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Implementation of Passive Leg Movement on Blood Pressure in Post-Op Laparatomy Exploration Patient

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ABSTRACT

Background: Management of secretions is one of the main problems faced in the medical condition of respiratory disorders. The use of complementary therapy techniques to treat airway clearance such as the active cycle of breathing technique is still low when compared with other interventions in treating respiratory problems. **Aims:** The research aims to determine the effectiveness of providing active cycle of breathing technique therapy to overcome nursing problems ineffectiveness airway clearance in nursing care. **Method:** This type of research is a case study using nursing care methods. The research sample was patients treated in the Catleya room at Dr. Soebandi Jember Hospital. Patients are given nursing intervention in the form of therapy active cycle of breathing technique for 4 consecutive days 2 times a day for 15-20 minutes with 4 cycles. **Results:** providing active cycle of breathing technique therapy can reduce nursing problems ineffectiveness airway clearance. Providing active cycle of breathing technique therapy effectively shows improvements in conditions such as improved respiratory frequency, reduced shortness of breath, and decreased sputum production. **Conclusion:** providing active cycle of breathing technique therapy effectively solve nursing problems ineffectiveness airway clearance.

Keywords: Passive Leg Movement, Blood Pressure, Laparatomy Exploration

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1. INTRODUCTION

Gastric perforation is a condition characterized by damage to the gastric or stomach wall, which can then cause a connection between the gastric lumen and the peritoneal cavity. Gastric perforation with clinical signs in patients will appear to feel great pain because of a leak in the stomach wall, making stomach acid chemicals in the abdominal cavity come out and become peritonitis. Gastric perforation

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is an emergency complication with symptoms such as acute abdominal pain requiring immediate treatment (Andrian et al., 2022). Peritonitis is the leading cause of complications of sepsis in patients in the intensive care unit. Data from WHO shows that the peritonitis mortality rate reaches 5.9 million per year, with a mortality rate of 9,661 people, with the highest cases of peritonitis in the United States. Indonesia alone has around 179,000 sufferers, or about 9% of the population (Sayuti, 2020). Patients with peritonitis present with an acute onset of symptoms with a subsequent severity ranging from mild to severe with septic shock. Septic shock is the most frequent complication in a person with peritonitis with multiple organ failure or sometimes with death (Ajeng Ridwan et al., 2021; Najamuddin et al., 2020). The management of sepsis in patients with gastric perforation is exploratory laparotomy. Exploratory laparotomy with indications of peritonitis and sepsis will repair gastric perforation and decompression of the abdomen due to previous illness; this action will result in a stomach full of gastric masses, fluid, and blood, which indicates that the contents of the abdominal cavity have increased from average (Ridwan et al., 2021). One of the effects of exploratory laparotomy is the patient's hemodynamic instability (Fahlevie, 2017). Hemodynamic disturbances in patients can cause several impacts, such as hypovolemia, which can reduce extracurricular volume due to massive fluid shifts in the peritoneal cavity and then result in a decreased cardiac index, increased peripheral vascular resistance, and increased oxygen consumption in the periphery (Najamuddin et al., 2020). Septic shock is characterized by intractable hypotension and decreased tissue perfusion. Then, another sign is a respiratory or circulatory failure despite maximal fluid resuscitation or vasopressors to maintain blood pressure and organ perfusion.

The pharmacological management includes resuscitation to improve perfusion, infection, and the host's immune response modulation. Then, the management of sepsis according to surviving sepsis guidelines has essential components, namely initial resuscitation, vasopressors/inotropes, initial administration of antibiotics, control of sources of infection, diagnosis (culture and radiological examination), hemodynamic support, supportive management (ventilation, dialysis, transfusion), and infection prevention (Polat et al., 2017). In addition to this management, nurses can carry out non-pharmacological actions independently. One of them is the Passive

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Leg Movement (PLM). Passive Leg Movement (PLM) is a passive movement of the lower leg that increases blood circulation and tissue perfusion (D'Agata et al., 2023). PLM can increase cardiac output due to increased stroke volume, and vascular resistance can decrease due to mechanical compression (Trinity & Richardson, 2019). So, the condition of septic patients with hypotension is expected to provide stable blood pressure.

