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Nursing Care for Pleural Effusion Patients Through Semifowler Position on Hemodynamic Status: A Case Report

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Abstract:
Pleural effusion is the accumulation of fluid in the pleural cavity or membrane that separates the inner chest wall from the lungs. Pleural effusion can affect hemodynamics because increased intrapleural pressure can push organs in the mediastinum. Providing a semi-fowler position is a nursing intervention expected to improve hemodynamic status in patients with pleural effusion. This study aims to determine the implementation of nursing care for patients with pleural effusion by applying the semi-fowler position to hemodynamic status in the Catleya Room, dr. Soebandi Hospital, Jember. The research method used in this study is a case study. The respondents and place in this study were Mr. T., who had pleural effusion in the Catleya Room of dr. Soebandi Hospital Jember. Semifowler position intervention was given for 3 days for 2 hours. The results of this study indicate that on the first day, there was a decrease in blood pressure, MAP, and respiratory rate. At the same time, the pulse rate and oxygen saturation increased. On the second and third days, after applying for the semi-fowler position, the results showed a decrease in respiratory rate and an increase in pulse rate and oxygen saturation. In contrast, there were no hemodynamic changes in blood pressure and MAP. This study concludes that implementing the semi-Fowler position affects hemodynamic status, especially in reducing the respiratory rate and increasing pulse rate and oxygen saturation.

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INTRODUCTION

Pleural effusion is the accumulation of fluid in the pleural cavity or membrane that separates the inner chest wall from the lungs (Ferreiro et al., 2024). Excess fluid in the pleural cavity will cause pressing pressure on the lungs. If this condition continues, the lungs will collapse (Patel et al., 2021). In addition, pleural effusion can affect hemodynamics; this is because increased intrapleural pressure can push organs in the mediastinum it has an impact on respiratory insufficiency, heart disorders, and increased pulmonary vascular resistance to lung collapse (Bediwy et al., 2023). The increase in pleural pressure also causes lung expansion to decrease so that sufferers will breathe rapidly or tachypnea (Zunzunwala & Vardhan, 2023). Therefore, further treatment is needed to remove fluid in the pleural cavity so that the affected side of the lung can expand correctly. The heart and mediastinum are not pressed towards the healthy lung, and shortness of breath is reduced (Hassan et al., 2021).

Medical treatment for patients with pleural effusion includes WSD (Water Seal Drainage), thoracentesis, pleurodesis, administration of antibiotics, chest tube insertion, and surgery to remove fluid (Wahyudi & Saputra, 2025). In addition to medical treatment, patients also need comprehensive

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care. The role of nurses here is important in providing comprehensive nursing care to patients with pleural effusion (promotive, preventive, curative, and rehabilitative) as prevention against worse complications such as pneumothorax, empyema, and death (Sorino et al., 2022). Independent actions that nurses can carry out independently include practical coughing exercises, administration of additional oxygen, and semi-Fowler or Fowler positions (Lail et al., 2024).

Positioning is one of the nursing interventions that can be given to patients with pleural effusion (Rahmawati et al., 2021). One position that can help with respiratory and cardiovascular difficulties is the semi-Fowler position (Saraswati et al., 2024). Providing a semi-Fowler position is a half-sitting position where the head is raised so that the patient is comfortable, increases oxygen in the lungs, and reduces breathing difficulties (Sari et al., 2023). The semi-Fowler position also has an impact on hemodynamics because this position will affect the expansion of the lung cavity and cardiac output (Purnamayanti et al., 2023). Expanding the lung cavity will improve oxygen so respiration can return to normal (Wirawan et al., 2022). The semi-Fowler position will also reduce the burden on the heart, thereby reducing venous return to the heart or preload, pulmonary congestion, and minimal pressure on the diaphragm to the liver, thereby causing a decrease in blood pressure and heart rate (Ismail et al., 2021).

