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Implementation Trendelenburg Position in Sepsis Shock Patients in the Intensive Care Unit: A Case Report

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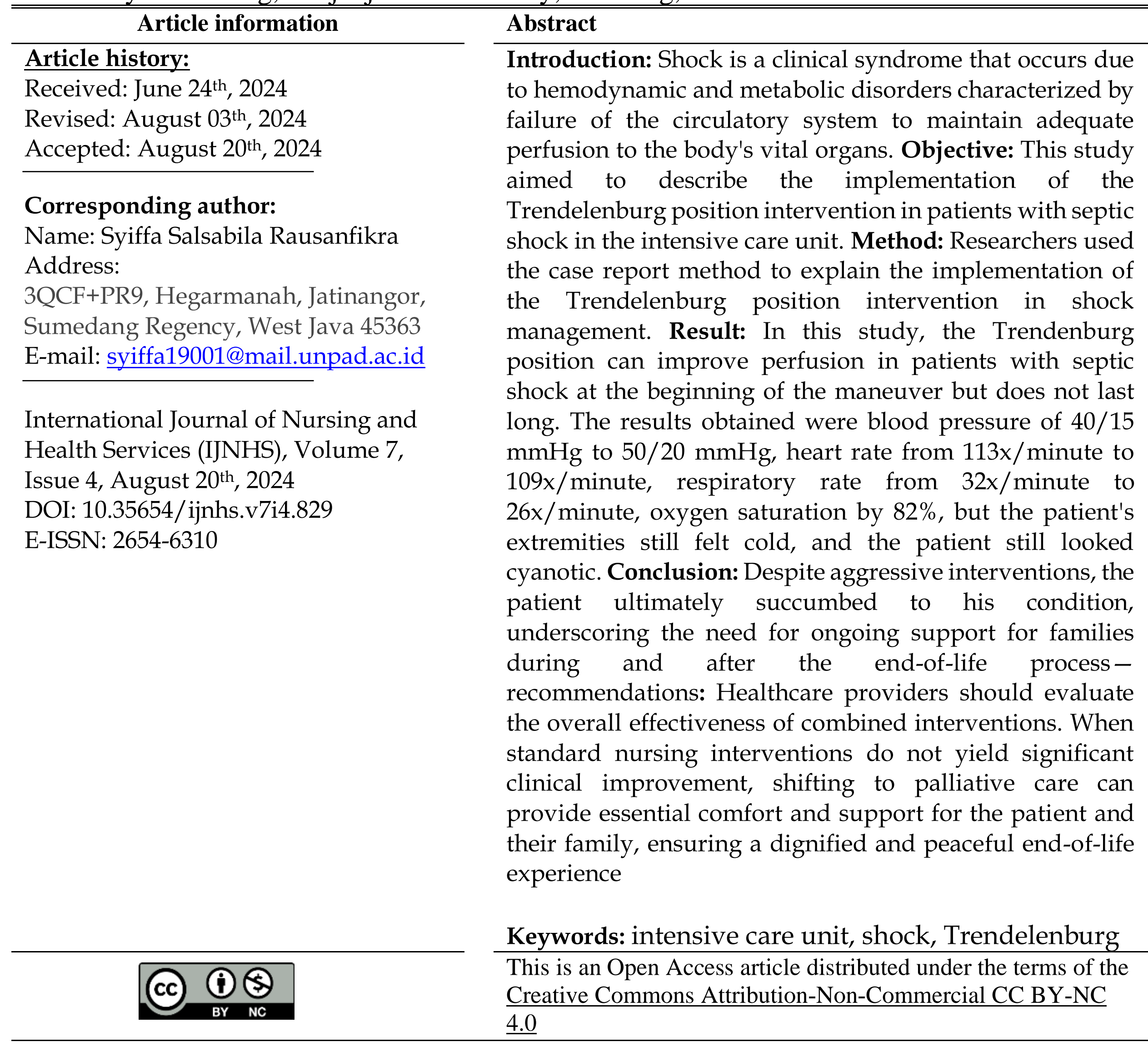