2. METHODS

Case studies use descriptive case studies. The population in this study were postoperative exploratory laparotomy patients in the Intensive Care Unit (ICU) of dr. Soebandi Hospital Jember. Respondents in this study were one respondent. This research was conducted in April 2023 for four days with one daily implementation and measurement by observation of blood pressure and using data collection tools in observation sheets and nursing care sheets. The inclusion criteria for this sample were postoperative exploratory laparotomy patients, decreased blood pressure (hypotension), and using a ventilator. Data collection procedures included nursing assessment, diagnosis, intervention, implementation (passive leg movement), and evaluation. The case study process is that the respondent experiences hemodynamic instability (blood pressure), the patient is in a semi-supination position (30°), and the blood pressure is measured during pre- and post-implementation of passive leg movement. The passive leg movement stages that are carried out are:

Table 1. Passive Leg Movement Steps (Rezaeikia et al., 2020). *(Continue to page 61)*

Steps	Intervention Description
1	Raise the right leg of the patient directly at 45° and keep it in this position for one minute and perform the same for the left leg.
2	Up and down right ankle at 20° to 50°, 30 times per minute for one minute and similar on the left ankle
3	The right ankle rotation movements 30 times per minute in clockwise direction for one minute and the same for the left ankle
4	The right ankle rotation movements 30 times per minute in counterclockwise direction for one minute and the same for the left ankle
5	Raise the patient's right leg directly at 45 ° and keep it in this position for one minute and perform the same on the left leg.

6	Bend and straight the right knee joint at a 90°, 30 times per minute for two minutes and perform the same on the left leg
7	Raise the right leg of the patient directly at 45 ° and keep it in this position for one minute and perform the same for the left leg.
8	Open and close the right hip at a 90°, 30 times per minute for two minutes and perform the same for the left hip joint
9	Raise the right foot of the patient directly at 45 °and keep it in this position for one minute and perform the same for the left leg.

3. RESULTS

The implementation of nursing is related to hypervolemia nursing problems characterized by hemodynamic instability in patients, namely by observing monitoring of vital signs and giving passive leg movement as one of the independent nursing interventions. The provision of PLM implementation is expected with the criteria that the results of vital signs (blood pressure) can be stable or increase and edema decreases. This implementation can stimulate blood vessels to become elastic and cause vasodilation in blood vessels, resulting in smooth blood flow to the heart and stable heart work so that the heart's ability to pump blood increases, increasing blood pressure (Khasanah & Yulistiani, 2020). On the first day of implementation, there was no change in blood pressure before and after PLM implementation. Then, on the second day, there is an increase in blood pressure in systole and diastolic pre-post PLM. On the third day, there was a decrease in systolic diastolic pre- and post-PLM implementation. Then, on the fourth day, there was an increase in systolic and diastolic blood pressure during pre- and post-PLM.

Table 2. Blood Pressure Pre- and Post-PLM Implementation

Blood Pressure – 4 days Implementation				
Day	Systolic		Dyastolic	
	Pre	Post	Pre	Post
Day – 1	125 mmHg	125 mmHg	65 mmHg	65 mmHg
Day – 2	100 mmHg	110 mmHg	58 mmHg	61 mmHg
Day – 3	91 mmHg	90 mmHg	58 mmHg	60 mmHg
Day – 4	96 mmHg	100 mmHg	72 mmHg	68 mmHg