Hemodynamic monitoring plays a critical role in managing patients with pleural effusion, enabling clinicians to assess cardiovascular status, evaluate the effectiveness of interventions, and guide therapeutic decisions (Hu et al., 2021). Continuously tracking parameters such as blood pressure, cardiac output, and central venous pressure helps ensure adequate tissue perfusion, vital for maintaining cellular metabolism and organ function (Valeanu et al., 2021). Impaired perfusion, often exacerbated by the mechanical effects of pleural effusion on lung expansion and cardiac filling, can disrupt the balance between oxygen supply and demand (Bojan & Pouard, 2023). Without timely intervention, sustained hemodynamic instability may progress to systemic hypoperfusion, leading to metabolic acidosis, electrolyte imbalances, and, ultimately, multiple organ failure (Siopi et al., 2024). Thus, hemodynamic monitoring serves as a cornerstone for the early detection of deterioration, allowing for prompt adjustments in fluid therapy, vasopressor support, or drainage procedures to stabilize the patient (Moschopoulos et al., 2023).

In pleural effusion, hemodynamic disturbances often arise from compromised cardiac and respiratory mechanics, necessitating a tailored approach to monitoring (Simonte et al., 2023). Fluid accumulation in the pleural space can compress the lungs, reduce venous return, and impair proper ventricular function, creating a cascade of circulatory inefficiencies (Narayan et al., 2022). Hemodynamic monitoring helps clinicians optimize fluid balance, ensuring that interventions such as thoracentesis or diuretic administration do not inadvertently worsen cardiac output or tissue oxygenation (Pinsky et al., 2022). Additionally, tracking electrochemical balance—such as electrolyte levels and acid-base status—is essential, as derangements can exacerbate cellular dysfunction (Marchant et al., 2022). By integrating real-time preload, afterload, and contractility data, clinicians can preemptively address hemodynamic compromise, mitigating risks of acute kidney injury, respiratory failure, or circulatory shock (Lorente & Ignacio, 2023). This proactive strategy underscores the importance of hemodynamic monitoring in improving outcomes and preventing irreversible organ damage in patients with pleural effusion (Dmytriiev et al., 2022).

Based on research conducted by Ismail et al. (2021), after being given a semi-fowler position, there was an increase in hemodynamics in oxygen saturation and a significant decrease in hemodynamics in pulse rate, respiratory rate, systolic and diastolic blood pressure, and MAP after being given a semi-fowler position for four to five hours compared to before being given a semi-fowler position. After being given a therapeutic position with a semi-fowler position, there was also a change in hemodynamic status, especially in oxygen saturation (Taha et al., 2021).

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Based on the explanation above, the role of nurses is important in providing comprehensive nursing care to patients with pleural effusion as prevention of hemodynamic disorders, one of which is through independent actions such as applying the semi-fowler position. Therefore, researchers are interested in conducting a case study related to nursing care for patients with pleural effusion and the application of the semi-fowler position on hemodynamic status in the Catleya Room, RSD dr. Soebandi Jember.

METHOD

The research design employed in this study is a case study approach, focusing on a patient (Mr. T) with pleural effusion who was admitted to the Catleya Room of dr. Soebandi Hospital Jember. The case study methodology was chosen to provide an in-depth analysis of the patient's hemodynamic response to a specific intervention. Before participation, the researcher explained the study's objectives, benefits, and procedures to the patient, ensuring ethical rigor. Informed consent was obtained through a formal document, adhering to ethical guidelines. The intervention involved implementing a semi-Fowler position over three days (16, 17, and 19 November 2023), each session lasting two hours. This approach evaluated the positional effects on hemodynamic stability and respiratory function in pleural effusion management.