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Abstract

Introduction: Shock is a clinical syndrome that occurs due to hemodynamic and metabolic disorders characterized by failure of the circulatory system to maintain adequate perfusion to the body's vital organs. **Objective:** This study aimed to describe the implementation of the Trendelenburg position intervention in patients with septic shock in the intensive care unit. **Method:** Researchers used the case report method to explain the implementation of the Trendelenburg position intervention in shock management. **Result:** In this study, the Trendenburg position can improve perfusion in patients with septic shock at the beginning of the maneuver but does not last long. The results obtained were blood pressure of 40/15 mmHg to 50/20 mmHg, heart rate from 113x/minute to 109x/minute, respiratory rate from 32x/minute to 26x/minute, oxygen saturation by 82%, but the patient's extremities still felt cold, and the patient still looked cyanotic. **Conclusion:** Despite aggressive interventions, the patient ultimately succumbed to his condition, underscoring the need for ongoing support for families during and after the end-of-life process—recommendations: Healthcare providers should evaluate the overall effectiveness of combined interventions. When standard nursing interventions do not yield significant clinical improvement, shifting to palliative care can provide essential comfort and support for the patient and their family, ensuring a dignified and peaceful end-of-life experience

Keywords: intensive care unit, shock, Trendelenburg

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INTRODUCTION

Septic shock is a serious clinical condition that occurs due to infection and can cause an excessive systemic inflammatory response in the body (1). Signs and symptoms that usually appear in septic shock can include tachycardia, hypotension, hypothermia, increased respiratory rate, decreased urine production, changes in mental status, and signs of other organ dysfunction (2). According to Saleh (3), shock has 3 phases. The first is the compensation phase, where the body can maintain its normal functions. The second phase, or decompensation, is where the body tries to protect vital organs by reducing blood flow to the arms and legs because it prioritizes flow to the brain, heart, and lungs. The final phase is refractory, where the organ has been damaged because the body's defense mechanism prioritizes blood flow to the brain and heart to decrease flow to other organs. This causes damage to other body organs. In this case, the patient is in the third phase, namely the refractory phase, where the patient's condition does not respond to fluid resuscitation, and the body fails to maintain organ perfusion even though aggressive intervention has been given.

Nurses must be precise and adequate in designing interventions. Inaccuracy and inadequacy in assisting to shock patients cause patient death. There were 48.9 million incident cases of sepsis and 11 million sepsis-related deaths in 2017. Therefore, shock is considered one of the main causes of death in the intensive care unit (4). Nurses need to monitor regularly to prevent the worsening of the condition and the signs and symptoms of shock. Also, nurses must know and can handle this condition in every place/room. Nurses must also provide appropriate intervention or emergency management to overcome shock (5).

According to Evans et al., (6) In the International Guidelines for Management of Sepsis and Septic Shock 2021, the management that must be carried out in patients with sepsis and septic shock is carrying out initial screening, blood lactate examination, pharmacological administration to maintain mean arterial pressure (MAP) ≥ 65 mm Hg and immediate resuscitation using crystalloid fluids and treatment in the ICU to ensure optimal treatment. In managed patients, shock management was carried out in the form of fluid therapy and pharmacotherapy according to the International Guidelines for Management of Sepsis and Septic Shock. Still, this intervention did not bring improvement to the patient. In conditions where fluid therapy and pharmacotherapy are ineffective, nurses can provide additional intervention in the Trendelenburg position. This position can be used for monitoring patient hemodynamics (7). The Trendelenburg position is carried out for 10 to 30 minutes to identify cardiovascular sensitivity to fluid administration and whether it can increase venous return and increase cardiac output or not (8,9). However, nurses provided additional intervention in a Trendelenburg position for three consecutive days in managed patients.

In some situations, the Trendelenburg position is no longer recommended but is still given to patients because it may have an effect. So, this study aims to evaluate hemodynamic changes in patients with septic shock by administering the Trendelenburg position in the Intensive Care Unit.

OBJECTIVE

This study aimed to describe the implementation of the Trendelenburg position intervention in patients with septic shock in the intensive care unit.

METHODS

This study uses a case report method to explain the implementation of Trendelenburg position intervention in patients with septic shock. This intervention is carried out in the Intensive Care Unit (ICU). Data collection techniques include observation, interviews with patient families, physical examination, and hospital medical records. The data obtained is then analyzed and grouped to become a nursing diagnosis. The nursing diagnosis that emerges becomes a guide for researchers in determining interventions and evaluations that are appropriate to the patient's condition.

