.88±12.18. Regarding patients' gender, the control group had a slightly higher proportion of females than males. In contrast, the intervention group had a significantly higher proportion of males compared to females. These factors are often associated with cardiovascular health risks.

This finding was supported in Egypt by Hussein et al. [22], who found that the highest percentage of both groups of patients with AHF whose ages ranged between 40<60 years were male. This was inconsistent with Carmin et al. [23], who found that the majority of patients with AHF were women.

Regarding ABG, a statistically significant difference in SaO_2 levels was observed, indicating better oxygen saturation in the intervention group on days 3 and 5. This suggests the positive effect of deep breathing exercises and an ambulation program on AHF patients. Other ABG parameters (pH, PaO_2, $PaCO_2$, HCO_3) showed no significant differences between groups.

These findings were consistent with Radaelli et al. [24], who found that slowing respiratory rate reduces dyspnea and improves both resting pulmonary gas exchange and exercise performance in patients with AHF, and improves oxygen saturation. These findings were inconsistent with Kagami et al. [25], who found that during exercise, heart rate and systolic blood pressure were lower in the patients with AHF than those in controls, while the oxygen saturation was similar between the groups.

Table 1. Demographic data and ABG

Variables		Mean±SD/No. (%)		P
		Control Group (n=50)	Intervention Group (n=50)	
Demographic data	Age (y)	55.76±10.51	50.88±12.18	0.034*a
Gender	Male	23(46.0)	36(72.0)	0.008*b
	Female	27(54.0)	14(28.0)	-
ABG (PH)	On admission	7.42±0.09	7.37±0.13	0.056a
	3rd day	7.43±0.08	7.40±0.07	0.056a
	5th day	7.44±0.09	7.42±0.08	0.324a
	P^2	0.259	0.014*c	-
PaO_2a	On admission	83.62±34.97	77.52±24.99	0.318
	3rd day	82.90±26.38	85.32±25.79	0.644
	5th day	81.18±28.24	90.18±28.32	0.115
	P^2	0.236	0.007* c	-
$PaCO_2$	On admission	34.98±8.51	35.38±8.15	0.811a
	3rd day	35.72±8.76	36.82±8.24	0.519a
	5th day	36.00±9.03	35.94±7.62	0.971a
	P^2	0.147	0.320c	-
HCO_3	On admission	21.73±3.56	20.84±5.12	0.315a
	3rd day	22.93±5.52	21.31±5.35	0.139a
	5th day	23.76±5.09	22.10±5.54	0.121a
	P^2	0.269	0.352 c	-
SaO_2	On admission	93.58±4.97	91.84±8.62	0.219a
	3rd day	88.82±9.53	92.74±5.55	0.014*a
	5th day	91.12±7.98	93.78±4.29	0.041*a
	P^2	0.105	0.372c	-

JRH

Abbreviations: PaO_2: Partial pressure of oxygen; $PaCO_2$: Partial pressure of carbon dioxide; HCO_3: Bicarbonate; SaO_2: Arterial O_2 saturation; P_2: Statistical significance of changes over time within each group independently.

[a]Independent samples t-test, [b]chi-square test , [c]repeated measures ANOVA, [*]statistically significant difference (P<0.05)

The intervention group showed significant improvement in respiratory function, evidenced by reduced accessory muscle use on days 3 and 5, suggesting that deep breathing and active ROM enhanced recovery.

These results were consistent with Piotrowska et al. [26], who showed that significant statistical improvement was observed in the majority of the hemodynamic parameters, lung function parameters, and respiratory muscle strength in the exercise-based cardiac rehabili-

Table 2. Respiratory assessment (chest examination, chest sound assessment, and dyspnea scale)