The intervention protocol began with the patient in a supine position for 30 minutes, followed by baseline hemodynamic monitoring, including measurements of blood pressure, pulse rate, mean arterial pressure (MAP), respiratory rate, and oxygen saturation. After this baseline assessment, the patient was repositioned to a semi-Fowler position (30–45 degrees), and nebulizer therapy was administered concurrently. Hemodynamic parameters were reassessed after two hours of maintaining the semi-Fowler position. This structured sequence allowed the researcher to compare physiological changes between the supine and semi-Fowler positions, isolating the intervention’s impact. The hospital's Standard Operating Procedure (SOP) guided the semi-Fowler positioning to ensure consistency and safety throughout the study.

Data collection utilized standardized tools, including a sphygmomanometer for blood pressure, pulse oximetry for oxygen saturation, and an analog watch for respiratory rate monitoring. A nursing care format and observation sheets were employed to systematically record hemodynamic data at each time point. These tools ensured accuracy and reliability in capturing trends in blood pressure, pulse, MAP, respiratory rate, and oxygen saturation. By documenting these parameters before and after the intervention, the study aimed to identify correlations between positional changes and improvements in cardiopulmonary function. All procedures were conducted under the supervision of healthcare professionals to minimize risks and ensure patient safety.

Ethical approval for this study was obtained from the Faculty of Nursing, Universitas Jember, ensuring compliance with national and institutional research ethics standards. The study emphasized patient autonomy, with Mr. T retaining the right to withdraw at any stage without compromising clinical care. This case study contributes to evidence-based practice in managing pleural effusion and highlights the importance of positional therapy in optimizing hemodynamic and respiratory outcomes. The findings inform future protocols for non-invasive interventions in critical care settings, balancing efficacy with patient comfort and safety.

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RESULT

Case Overview

The patient managed in this study was Mr. T, a 67-year-old male. The patient was diagnosed with bilateral pleural effusion, anterior mediastinal tumor, peptic ulcer, and hypokalemia. The family said they had complained of shortness of breath for 1 month. The patient also complained of vomiting since 4 months ago. Vomit was only water. The patient's child said that the patient's appetite had decreased. The patient experienced a drastic weight loss 1 month ago, from a previous weight of 60 kg to 40 kg. The patient's child said that the patient had not been strong enough to stand and walk since 1 week ago, accompanied by swollen hands and thin legs. Due to the increasingly severe shortness of breath since 3 days ago, the patient was finally taken to the Emergency Room of Dr. Soebandi Hospital on 15-11-2023 at 16.30 WIB. The results of the vital signs examination in the ER were blood pressure 169/101mmHg, pulse 100x/min, RR 28x/min, SpO2 96% using nasal cannula oxygen four lpm. The patient received 0.9% NaCl infusion therapy 500cc/8 hours, santagesic injection 1gr, and ranitidine injection 50 mg.

The patient was then transferred to the Catleya Bawah Room at 22.00 WIB. On 16-11-2023, the patient underwent an abdominal USG and Thorax CT Scan, which showed bilateral pleural effusion and DD lymphadenopathy lung mass. The researcher conducted an assessment on 16-11-2023/ 16.00 WIB and obtained blood pressure of 150/80mmHg, pulse 105x/min intense regular, spontaneous breathing, RR 26x/min, SpO2 94% with four lpm nasal cannula oxygen, and temperature 36.5oC. The patient was composmentis conscious (GCS E4V5M6). The patient still looked short of breath and had chest retraction. The patient did not vomit but still complained of nausea. The patient appeared weak and had rapid breathing. The patient's hands were swollen, and both legs were thin. The patient said that before, he could not walk; after doing activities, he felt short of breath and tired.

The researcher established five nursing diagnoses, all of which the researcher has provided nursing interventions according to SIKI (Indonesian Nursing Intervention Standards). One diagnosis given special intervention based on EBN (Evidence-Based Nursing) is an ineffective breathing pattern because, at the time of the assessment, the patient's main complaint was shortness of breath. In addition, the hemodynamic status is expected to be stable by providing a semi-fowler position. The researcher took nursing interventions according to EBN, previously reviewed in the literature, by providing a semi-fowler position. , the researcher conducted monitoring before and after being given a semi-fowler position To determine the effectiveness of providing a semi-fowler position on the patient's hemodynamic status.