The Trendelenburg position intervention was evaluated for three days from January 19 to January 21, 2024, by filling out an observation sheet and monitoring until the patient's hemodynamics improved.

RESULTS

Nursing Assessment

Mr. K, a 55-year-old man, was admitted to the intensive care unit with a primary diagnosis

of respiratory failure complicated by bilateral pleural effusion. The patient suffered from subacute subdural hematoma, septic shock, and acute kidney injury. After physical examination, it was found that Mr. K had a Glasgow Coma Scale (GCS) score of E4M5Vtc, which indicated a state of delirium and unstable vital signs. Blood pressure fluctuates between 40/15 mmHg and 55/25 mmHg, indicating severe hypotension. His heart rate was erratic, ranging from 103 to 115 beats per minute, and his respiratory rate varied between 22 and 39 breaths per minute. Oxygen saturation levels were very low, between 80% and 86%, despite using a SIMV PC mode ventilator with high FiO2. Laboratory tests show results: Hemoglobin levels (9.0 g/dL) and hematocrit (30.1%) were far below normal, urea levels (125.5 mg/dL) and creatinine (1.87 mg/dL). Chest x-ray results showed right pleural effusion and cardiomegaly; blood gas analysis showed low PCO2 (32.1 mmHg) and low PO2 (67.3 mmHg). Low HCO3 (18.5 mmol/L).

The assessment results on Mr. K indicate very low blood pressure, with the highest blood pressure recorded at 55/25 mmHg and the lowest at 40/15 mmHg—the pulse rate increases, ranging from 103 to 115 beats per minute. Despite being on a ventilator, Mr. K remains very low, fluctuating between 80% and 86 and the extremities of Mr. K feel cold.

Nursing diagnoses

Mr. K raised several nursing diagnoses, and the main diagnosis discussed was impaired renal perfusion related to renal dysfunction. Laboratory data, such as high urea and creatinine levels, hypotension, and AGD results indicating metabolic acidosis, support this diagnosis. This condition requires immediate intervention to increase blood pressure and ensure adequate organ perfusion, such as administering intravenous fluids and medications to support hemodynamic stabilization.

Implementation and Evaluation

At the implementation stage, Mr. K was given appropriate fluid therapy, namely the Wida 2A infusion solution. In addition, collaboration with doctors leads to the administration of pharmacological agents such as Noradrenaline: 0.4 mcg/kgBB/minute, Adrenaline: 0.4 mcg/kgBB/minute, Dobutamine: 10 mcg/kgBB/minute, Vasopressin: 0.04. This position is important because it can improve venous return to the heart, thereby increasing cardiac output and stabilizing blood pressure in patients experiencing septic shock. The patient's oxygen saturation was maintained using an NRM (Non-Rebreather Mask) at 10 Lpm to keep levels above 94%.

Routine evaluations are carried out to monitor the effectiveness of the interventions implemented. Fluid and electrolyte balance is evaluated through urea, creatinine, and sodium levels in the normal range or not. These results are seen from laboratory test results, but the laboratory results had not yet come out at the time of evaluation. Prevention of shock was assessed by monitoring blood pressure, warm extremities, and the absence of cyanosis. The patient's blood pressure was found to be still low but had increased from the previous blood pressure of 40/15 mmHg to 50/20 mmHg; heart rate had also decreased from the initial 113x. /minute at the beginning of the assessment to 109x/minute, the respiration rate decreased from the highest 32x/min to 26x/minute. There was a decrease in the patient's oxygen saturation to 82%; the patient's fluid intake was 140 cc, and the patient's fluid output was 127 cc. The patient's acral still felt cold, and the patient still appeared cyanotic.

Clarification on Trendelenburg Position

The Trendelenburg position was chosen for Mr. K due to its ability to improve venous return and cardiac output, which is crucial in managing septic shock. By tilting the patient's body so that the feet are elevated above the head, this position aims to counteract the severe hypotension observed in septic shock by facilitating blood flow back to the heart, thereby enhancing the perfusion of vital organs.