Chest Examination		Mean±SD/No. (%)/Median (IQR)		P
		Control Group (n=50)	Intervention Group (n=50)	
Respiratory rate	On admission	25.12±6.26	25.46±6.61	0.323[a]
	3rd day	23.88±5.83	24.74±6.56	0.490[a]
	5th day	22.92±4.65	21.98±4.00	0.281[a]
Accessory muscle use	On admission	39(78.0)	39(78.0)	1.000[b]
	3rd day	18(36.0)	5(10.0)	0.002*[b]
	5th day	17(34.0)	5(10.0)	0.004*[b]
Chest sound assessment on admission	Normal chest sound	3(6.0)	1(2.0)	0.617[c]
	Wheezing	12(24.0)	13(26.0)	0.817[b]
	Bronchospasm	5(10.0)	6(12.0)	0.749[b]
	Crepitation	43(86.0)	41(82.0)	0.585[b]
3rd day	Normal chest sound	15(30.0)	25(50.0)	0.041*[b]
	Wheezing	6(12.0)	5(10.0)	0.749[b]
	Bronchospasm	3(6.0)	6(12.0)	0.487[c]
	Crepitation	30(60.0)	14(28.0)	0.001*[b]
5th day	Normal chest sound	23(46)	28(56.0)	0.317[b]
	Wheezing	6(12)	9(18.0)	0.401[b]
	Bronchospasm	2(4.0)	6(12.0)	0.269[c]
	Crepitation	24(48.0)	11(22.0)	0.008*[b]
Dyspnea scale	On admission	6.0 (4.0-9.0)	7.0 (6.0-10.0)	0.102[d]
	3rd day	3.0 (1.0-5.0)	3.0 (1.0-3.0)	0.609[d]
	5th day	2.0 (0.0-3.0)	0.0 (0.0-1.0)	0.009*[d]

IQR: Interquartilerange.

[a]Independent samples t-test, [b]chi-square test , [c]Fisher's exact test, [d]Mann-Whitney test.

tation and inspiratory muscle training in AHF patients. These results were inconsistent with Greene et al. [27], who reported that nurse-led protocols (e.g. early mobilization, self-care education) did not reduce readmission rates or mortality in AHF patients.

At admission, both groups had similar chest-sound distributions, mostly crepitation. By days 3 and 5, the intervention group showed significant improvement, with reduced crepitation and abnormal sounds, indicating the effectiveness of the nursing guideline. These results were consistent with Gunawan et al. [28], who found that nursing care for patients with AHF is well managed. Providing deep-breathing relaxation interventions is effective in reducing respiratory rate.

The intervention group had a lower median dyspnea score compared to the control group on the fourth and fifth days. This suggests that deep breathing exercise improved patient's dyspnea, which reduced the dyspnea score. This result is supported by Neşe and Bağlama [29], who found that deep breathing exercises were ef-

Table 3. Patients' outcomes

Patients' Outcomes		No. (%)		P
		Control Group (n=50)	Intervention Group (n=50)	
Mortality		13(26.0)	5(10.0)	
Number of patients discharged to home		24(48.0)	37(74.0)	0.023[*a]
Number of patients transferred to ward		13(26.0)	8(16.0)	
Complications	Chest infection	27(54.0)	16(32.0)	0.02[6*a]
	Arrhythmia	22(44.0)	14(28.0)	0.096[a]
	Digitalis toxicity	0	0	-
	Hypokalemia	4(8.0)	1(2.0)	0.362[b]
	Hyperkalemia	1(2.0)	3(6.0)	0.617[b]
	Hyponatremia	5(10.0)	4(8.0)	1.000[b]

Length of stay	Median (IQR)		P
Length of stay in CCU	5.0 (3.0-8.0)	5.0 (4.0-7.0)	0.546[c]
Length of stay in ED	0.0 (0.0-3.0)	0.0 (0.0-3.0)	0.856[c]
Length of hospital stay (days)	8.0 (6.0-10.0)	6.0 (5.0-9.0)	0.009[*c]

Multiple Logistic Regression Analysis for Mortality

Variables	Beta	S.E	P	OR	95% CI	
Age (y)	-0.009	0.023	0.694[d]	0.991	0.947	1.037
Gender (male)	0.521	0.604	0.389[d]	1.683	0.515	5.501
SaO_2	0.062	0.043	0.146[d]	1.064	0.979	1.157
Constant	-7.098	3.914	0.070[d]	0.001	-	-

JRH

Abbreviations: CCU: Coronary care unit; ED: Emergency department; IQR: Interquartile range; CI: Confidence interval; SE: Standard error; OR: Odds ratio; SaO_2: Arterial O_2 saturation.