Results of Implementing the Semi-Fowler Position

The results of the patient's response after applying the semi-fowler position showed that they felt more comfortable after being given it, and their shortness of breath decreased slightly. The patient was less comfortable when given the supine position before the semi-fowler position. The patient's hemodynamic status was stable on the first and second days of treatment. However, the patient's condition was less stable on the third and fourth days of treatment. This was indicated by an increase in hemodynamic status on the third day (18 November 2023) with blood pressure of 200/110 mmHg, MAP 140 mmHg, pulse rate 117x/min, and respiratory rate 30x/min, and a decrease in oxygen saturation of 91%. So, on the third day, measurements could not be taken after implementing the semi-fowler position. This is because the patient experienced tachycardia and contraindications to nebulizer therapy. Assessment of hemodynamic status before and after being

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given the semi-fowler position can only be done on 16, 17, and 19 November 2023 or for 3 days. The following are the results of implementing the semi-Fowler position on patient Mr. T for 3 days.

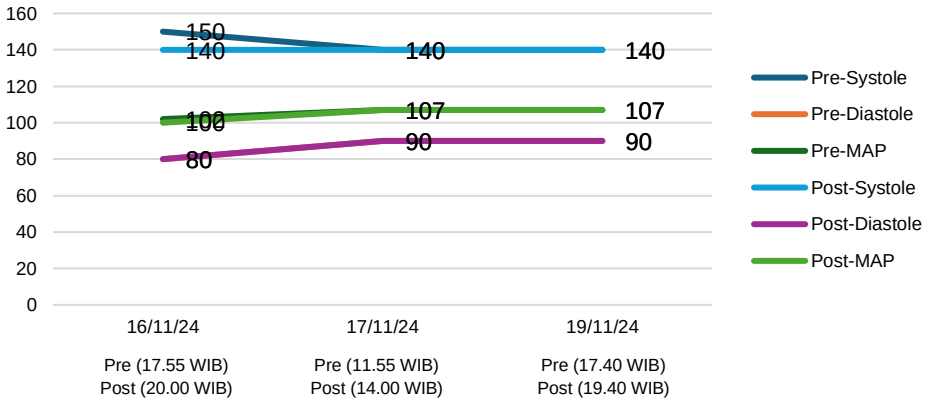

Figure 1. Pre and Post Results of Implementation of Semi-Fowler Position on Systolic, Diastolic, and MAP Blood Pressure

Based on Figure 1, on the first day, there was a decrease in hemodynamic status in systolic blood pressure from 150 mmHg to 140 mmHg after being given the implementation of the semi-Fowler position. However, on the second and third days, there was no difference in hemodynamic status between before and after being given the implementation of the semi-Fowler position. While in the hemodynamic status of diastolic blood pressure from the first day to the third day, there was no difference in hemodynamic status in diastolic blood pressure between before and after being given the implementation of the semi-Fowler position.

Based on diagram 4.1, on the first day, there was a decrease in hemodynamic status in MAP from 103 mmHg to 100 mmHg after the implementation of the semi-Fowler position. However, on the second and third days, there was no difference in hemodynamic status in MAP between before and after the implementation of the semi-Fowler position.