Summary of Results

The use of the Trendelenburg position, along with pharmacological and fluid therapy interventions, slightly improved Mr. K's hemodynamic parameters. However, the patient's overall condition remained critical, with persistent low oxygen saturation and cold extremities. Further evaluation and continued

management were necessary to stabilize the patient fully.

DISCUSSION

In the case of Mr. K, the assessment results show that the patient is experiencing severe shock. His blood pressure was very low, with the highest recorded at 55/25 mmHg and the lowest at 40/15 mmHg. This severe hypotension is a sign of critical shock. His heart rate increased to 103 and 115 beats per minute, indicating that the body was trying to compensate for the reduced blood flow. Oxygen saturation fluctuated between 80% and 86% despite being on a ventilator. Additionally, Mr. K feels cold, indicating poor peripheral perfusion, a hallmark of shock (10). Mr. K includes acute kidney injury, most likely caused by hypoperfusion. Laboratory tests showed low hemoglobin (9.0 g/dL) and hematocrit (30.1%), as well as elevated levels of urea (125.5 mg/dL) and creatinine (1.87 mg/dL), indicating renal dysfunction. I. Chest x-ray results showed right pleural effusion and cardiomegaly, indicating fluid buildup and heart enlargement. Blood gas analysis showed low PCO2 (32.1 mmHg) and PO2 (67.3 mmHg), as well as low HCO3 (18.5 mmol/L), indicating metabolic acidosis (11).

Septic shock is a septic condition with impaired circulation and abnormal metabolism, characterized by persistent hypotension requiring vasopressors to maintain MAP ≥65 mmHg and serum lactate >2 mmol/L despite adequate fluid resuscitation (12). In this case, several interventions were carried out on Mr. K, including installing an IV line, a urinary catheter, and regular hemodynamic monitoring. The therapy given includes IV Wida 2A fluid and drugs such as Noradrenaline, Adrenaline, Dobutamine, and Vasopressin via the CVC route. This is in line with the resuscitation management of patients with septic shock (12,13). Cases of patients with Acute Kidney Injury (AKI) who experience shock represent a complex clinical challenge because these two conditions require treatment that is often contradictory (13).

AKI, which is characterized by a sudden decline in kidney function, requires careful management of the patient's fluid status to avoid overload, which can worsen kidney damage. On the other hand, shock, which is an emergency condition with inadequate tissue perfusion, requires rapid fluid resuscitation to restore organ perfusion and prevent further damage (13). The approach to handling these cases must be very careful and based on close monitoring of the patient's condition. Continuous hemodynamic monitoring using invasive or non-invasive devices is key to evaluating the status of intravascular volume and tissue perfusion in real-time. Monitoring urine output is also very important to assess the kidney's response to the fluid therapy given (13). The results of the intervention on Mr. K can be seen in Table 1.1 below:

Table 1.1 Evaluation of Conditions, Actions, and Results of Intervention in Mr. K

Day	Condition	Action	Result
Day 1	1. Blood Pressure 40/15 mmHg 2. Heart rate 113 bpm 3. Respiratory rate 32 bpm 4. O2 saturation 82% 5. Cold extremities and cyanosis	1. Wida 2A infusion fluid 2. Noradrenaline: 0.4 mcg/kgBB/minute 3. Adrenaline: 0.4 mcg/kgBB/minute 4. Dobutamine: 10 mcg/kgBW/minute 5. Vasopressin: 0.04 units/minute 6. Installation of a urinary catheter 7. Trendelenburg position 8. NRM 10 Lpm oxygen 9. Emotional support and information to the family	1. Blood pressure rises to 50/20 mmHg 2. Heart rate drops to 109 bpm 3. Respiratory rate drops to 26 bpm 4. O2 saturation remains 82% 5. Extremities are still cold and cyanotic 6. The family understands the patient's condition better
Day 2	1. Blood pressure 45/18 mmHg 2. Heart rate 107 bpm	1. Continue administering Wida 2A IV fluids 2. Adjustment of doses of Noradrenaline,	1. Blood pressure rises to 48/20 mmHg 2. Heart rate drops to 105 bpm