[a]chi-square test, [b]Fisher Exact test, [c]Mann-Whitney test, [d]multiple logistic regression.

fective in decreasing their dyspnea and fatigue symptoms in patients. However, these results are not in line with those of Kittleson et al. [30], who found that AHF patients with structured deep breathing exercises did not improve dyspnea scores or oxygen saturation compared to standard care.

The intervention group showed improved respiratory status, including higher SaO_2, reduced accessory muscle use, and progressive chest sound clearance, lower rates of crepitation, and improved patient dyspnea. Based on these results, Hypothesis 1, "Patients in the intervention group will show a statistically significant improvement in respiratory status compared to the control group," was supported.

The current study revealed that the nursing guidelines for AHF had a positive effect on mortality rate, discharge to home and transfer to ward. These results are consistent with Son et al. [31], who found that nurse-led heart failure self-care education significantly reduced the risk of all-cause readmission and all-cause mortality.

The current study found that chest infection showed a statistically significant reduction in the intervention group. This suggests that applying nursing guidelines and closely monitoring to patients with AHF had a positive effect on patients' outcomes.

This result was consistent with the study by Geng et al. [32], who mentioned that various types of nursing guidelines can effectively influence the improvement of patients with AHF and decrease the complications rate. This was inconsistent with Abel et al. [33], who reported that reduced chest infection rates in intervention groups were more strongly associated with hospital-wide infection control protocols (e.g. hand hygiene, ventilator management) than nursing guidelines.

A statistically significant reduction in hospital stay was observed in the intervention group, suggesting that nursing guidelines positively impacted length of stay and mortality in patients with AHF. This finding was consistent with that of Beghini et al. [34], who reported that early interventions and optimized medication reduce hospitalizations. However, it was inconsistent with Peschanski et al. [35], who found no reduction in hospital stay among patients with AHF receiving early mobilization.

Statistically significant differences were found between groups in age, gender, and SaO_2; however, multiple logistic regression showed none were independently associated with mortality. Male gender and lower SaO_2 trended toward higher mortality, but without statistical significance. These findings were consistent with De Matteis et al. [36], who reported few independent predictors of in-hospital mortality. Conversely, Wu et al. [37] found a higher risk of all-cause death in male patients with AHF. As expected, a worse NYHA class was strongly associated with increased mortality, particularly with advancing age.

The nursing guidelines improved key outcomes in patients with AHF, including dyspnea, respiratory function, chest sound clearance, hospital stay, and mortality. Its application in ED and CCU settings may enhance respiratory status. Deep-breathing exercises were particularly practical. Close nursing monitoring and guideline adherence are essential to reduce complications, mortality, and hospitalization duration.

Conclusion

Nursing guidelines among patients with AHF have been successful in improving respiratory status and decreasing complications, length of stay, and mortality.

Recommendations

Apply AHF nursing guidelines in ED and CCU to improve respiratory status. Provide educational materials for nurses in both units. Replicate the study with larger, geographically diverse samples in Egypt.

Study limitations

A small, convenience-based sample with limited geographic diversity limited this study. Socio-economic status was not assessed, which may have influenced outcomes. Although the intervention was associated with improved respiratory outcomes and reduced mortality, further studies in diverse settings are required. Although baseline differences in age, gender, and SaO_2 existed, these variables were independently linked to mortality, suggesting the effect was likely due to the intervention rather than confounders.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Assuit University, Asyut, Egypt (Code: 1120220526). Written informed consent was obtained from patients who were willing to participate in the study, after explaining the nature and the purpose of the study. Patient privacy was considered during the data collection. Each patient had the right to refuse participation or withdraw from the study at any time without providing a reason.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

All authors contributed equally to the conception and design of the study, data collection and analysis, interpretation of the results, and drafting of the manuscript. Each author approved the final version of the manuscript for submission.