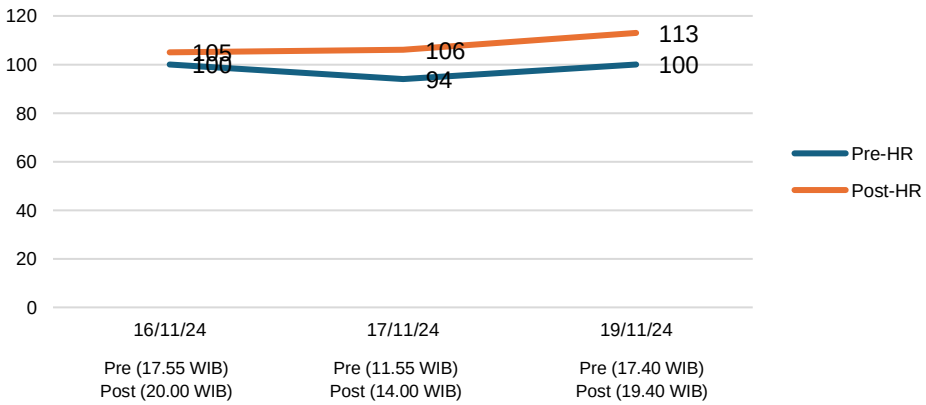

Figure 2. Pre and Post Results of Implementation of Semi-Fowler Position on Heart Rate

Based on Figure 2, from the first to the third day there was an increase in hemodynamic status in pulse rate. The pulse rate on the first, second, and third days before the implementation of the semi-Fowler position was 100x/min, 94x/min, and 100x/min. After the implementation of the semi-Fowler position, there was an increase in pulse rate on the first, second, and third days, namely

105x/min, 106x/min, and 113x/min. So, there is a difference in hemodynamic status in pulse rate between before and after the semi-Fowler position intervention was given.

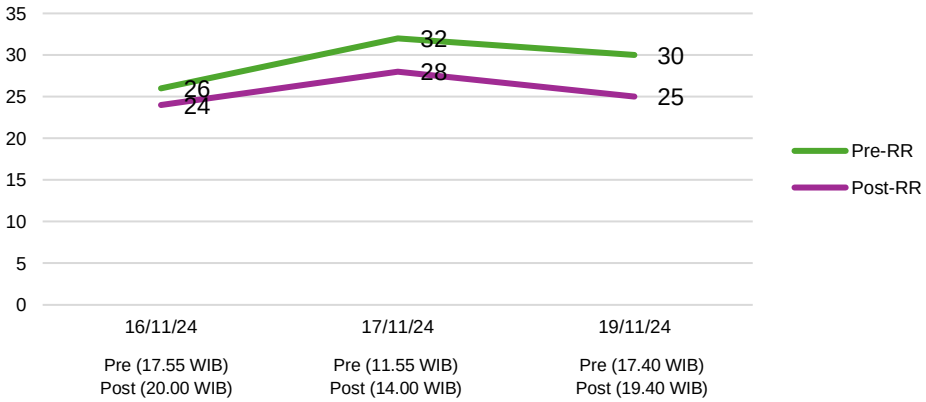

Figure 3. Pre and Post Results of Implementation of Semi-Fowler Position on Respiratory Rate

Based on Figure 3, from the first to the third day, there is a decrease in hemodynamic status in the breathing frequency. The frequency of breathing on the first, second, and third days before the implementation of the semi-fowler position was 26x / min, 32x / min, and 30x / min. After being given the implementation of the semi-fowler position, there was an increase in the frequency of breath on the first, second, and third days being 105x/min, 106x/min, and 113x/min. So, it can be concluded that there is a difference in hemodynamic status in the frequency of breathing before and after the implementation of the semi-fowler position.