	3. Respiratory rate 28 bpm 4. O2 saturation 80% 5. Extremities are still cold and cyanotic	Adrenaline, Dobutamine, and Vasopressin 3. Continue hemodynamic monitoring 4. Do Not Resuscitate (DNR) discussion with family 5. Providing spiritual support by the palliative care team 6. Management of symptoms with analgesics and anxiolytics	3. Respiratory rate drops to 25 bpm 4. O2 saturation remains 80% 5. Extremities are still cold and cyanotic 6. The family agrees with the DNR decision and feels calmer after spiritual support.
Day 3	1. Blood pressure 50/22 mmHg 2. Heart rate 104 bpm 3. Respiratory rate 24 bpm 4. O2 saturation 78% 5. Extremities are still cold and cyanotic	1. Continue administering IV fluids and medication 2. Continued emotional and spiritual support for families 3. Explanation of end-of-life conditions and comfort care 4. Symptom management for patient comfort 5. Providing a calm and comfortable environment	1. Blood pressure remains 50/22 mmHg 2. Heart rate is stable at 104 bpm 3. Respiratory rate is stable at 24 bpm 4. O2 saturation remains 78% 5. Extremities are still cold and cyanotic 6. The patient died peacefully 7. The family feels supported and ready to face the patient's condition, feels respected and given comfort

Even though he has been given various therapies and maximum interventions, Mr. K did not show significant improvement. The Trendelenburg position was carried out as an additional effort, but the results were ineffective. Trendelenburg position is defined as a body tilt with a lower head than the body or legs in a supine position. This position is used to increase the perfusion of vital organs by improving blood flow to the brain and other organs in patients with shock or hypotension (14). However, in this case, the Trendelenburg position did not produce significant changes in blood pressure, and the patient's overall condition remained critical. The Trendelenburg position is ineffective in the long term for patients with hypovolemic shock like Mr. K. The resulting increase in venous return is insufficient to improve the overall poor perfusion condition. Studies show that the effects of increasing mean arterial pressure (MAP) and cardiac output from the Trendelenburg position are temporary and not significant in the long term (7).

In addition, this position can worsen the patient's respiratory and ventilation conditions (7). The evaluation showed that the Trendelenburg position intervention given in the initial phase of shock for 30 minutes only slightly increased blood pressure from 40/15 mmHg to 50/20 mmHg with a MAP of 30 mmHg, but it remained very low. The heart rate decreased slightly from 113 to 109 times per minute, and the respiratory rate decreased 32 to 26 times per minute. However, the patient still appeared short of breath and showed cyanosis. Oxygen saturation remained fluctuating between 82% to 88%, and the patient's fluid output of only 127 cc indicated oliguria (15).

At this stage, the patient, Mr. K, is already in the end-of-life phase. All medical interventions, including intravenous fluids, vasopressors, and Trendelenburg position, could not improve the condition significantly. Therefore, it is best to shift the care focus to an end-of-life approach to ensure patient comfort at the end of life. In treating patients like Mr. K, who experienced severe shock and critical condition, end-of-life care efforts became a priority to ensure the patient's comfort and dignity during the end-of-life process (16).

The medical team will provide strong emotional support to the patient and his family while clearly explaining the situation and assisting in making the right decisions (17). Symptom management is carried out by administering drugs, such as Noradrenaline: 0.4 mcg/kgBB/minute, Adrenaline: 0.4 mcg/kgBB/minute, Dobutamine: 10 mcg/kgBB/minute, Vasopressin: 0.04 units/minute for increasing blood pressure and heart rate which is expected to improve the patient's quality of life (13). If hypotension persists or lactate remains high, administer vasopressors (norepinephrine as the first choice) to achieve MAP ≥65 mmHg.

Another effort taken is intravenous antibiotics given within 1 hour after the diagnosis of septic shock. During the first 6 hours, resuscitation targets are CVP 8-12 mmHg, MAP ≥65 mmHg, urine production ≥0.5 mL/kg BW/hour, and central venous oxygen saturation ≥70% (12). Corticosteroids are only given if adrenal insufficiency is present. Regular monitoring is needed to assess the response to therapy and adjust treatment according to the patient's condition (18).

In line with theory, in the case of Mr. K, several interventions were carried out, including installing an IV line to provide fast access for administering medication or intravenous fluids that the patient needed, installing a urinary catheter to monitor urine production which reflects kidney function and hydration status, and carrying out regular hemodynamic monitoring. The therapy given includes an infusion of Wida 2A fluid containing Glucose Monohydrate and Sodium Chloride. This fluid helps improve the patient's fluid and electrolyte balance (19).