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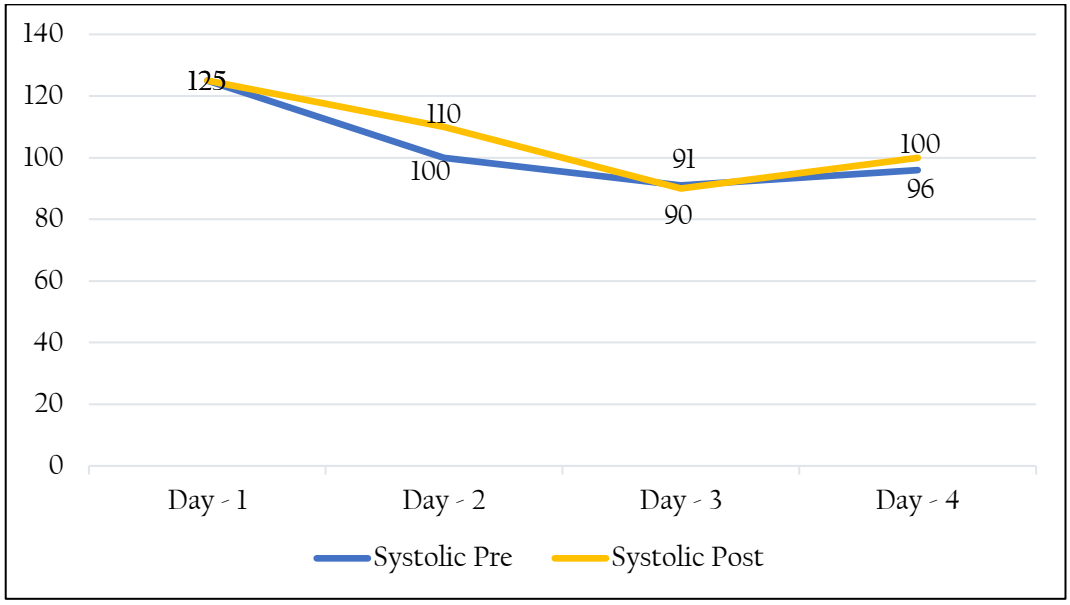

Figure 1. Systolic Blood Pressure Pre- and Post-PLM Implementation

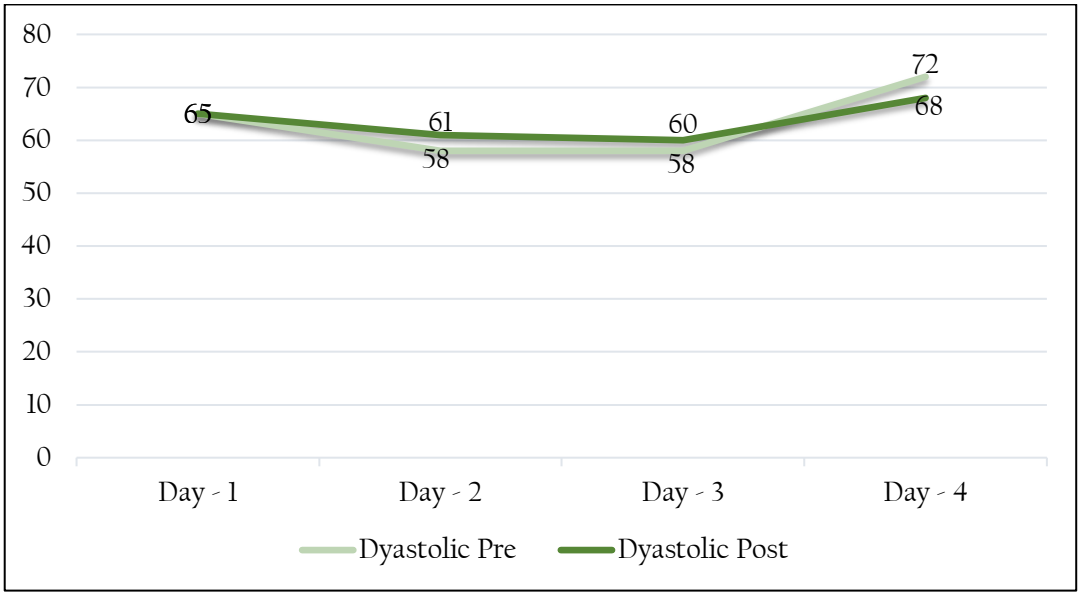

Figure 2. Dyastolic Blood Pressure Pre- and Post-PLM Implementation

The results of the implementation evaluation are documented by recording the blood pressure results before and after implementation. Blood pressure results on day 1 for pre and post were 125/65 mmHg – 125/65 mmHg, day 2 100/58 mmHg – 110/61 mmHg, day 3 91/58 mmHg – 90/60 mmHg, day 4 96/72 mmHg – 100/68 mmHg.