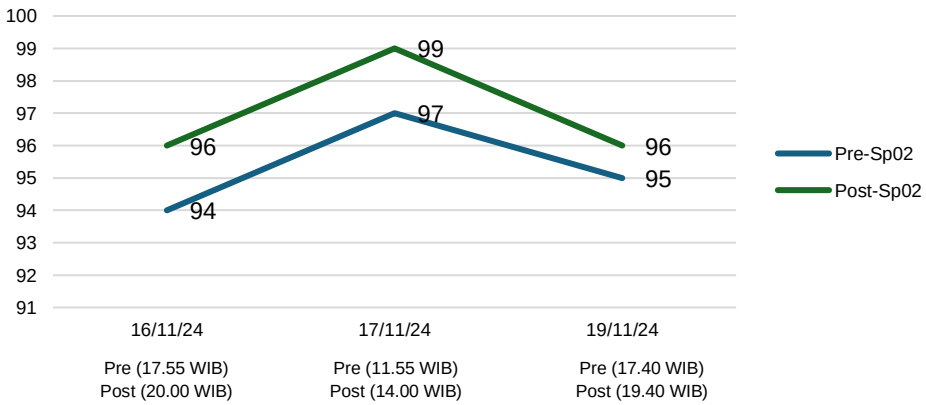

Figure 4. Pre and Post Results of Implementation of Semi-Fowler Position on Oxygen Saturation

Based on Figure 4, there was an increase in hemodynamic status in oxygen saturation from the first to the third day. Oxygen saturation on the first, second, and third days before the implementation of the semi-Fowler position was 94%, 97%, and 95%. After the implementation of the semi-Fowler position, there was an increase in oxygen saturation on the first, second, and third days, namely 95%, 99%, and 96%. So, there is a difference in hemodynamic status in oxygen saturation before and after implementing the semi-Fowler position.

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DISCUSSION

In this study, the semi-fowler position was given when the patient was given nebulizer therapy. The semi-fowler position is very effective for cardiopulmonary diseases. This position is done by lifting the head and body, which are raised to a 45-degree angle (Patel et al., 2021). Meanwhile, nebulizer therapy is the administration of drugs that are carried out by inhaling them into the respiratory tract. This is drug particle vapor therapy, which will be broken down into small vapor molecules before entering (Khairnar et al., 2021). The patient is positioned in a semi-Fowler position when administering nebulizer therapy because, in this position, there is the force of the earth's gravity, which can help expand the lungs so that the inhaled medication can enter the respiratory tract more optimally (Purba et al., 2024).

The study results showed that feeling more comfortable and shortness of breath slightly reduced after implementing the semi-fowler position. Patients were less comfortable when given a supine position before the semi-fowler position was given. This shows that the semi-fowler position can reduce shortness of breath and improve the comfort of patients with complaints of shortness of breath. The semi-fowler position can increase lung expansion and help develop the respiratory muscles optimally to reduce shortness of breath. In addition, increased oxygen in the lungs can help reduce difficulty breathing and reduce damaged alveolar membranes caused by fluid accumulation so that the patient's condition improves (Sari et al., 2023).

The study's results showed that on the third and fourth days of treatment, the patient experienced an increased hemodynamic status in blood pressure, MAP, pulse rate, respiratory rate, and a decrease in oxygen saturation. This is likely because the patient experienced superior vena cava syndrome, which is a clinical manifestation of mediastinal tumors caused by obstruction of blood flow in the superior vena cava (Dragomir et al., 2021). The signs in patient Mr. T are the same as those in superior cava syndrome, such as shortness of breath, swelling in the upper extremities, and decreased potassium. Superior vena cava pressure can cause hemodynamic disorders such as increased blood pressure and hypokalemia (Kapur et al., 2022).

The results of this study indicate that on the first day, there are hemodynamic changes in blood pressure and MAP where blood pressure and MAP decrease. This is because when the semi-fowler position causes cardiac output to decrease due to decreased venous return blood flow so that blood pressure decreases (Ismail et al., 2021). However, there were no hemodynamic changes on the second and third days. So, the semi-fowler position has no significant effect on the pre and post of the semi-fowler position. This is because unstable hemodynamic conditions can be influenced by several factors, such as cardiac dysfunction, changes in circulation volume, and changes in vascular tone (Yildiz et al., 2023).

