IMPLEMENTATION OF THE SEMI-FOWLER POSITION IN CHF PATIENTS WITH GAS EXCHANGE DISORDERS IN THE CVCU ROOM AT ARIFIN ACHMAD REGIONAL GENERAL HOSPITAL, RIAU PROVINCE

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Abstract

Congestive Heart Failure (CHF) is a chronic syndrome in which the heart is unable to meet tissue oxygenation needs, resulting in pulmonary congestion, alveolar edema, and impaired gas exchange. A preliminary study at the CVCU of Arifin Achmad Hospital showed that the average oxygen saturation in CHF patients was only <94% despite supplemental oxygen use, with a respiratory rate >20 breaths/minute and a tendency to return to the supine position during sleep. Based on scientific evidence, the Semi-Fowler position (30–45°) has been shown to increase ventilation, reduce diaphragmatic pressure, and improve oxygen saturation. This case study aims to evaluate the effectiveness of the Semi-Fowler position on improving oxygenation in CHF patients with impaired gas exchange. The method used was the implementation of evidence-based practice in one CHF patient who met the inclusion criteria. The intervention was conducted over three consecutive days (June 6–9, 2025), with observation durations of 30–45 minutes per session. Data were collected through observation of vital signs, the Borg scale, and oxygen saturation values before and after the intervention. The results showed consistent improvement. On the first day, the respiratory rate decreased from 28 breaths/minute to 25 breaths/minute, and the SpO_2 increased from 92% to 95%. On the second day, the respiratory rate decreased from 24 breaths/minute to 22 breaths/minute, and the SpO_2 increased to 97%. On the third day, the respiratory rate decreased from 21 breaths/minute to 20 breaths/minute, and the SpO_2 stabilized at 98%. The Borg scale also decreased from "very severe" (7) to "mild" (2). In conclusion, the Semi-Fowler position effectively improves gas exchange, reduces dyspnea, and improves respiratory comfort in patients with CHF. This simple intervention is recommended as an applicable, evidence-based, non-pharmacological nursing practice.

Keyword: Congestive Heart Failure; Semi-Fowler Position; Gas Exchange Impairment

INTRODUCTION

Congestive Heart Failure (CHF) is a chronic clinical syndrome where the heart is unable to pump blood adequately to meet the body's needs, leading to fluid accumulation (pulmonary congestion) that impairs oxygen diffusion [2]. This results in hypoxemia, making impaired gas exchange a highly relevant nursing diagnosis [2]. Physiologically, CHF, particularly left ventricular failure, causes alveolar edema, which worsens the ventilation-perfusion (V/Q) ratio, decreases gas exchange, and triggers dyspnea and increased respiratory rate [7].

A preliminary study conducted in the Cardiac and Vascular Care Unit (CVCU) of Arifin Achmad Regional General Hospital, Riau Province, involving five cardiac patients, revealed an average oxygen saturation of only 89% [8, 9]. This was observed despite the use of a Non-Rebreathing Mask (NRM) or nasal cannula, with the respiratory rate recorded at more than 20x times/minute, indicating persistent oxygenation impairment [8, 9]. Furthermore, the

consistency of applying the Semi-Fowler position was compromised because patients tended to return to the supine position while sleeping [8, 9].

The Semi-Fowler position works physiologically by using gravity to lower the diaphragm, reducing intra-abdominal pressure and optimizing lung expansion and ventilation [1, 3]. This mechanism effectively improves oxygen saturation [1, 3]. Quasi-experimental research in Indonesia has shown that the Semi-Fowler position significantly increases oxygen saturation in CHF patients, with the average saturation rising from 90.5% to 94.25% at a 45^0 angle [9]. Another study reported a significant saturation increase ($p = 0.0004$) and improvements in sleep quality and respiratory comfort after Semi-Fowler was implemented [4]. A national systematic review also concluded that most experimental studies recommend the Semi-Fowler position as the appropriate intervention for CHF patients [5].