Conflict of interest

The authors declared no conflicts of interest.

Acknowledgments

The authors express their gratitude to all those who played a role in implementing this research and facilitating its progress.

References

[1] Bragazzi NL, Zhong W, Shu J, Abu Much A, Lotan D, Grupper A, et al. Burden of heart failure and underlying causes in 195 countries and territories from 1990 to 2017. European Journal of Preventive Cardiology. 2021; 28(15):1682-90. [DOI:10.1093/eurjpc/zwaa147] [PMID]

[2] Schwinger RH. Pathophysiology of heart failure. Cardiovascular Diagnosis and Therapy. 2021; 11(1):263. [DOI:10.21037/cdt-20-302] [PMID]

[3] Herdiana Y, Ta'adi TA, Djamil M. The effectiveness of recitation Al-Qur'an intervention and deep breathing exercise on improving vital sign and anxiety level among congestive heart failure (CHF) patients. International Journal of Nursing and Health Services. 2021; 4(1):9-16. [DOI:10.35654/ijnhs.v4i1.369]

[4] Wang H, Chai K, Du M, Wang S, Cai JP, Li Y, et al. Prevalence and incidence of heart failure among urban patients in China: A national population-based analysis. Circulation: Heart Failure. 2021; 14(10):e008406. [DOI:10.1161/CIRCHEARTFAILURE.121.008406] [PMID]

[5] Purnamayanti NKD, Tondok SB, Susasnto WHA, Rohmani R. Impact of semi-Fowler's position in chronic heart failure (CHF) patients: Scoping review. Jurnal Penelitian Pendidikan IPA. 2023; 9(11):1229-36. [DOI:10.29303/jppipa.v9i11.5074]

[6] Abdel-Aleem A, Mohammed M, Abd El-all H, Abd El Ghaffar M. Effect of designed nursing guidelines on modifiable risk factors among patients with heart failure. Assiut Scientific Nursing Journal. 2021; 9(25.0):187-93. [DOI:10.21608/asnj.2021.79237.1189]

[7] McDonagh T, Metra M. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Russian Journal of Cardiology. 2023; 28(1):5168. [DOI:10.15829/1560-4071-2023-5168]

[8] Ribeiro R, Oliveira H, Goes M, Gonçalves C, Dias A, Fonseca C. The effectiveness of nursing Rehabilitation interventions on Self-Care for older adults with respiratory disorders: a systematic review with Meta-analysis. International Journal of Environmental Research and Public Health. 2023; 20(14):6422. [DOI:10.3390/ijerph20146422] [PMID]

[9] Jia Y, Li N, Zhang X, Lu Z, You X, Xu Q. Study on the clinical efficacy, safety and compliance of quality nursing intervention in the treatment of chronic heart failure combined with respiratory tract infections. Pakistan Journal of Medical Sciences. 2024; 40(7):1533. [DOI:10.12669/pjms.40.7.7873] [PMID]

[10] Mohamed MG, Alaa EL-Deen SM, Ali GA, Ibrahim MH. The impact of clinical pathway for congestive heart failure patients on their length of hospital stay and Limb Edema. Zagazig Nursing Journal. 2017; 13(1):213-26. [DOI:10.21608/znj.2017.38318]

[11] Sax DR, Mark DG, Rana JS, Reed ME, Lindenfeld J, Stevenson LW, et al. Current emergency department disposition of patients with acute heart failure: An opportunity for improvement. Journal of Cardiac Failure. 2022; 28(10):1545-59. [DOI:10.1016/j.cardfail.2022.05.006] [PMID]

[12] Zhang X, Zhao C, Zhang H, Liu W, Zhang J, Chen Z, et al. Dyspnea measurement in acute heart failure: A systematic review and evidence map of randomized controlled trials. Frontiers in Medicine. 2021; 8:728772. [DOI:10.3389/fmed.2021.728772] [PMID]