The study's results showed hemodynamic changes in the pulse rate on the first, second, and third days, and the pulse rate increased after being given a semi-fowler position intervention. This is in contrast to the study conducted in patients with traumatic brain injury who, after being given a semi-fowler position, can significantly reduce heart rate, respiratory rate, systolic and diastolic blood pressure, and mean arterial blood pressure. This is because the possibility of tachycardia in patients with respiratory disorders can be influenced by hypoxia. In addition, tachycardia in patients can occur due to the influence of the S-enantiomer content in salbutamol, which impacts increasing intracellular calcium. Increased intracellular calcium can cause excessive contractions in blood vessels and cardiac smooth muscles, which can cause tachycardia (Stewart & Pianosi, 2020).

The study's results showed hemodynamic changes in respiratory frequency on the first, second, and third days, and the respiratory frequency decreased after being given a semi-fowler position intervention. This aligns with research by El Haque et al. (2021), which found that providing

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a semifowler position effectively reduces breathing frequency. Before the patient was positioned semi-fowler, the breathing frequency was 28x/min. After being given a semi-fowler position for 3 days, breathing frequency decreased to 22x/min. This shows that there is an effect of giving a semi fowler position on the frequency of breathing because in the semi-fowler position, using gravity, which can help expand the lungs and reduce visceral-visceral abdominal pressure on the diaphragm which causes the diaphragm to be lifted, maximize lung development, and will fulfill the tidal volume (Soemah et al., 2024). The increase in lung development will cause the air in the alveoli to absorb oxygen maximally and more optimally, and the respiration process will return to normal (Ardiyanto et al., 2024). It can be concluded that providing a semi-Fowler position affects respiratory rate.

The study results showed hemodynamic changes in oxygen saturation on the first, second, and third days, and oxygen saturation increased after being given a semi-fowler position intervention. This is because the semi-fowler position helps the airway to the lungs to be smooth, facilitating oxygen entry and increasing oxygenation during inspiration and inhalation. Increased oxygen in the body will increase oxygen in hemoglobin to increase oxygen saturation (Alan & Khorshid, 2020). Thus, it can be concluded that a semi-Fowler position affects oxygen saturation.

Based on the results of this study, it can be concluded that after the implementation of the semi-fowler position, there was an effect on the hemodynamic status of systolic blood pressure, MAP, pulse rate, respiratory rate, and oxygen saturation, especially hemodynamic changes in decreasing respiratory rate and increasing oxygen saturation from the first to the third day. After being given a therapeutic position with the semi-fowler position, there was also a change in hemodynamic status, especially in oxygen saturation (Ismail et al., 2021). From the results of this study, it can also be seen that the provision of this semi-fowler position is also influenced by the patient's clinical condition, such as in the case of Mr. T, who is likely to have superior vena cava syndrome, which is a clinical manifestation of a mediastinal tumor so that there is no effect on blood pressure and MAP after the implementation of the semi-fowler position on the second and third days.

CONCLUSION

Based on the application results for the semi-fowler position on Mr. T, pleural effusion in the Catleya Room of dr. Soebandi Hospital Jember, it can be concluded that the assessment was carried out on patient Mr. T, who had pleural effusion aged 67 years, with the main complaint being shortness of breath. The results of the data analysis showed that there were main nursing problems in the patient, namely ineffective breathing patterns. The intervention of applying the semi-fowler position was given for 3 days together with nebulizer therapy. The semi-fowler position was provided for 2 hours. Hemodynamic status measurements were carried out before and after the provision of the semi-fowler position. Based on the results of the implementation of the application of the semi-fowler position on Mr. T, it was found that on the first day, there was a decrease in blood pressure, MAP, and respiratory rate. At the same time, the pulse rate and oxygen saturation increased. On the second and third days of applying the semi-fowler position, the results showed a decrease in respiratory rate and an increase in pulse rate and oxygen saturation. In comparison, there were no hemodynamic changes in blood pressure and MAP. Therefore, applying the semi-fowler position to hemodynamic status is effective, especially in reducing breathing frequency and increasing oxygen saturation from the first to the third day. In addition, the patient's hemodynamic status after being given the semi-Fowler position is also influenced by the patient's clinical condition.

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