Based on this clinical and scientific evidence, coupled with the empirical finding of low saturation despite respiratory support and the obstructive practice of supine sleeping, the study titled "Application of the Semi-Fowler Position in CHF Patients with Impaired Gas Exchange in the CVCU Ward of Arifin Achmad Regional General Hospital, Riau Province" is highly relevant [8, 9]. This topic aims to bridge the gap between evidence-based practice (EBP) and clinical reality, demonstrating that simple, non-pharmacological nursing interventions like consistent body positioning can improve oxygenation, reduce shortness of breath, and enhance patient comfort [8, 9].

RESEARCH METHODS

The study was conducted using an evidence-based practice approach, specifically through the implementation and observation of the Semi-Fowler position in a patient diagnosed with Congestive Heart Failure (CHF) experiencing impaired gas exchange [8, 9].

Intervention and Rationale

The intervention involved positioning the patient in the Semi-Fowler position, which entails elevating the head of the bed to an angle of 30∘–45∘ [8, 9]. This choice is supported by evidence that the Semi-Fowler position enhances lung expansion, decreases intra-abdominal pressure, and improves pulmonary ventilation and perfusion, thereby optimizing gas exchange [8, 9].

Setting, Time, and Sample. The intervention was carried out from June 6–9, 2025, in the Cardiac and Vascular Care Unit (CVCU) of Arifin Achmad Regional General Hospital, Riau Province [8, 9]. The intervention was performed once daily, with an observation duration of approximately 30–45 minutes [8, 9]. The sample size was 1 patient, selected based on the inclusion criteria [8, 9]

Inclusion Criteria:

1. Patient with a medical diagnosis of CHF [8, 9].
2. Patient experiencing impaired gas exchange (SpO2 < 94%, respiratory rate > 24x/minute, nasal flaring, or abnormal blood gas analysis results) [8, 9].
3. Patient's level of consciousness is *compos mentis* - mild *somnolence* (GCS 13) [8, 9].
4. Patient or family consents to be a respondent [8, 9].

Exclusion Criteria:

1. Patient with unstable hemodynamic status [8, 9].
2. Patient with contraindications to position change (e.g., spinal injury or specific post-operative conditions) [8, 9].
3. Patient using full mechanical ventilation [8, 9].
4. Patient with severe altered consciousness (GCS < 13) [8, 9].

Data Collection and Success Indicators

Data were collected through direct observation and recording of values before and after the intervention using the following tools:

a. Pulse oximeter → to measure SpO2 [8, 9].

b. Dyspnea observation sheet using the Borg scale [8, 9].

c. Success indicators based on the Indonesian Nursing Outcomes Standard (SLKI) for Gas Exchange [8, 9].

No.	Success Indicator	Expectation	1 (Increased/ Worsened)	2 (Mildly Increased/ Worsened)	3 (Moderate)	4 (Mildly Decreased/ Improved)
Expectation: Decreased						
1.	Dyspnea	Decreased	1	2	3	4
2.	Adventitious Breath Sounds	Decreased	1	2	3	4
3.	Tachycardia	Decreased	1	2	3	4
Expectation: Improved						
1.	PCO_2	Improved	1	2	3	4
2.	PO_2	Improved	1	2	3	4
3.	pH	Improved	1	2	3	4

Data Analysis Technique The analysis employed a descriptive observational technique [8, 9]. Pre- and post-intervention data were compared daily to observe improvements in comfort and respiratory function [8, 9].

RESEARCH RESULTS

The intervention was carried out over three consecutive days (June 6–9, 2025) on the single subject meeting the inclusion criteria (Patient with CHF and Impaired Gas Exchange) in the CVCU ward. Data were collected via pulse oximeter for SpO2, direct observation for respiratory rate (RR), and the Borg scale for dyspnea severity, before and after the application of the Semi-Fowler position (30^0–45^0).