[13] Kidambi BR, Seth S. Checklists-the road to a safer healthcare in heart failure patients. Journal of the Practice of Cardiovascular Sciences. 2019; 5(1):2-11. [DOI:10.4103/jpcs.jpcs_23_19]

[14] Malik A, Brito D, Vaqar S, Chhabra L, Doerr C. Congestive heart failure (nursing). Treasure Island: StatPearls Publishing; 2023. [Link]

[15] Nirmalasari N, Mardiyono M, Dharmana E, Arifin T. Deep breathing exercise and active range of motion influence physiological response of congestive heart failure patients. Nirmalasari. 2020; 10(1): 57-65. [DOI:10.14710/nmjn.v10i1.25318]

[16] Patel L, Dhruve R, Keshvani N, Pandey A. Role of exercise therapy and cardiac rehabilitation in heart failure. Progress in Cardiovascular Diseases. 2024; 82:26-33. [DOI:10.1016/j.pcad.2024.01.002] [PMID]

[17] Vazquez-Guajardo M, Rivas D, Duque G. Exercise as a therapeutic tool in age-related frailty and cardiovascular disease: Challenges and strategies. Canadian Journal of Cardiology. 2024; 40(8):1458-67. [DOI:10.1016/j.cjca.2024.01.005] [PMID]

[18] Izawa H, Yoshida T, Ikegame T, Izawa KP, Ito Y, Okamura H, et al. Standard cardiac rehabilitation program for heart failure. Circulation Journal. 2019; 83(12):2394-8. [DOI:10.1253/circj.CJ-19-0670] [PMID]

[19] Makita S, Yasu T, Akashi YJ, Adachi H, Izawa H, Ishihara S, et al. JCS/JACR 2021 guideline on rehabilitation in patients with cardiovascular disease. Circulation Journal. 2022; 87(1):155-235. [DOI:10.1253/circj.CJ-22-0234] [PMID]

[20] Marinho RS, Jürgensen SP, Arcuri JF, Goulart CdL, Santos Pd, Roscani MG, et al. Reliability and validity of six-minute step test in patients with heart failure. Brazilian Journal of Medical and Biological Research. 2021; 54(10):e10514. [DOI:10.1590/1414-431x2020e10514] [PMID]

[21] AbdElaal EM, Abdelall HA, Abd-Elhafez MN, Abd-Elmohsen SA, Abozeid HA, Sobhy Mahmoud KM. Effect of applying designed nursing guidelines on health outcomes among patients with heart failure class III. Assiut Scientific Nursing Journal. 2022; 10(30):273-86. [DOI:10.21608/asnj.2022.147959.1403]

[22] Hussein AH, Aly Tohamy AM, Gamal Hashim NM, Mohamed NA, Abo El Ella Mohammed MM. [Effect of telenursing instructions and follow up on self care and health status of patients with heart failure (Persian)]. Assiut Scientific Nursing Journal. 2024; 12(41):273-80. [DOI:10.21608/asnj.2024.238501.1679]

[23] Carmin CN, Ownby RL, Fontanella C, Steelesmith D, Binkley PF. Impact of mental health treatment on outcomes in patients with heart failure and ischemic heart disease. Journal of the American Heart Association. 2024; 13(7):e031117. [DOI:10.1161/JAHA.123.031117] [PMID]

[24] Radaelli A, Mancia G, Balestri G, Bonfanti D, Castiglioni P. Respiratory patterns and baroreflex function in heart failure. Scientific Reports. 2023; 13(1):2220. [DOI:10.1038/s41598-023-29271-y] [PMID]

[25] Kagami K, Harada T, Yuasa N, Saito Y, Sorimachi H, Murakami F, et al. Impaired left atrial reserve function in heart failure with preserved ejection fraction. Circulation: Cardiovascular Imaging. 2024; 17(8):e016549. [DOI:10.1161/CIRCIMAGING.124.016549] [PMID]