Apart from that, there is also collaboration in administering the drugs Noradrenaline, Adrenaline, Dobutamine, and Vasopressin via the CVC route using a syringe pump with administering drugs via the CVC route using a syringe pump with respective doses, including; Noradrenaline: 0.4 mcg/kgBB/minute, Adrenaline: 0.4 mcg/kgBB/minute, Dobutamine: 10 mcg/kgBB/minute, Vasopressin: 0.04 units/minute. All drug doses are adjusted to the patient's needs. Correct drug dosage is very important to ensure the effectiveness of therapy and prevent unwanted side effects (12). Noradrenaline is used to increase blood pressure, Adrenaline to increase blood pressure and heart contractility, Dobutamine to increase the strength of heart contractions, and Vasopressin to increase blood pressure in patients with respiratory failure and shock (20).

The palliative care team will also provide holistic support in symptom management, emotional support, and assistance in making decisions regarding end-of-life care. A clear end-of-life care plan will be created to ensure that the patient's wishes are met, including decisions regarding medical care, choice of care site, and preferences regarding spiritual care (21). Spiritual support will be provided according to the patient's and his family's needs. In the end-of-life care process, patient honor and dignity will be safeguarded by respecting cultural, religious, or personal preferences regarding end-of-life care. Support will also be provided to the patient's family by providing information and emotional support and helping them deal with feelings of grief and loss (17).

Nurses take steps related to information and psychological support for the patient's family and consider the family's spiritual/religious and cultural needs (21). The nurse's approach to communication with families of critical patients in the intensive care unit (ICU) provides explanations about medical equipment and patient treatment. Nurses also seek to understand how families feel about the situations they face and provide necessary support during the process of experiencing loss (17). Clear and open communication with families is also important to palliative care. Sometimes, the doctor explains the patient's condition and realistic prognosis to the family, helping them understand the situation and make the right decision. A discussion about Do Not Resuscitate (DNR) was held, and the family accepted it cooperatively.

Evaluation results show that the Trendelenburg position intervention given in the initial phase of shock for 30 minutes has a positive effect, although it has not shown significant clinical improvement. The patient's blood pressure increased slightly from 40/15 mmHg to 50/20 mmHg but was still very low and far below the normal limit. The heart rate decreased from 113 to 109 beats per minute. However, this decrease was not clinically significant and remained above normal limits,

indicating that the patient was still under stress or compensating for hypotension. Although the respiratory rate decreased from 32 breaths per minute to 26 breaths per minute, the patient still appeared short of breath and showed cyanosis, indicating this respiratory rate reduction was insufficient to improve oxygenation or reduce respiratory workload. The patient's oxygen saturation fluctuated between 82% and 88%, indicating that oxygenation was still severely compromised. The patient's fluid output of only 127 cc indicates possible oliguria, which could be caused by poor renal perfusion due to hypotension or hypovolemia. The patient's cool and cyanotic accrual veins confirm poor peripheral perfusion, although blood pressure is slightly elevated.

Conclusion

In the case of Mr. K, who suffered from septic shock, the combined use of pharmacological agents such as Noradrenaline, Adrenaline, and Dobutamine was effective in temporarily increasing blood pressure and heart contractility. However, while the Trendelenburg position initially appeared to improve tissue perfusion, its short-lived effects did not result in sustained clinical improvement. Despite aggressive interventions, the patient did not show significant clinical improvement and ultimately succumbed to his condition. This case underscores the importance of providing ongoing support to families during and after the end-of-life process, ensuring that the patient dies peacefully and the family is adequately prepared for this transition.

Recommendations

This study concludes that while the Trendelenburg position may have a transient positive effect on tissue perfusion in patients with septic shock, its benefits are limited and short-term. The findings suggest that healthcare providers should consider the effectiveness of combined interventions and recognize when to shift focus from life-saving measures to palliative care. When all standard nursing interventions have been exhausted, and no significant clinical improvement is observed, transitioning to palliative care may be more beneficial to provide comfort and support for both the patient and their family. This approach can help ensure a dignified and peaceful end-of-life experience, highlighting nurses' critical role in managing life-saving and end-of-life care.

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