A consistent improvement in oxygenation and respiratory function was observed throughout the intervention period, as summarized in the table below:

Day	Parameter	Pre-Intervention	Post-Intervention	Change	SLKI Target Achieved
Day 1	Respiratory Rate (breaths/min)	28	25	Decreased (-3)	Simply Descend (4)
(June 6)	SpO2	92	95	Increased (+3)	Improved (5)

	Borg Scale (Dyspnea)	7 (Very Severe)	5 (Severe)	Decreased (-2)	Decreased (5)
Day 2	Respiratory Rate (breaths/min)	24	22	Decreased (-2)	Decreased (5)
(June 7)	SpO2	94	97	Increased (+3)	Improved (5)
	Borg Scale (Dyspnea)	5 (Severe)	3 (Moderate)	Decreased (-2)	Decreased (5)
Day 3	Respiratory Rate (breaths/min)	21	20	Decreased (-1)	Decreased (5)
(June 8)	SpO2	97	98	Increased (+1)	Improved (5)
	Borg Scale (Dyspnea)	3 (Moderate)	2 (Mild)	Decreased (-1)	Decreased (5)

On the first day, the patient's oxygen saturation increased from 92% to 95%, successfully achieving the threshold of improvement [8, 9]. By the third day, the SpO2 level stabilized at 98% post-intervention, indicating optimal oxygenation [8, 9]. Concurrently, the respiratory rate showed a positive downward trend, dropping from an initial 28x breaths/minute to 20x breaths/minute by the end of the observation period [8, 9]. Furthermore, the patient's subjective experience of shortness of breath, measured by the Borg scale, improved significantly, moving from "very severe" (7) on Day 1 to "mild" (2) on Day 3 [8, 9]. These results consistently demonstrate a beneficial effect of the Semi-Fowler position on the patient's respiratory status [8, 9].

DISCUSSION

The findings of this case study strongly support the use of the Semi-Fowler's position as an effective non-pharmacological intervention for CHF patients suffering from impaired gas exchange [1, 5, 12]. The significant rise in SpO2, alongside a decrease in respiratory rate and dyspnea severity, aligns perfectly with the physiological rationale behind this positioning technique [3]. Pathophysiologically, left ventricular failure triggers pulmonary congestion and alveolar edema, which disrupts the ventilation-perfusion (V/Q) ratio and leads to hypoxemia [6, 2, 15].

When a patient is in the supine position, the abdominal organs exert upward pressure on the diaphragm, restricting its downward movement and impeding full lung expansion, thereby exacerbating the V/Q mismatch [3, 8]. The application of the 30^0 – 45^0 Semi-Fowler's position counteracts this mechanism [1, 9]. By utilizing gravity, this position shifts the abdominal mass away from the diaphragm, allowing for greater mobility and optimizing the vertical distribution of ventilation and perfusion throughout the lungs [3, 13]. This mechanical advantage enhances lung expansion, directly contributing to the significant increase in SpO2 observed, reaching 98% by Day 3 [8, 9, 10].

The progressive decline in the Borg scale score from 7 to 2 is clinically significant [8, 9]. This reduction in perceived exertion and shortness of breath confirms the objective improvements in gas exchange and respiratory mechanics [4, 12]. These observations are consistent with prior research conducted in Sumedang, which reported a significant SpO2 increase from 90.50% to 94.25% using the 45^0 position [7].

The consistent requirement for nurses to reposition the patient to the Semi-Fowler's position over the three-day period highlights a key clinical challenge: patient non-adherence during sleep [8, 9]. This underscores the critical importance of continuous monitoring and maintenance of this optimal position within the CVCU setting to sustain respiratory benefits [15]. This evidence-based practice effectively bridged the gap between scientific knowledge and clinical application, providing clear proof of benefit for this specific patient in accordance with established nursing intervention standards [5, 11, 14].

CONCLUSION

The application of the Semi-Fowler position 30^0–45^0 in the CHF patient with impaired gas exchange in the CVCU of Arifin Achmad Regional General Hospital was highly effective [8, 9]. The intervention consistently led to significant improvements, specifically raising the SpO2 level from 92% to 98%, reducing the respiratory rate from 28 to 20x breaths/minute, and alleviating the patient's subjective dyspnea from "very severe" (7) to "mild" (2) on the Borg scale [8, 9]. This simple, non-pharmacological positional change successfully improved gas exchange and respiratory comfort [3]. Therefore, the Semi-Fowler position is strongly recommended as a foundational and mandatory evidence-based nursing practice that must be consistently enforced and maintained in the care plan for all CHF patients experiencing pulmonary congestion

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