4. DISCUSSIONS

A critical patient was diagnosed with Post Operation Laparotomy Exploration Day 2 + Peritonitis Generalisata ec Gastric Perforation + Intestinal Adhesions + Septic Shock in the ICU room of Dr. Soebandi Jember. The management of exploratory laparotomy surgery is a procedure to

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overcome the problem of gastric perforation and septic shock in patients. At the time of assessment, the patient was unconscious and hemodynamically unstable. Patients with GCS 1X4, BIPAP ventilator installed, FiO_2: 40%, PINSP: 14, PEEP: 3, ASB: 12, patients with wound dressings in the middle of the abdomen, and drains on the right and left. In the patient's case, Mr. S, post laparotomy exploration, is still under sedation and requires mechanical ventilation. The patient is accompanied by septic shock; Mr. S with conditions with abnormalities in circulation and cellular or metabolic can be life-threatening, so ventilators help reduce the increased risk of hemodynamic disorders and conditions that get worse until death (Yang et al., 2021). Several factors support the patient's prognosis, such as early diagnosis, administration of appropriate drugs or antibiotics, supportive intensive care, and fast operative measures (Japanesa et al., 2016). Of all the diagnoses raised in this case, the author focuses on the hemodynamics of the patient's blood pressure. Passive Leg Movement (PLM) intervention can be a therapeutic independent measure in patients with associated cases. Passive Leg Movement (PLM) is a passive movement of the lower leg that increases blood circulation and tissue perfusion.

Researchers carried out passive leg movement (PLM) following standard operating procedures and recorded the results of observations. The results of TTV measurements before and after PLM implementation showed that the hemodynamic changes were not too significant. This could also be related to the use of drug therapy in patients at that time, which affected the patient's hemodynamic condition. However, changes in the patient's TTV results indicate that passive leg movement can reasonably impact the patient's hemodynamics. Research by Rezaeikia et al. (2020) shows that passive movement in the lower extremities does not impact patient hemodynamics, including systolic and diastolic blood pressure, average arterial pressure, pulse, and pulse of ventilators. This differs from research (Younis, G. A., & Safaa, 2015) after passive movement showed that systolic blood pressure significantly decreased. From this, passive movements can be carried out throughout the body, but this research focuses on passive movements in the lower extremities. The lack of a significant increase in systolic and diastolic blood pressure is also related to the absence of a difference in changes in pulse pressure due to passive leg movement. This is also caused by the pulse pressure decreasing diastolic systolic pressure.

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However, this study had a confounding factor, namely the influence of the pharmacological therapy used. During the patient's treatment period in the ICU until April 27, 2023, the patient received midazolam 2 mg/hour and 2.7 cc/hour dopamine, a class of sedative drugs that impact the patient's level of consciousness. In addition, the patient also received continuous therapy with norepinephrine 0.5 cc/hour, which also plays a role in helping to increase hemodynamics, namely the patient's blood pressure. The drug therapy was a confounding factor in this study, but in order to be able to focus on the intervention given, namely the pre and post-blood pressure of the patient at the time of the intervention. In patients with exploratory post-op laparotomy, the effect of albumin can increase the regeneration of stomach cells to help the digestive tract and intestine function return so that organ function can return to its maximum. Reducing albumin levels in the body results in a decrease in osmotic pressure, which can maintain blood volume and is related to the stability of the patient's blood pressure (Sugiartanti et al., 2018).

5. CONCLUSION

The intervention of Passive Leg Movement (PLM) in patients can stabilize blood pressure changes. However, from the results, the changes that occurred were insignificant. An increase in cardiac output during PLM can increase systolic pressure; the foot position steps that are carried out can induce blood flow from the lower body to the central circulation, especially to the heart's capacity. Hence, further research incorporating more samples can be done for comparison and increase the findings' generalizability.

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AUTHOR CONTRIBUTIONS

Substantial contributions to conception, data collection, and analysis: Synthia Dwi Setiyaningrum, Akhmad Zainur Ridla, Ana Nistiandani and Sugito Tri Gunarto. Writing manuscript and revisions: Synthia Dwi Setiyaningrum and Akhmad Zainur Ridla,.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

Several data are not publicly available due to privacy or ethical restrictions.

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