[26] Piotrowska M, Okrzymowska P, Kucharski W, Rożek-Piechura K. Application of inspiratory muscle training to improve physical tolerance in older patients with ischemic heart failure. International Journal of Environmental Research and Public Health. 2021; 18(23):12441. [DOI:10.3390/ijerph182312441] [PMID]

[27] Greene SJ, Bauersachs J, Brugts JJ, Ezekowitz JA, Lam CS, Lund LH, et al. Worsening heart failure: Nomenclature, epidemiology, and future directions: JACC review topic of the week. Journal of the American College of Cardiology. 2023; 81(4):413-24. [DOI:10.1016/j.jacc.2022.11.023] [PMID]

[28] Gunawan A, Hidayat N, Rahmah SS. Implementation of deep breath relaxation techniques as an effort to overcome shortness of breath in congestive heart failure patients. Jurnal Vnus. 2023; 5(2):74-82. [DOI:10.52221/jvnus.v5i2.338]

[29] Neşe A, Bağlama SS. The effect of progressive muscle relaxation and deep breathing exercises on dyspnea and fatigue symptoms of COPD patients: A randomized controlled study. Holistic Nursing Practice. 2022; 36(4):E18-26. [DOI:10.1097/HNP.0000000000000531] [PMID]

[30] Kittleson MM, Panjrath GS, Amancherla K, Davis LL, Deswal A, Dixon DL, et al. 2023 ACC expert consensus decision pathway on management of heart failure with preserved ejection fraction: A report of the American College of Cardiology Solution Set Oversight Committee. Journal of the American College of Cardiology. 2023; 81(18):1835-78. [DOI:10.1016/j.jacc.2023.03.393] [PMID]

[31] Son YJ, Choi J, Lee HJ. Effectiveness of nurse-led heart failure self-care education on health outcomes of heart failure patients: A systematic review and meta-analysis. International Journal of environmental research and public health. 2020; 17(18):6559. [DOI:10.3390/ijerph17186559] [PMID]

[32] Geng W, Jia H, Zeng X, Li J. Effects of Nursing Interventions on Improving Patients With Heart Failure: A systematic review and meta-analysis. Research and Theory for Nursing Practice. 2025; RTNP-2024-0093.R1. [DOI:10.1891/RTNP-2024-0093] [PMID]

[33] Abel AA, Samuel NA, Cuthbert JJ, Brown OI, Pellicori P, Kazmi S, et al. Hospital admissions in the last year of life of patients with heart failure. European Heart Journal-Quality of Care and Clinical Outcomes. 2024; 10(2):168-75. [DOI:10.1093/ehjqcco/qcad047] [PMID]

[34] Beghini A, Sammartino AM, Papp Z, von Haehling S, Biegus J, Ponikowski P, et al. 2024 update in heart failure. ESc Heart Failure. 2025; 12(1):8-42. [DOI:10.1002/ehf2.14857] [PMID]

[35] Peschanski N, Zores F, Boddaert J, Douay B, Delmas C, Broussier A, et al. 2023 SFMU/GICC-SFC/SFGG expert recommendations for the emergency management of older patients with acute heart failure. Part 2: Therapeutics, pathway of care and ethics. Archives of Cardiovascular Diseases. 2025; 118(1):6-16. [DOI:10.1016/j.acvd.2024.09.004] [PMID]

[36] De Matteis G, Covino M, Burzo ML, Della Polla DA, Franceschi F, Mebazaa A, et al. Clinical characteristics and predictors of in-hospital mortality among older patients with acute heart failure. Journal of Clinical Medicine. 2022; 11(2):439. [DOI:10.3390/jcm11020439] [PMID]

[37] Wu X, Chen M, Wang K, Gao R, Li X. Gender differences in prognostic markers of all-cause death in patients with acute heart failure: A prospective 18-month follow-up study. Journal of Cardiovascular Translational Research. 2020;13(1):97-109. [DOI:10.1007/s12265-019-09893-2] [PMID]

This Page Intentionally Left Blank