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Application of Slow Deep Breathing Technique in Reducing Acute Pain Intensity in Postoperative Patients with Acute Kidney Failure in the ICU of Toto Kabila Regional Hospital

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Abstract: *Acute kidney failure (AKI) is a clinical condition characterized by a sudden decline in kidney function within hours to days, resulting in disturbances in fluid and electrolyte balance, and metabolism. The causes of acute kidney failure are diverse and generally related to impaired blood flow to the kidneys, direct damage to kidney tissue, or obstruction of urine flow. Management includes adequate fluid management, close monitoring of kidney function, correction of electrolyte disturbances, discontinuation of exposure to nephrotoxic substances, and administration of renal replacement therapy if necessary. Pain is one of the main problems often experienced by patients after nephrostomy surgery. Appropriate pain management is a crucial aspect of nursing care for post-nephrostomy patients. Relaxation techniques produce an integrated physiological response and also disrupt a part of consciousness known as the slow deep breathing relaxation response. Objectives: The purpose of this study was to provide nursing care to post-nephrostomy patients with acute pain nursing problems using the slow deep breathing technique.Methods: This type of research is a case study with data collection techniques through interviews, observation, physical examination and documentation. The implementation of slow deep breathing was carried out for 3 days for 5-10 minutes and the patient rested for 30 minutes.Results: The slow deep breathing technique is one of the interventions that can be used to reduce acute pain. Conclusions: Slow deep breathing is effective in reducing the pain scale in post-nephrostomy patients.*

Introduction

Acute kidney failure (AKI) or Acute Kidney Injury (AKI) is a clinical condition characterized by a sudden decline in kidney function over hours to days, resulting in disturbances in fluid and electrolyte balance, and metabolism. This condition is characterized by increased serum creatinine levels and/or decreased urine production (oliguria). AKI often occurs in patients with critical conditions, post-surgery, sepsis, severe trauma, dehydration, and the use of nephrotoxic drugs. The incidence of AKI is quite high, especially in patients treated in hospitals and intensive care units, and contributes significantly to increased morbidity and mortality. If not treated quickly and appropriately, acute kidney failure can progress to chronic kidney failure or even cause death(1)

The causes of acute kidney failure are diverse and generally related to impaired blood flow to the kidneys, direct damage to kidney

tissue, or obstruction of urine flow. Decreased renal perfusion due to dehydration, hemorrhage, shock, sepsis, or heart failure can lead to prerenal acute kidney failure. Additionally, exposure to nephrotoxic drugs, infections, and inflammatory kidney diseases can cause structural kidney damage leading to intrinsic acute kidney failure. Obstruction of urine flow due to urinary tract stones, an enlarged prostate, or tumors is also an important cause of postrenal acute kidney failure (2)

Classifying the signs and symptoms of acute kidney failure is necessary to facilitate early identification and appropriate management. In general, signs and symptoms of acute kidney failure can be classified based on the organ systems affected, including the urinary, cardiovascular, gastrointestinal, neurological, and metabolic systems. Manifestations such as decreased urine output, edema, shortness of breath, nausea, vomiting, decreased level of consciousness, and electrolyte disturbances are common clinical features (3)

AKI is estimated to affect >13 million individuals annually worldwide, with incidences varying from 3.2% to 20% in hospitalized patients and reaching up to 67% in critically ill patients. The prevalence of kidney disease in Indonesia increased to 3.8% in 2020 from 2%(4). The prevalence of patients with acute kidney in Gorontalo Province is 201 patients, the prevalence of patients based on age is the highest age ≥44 years - ≤66 l years as many as 121 patients and the highest gender is as many as 106 female patients (5).

The main impact of untreated acute kidney failure includes fluid and electrolyte imbalances, such as hyperkalemia and metabolic acidosis, which can lead to heart rhythm disturbances and cardiac arrest. Furthermore, fluid retention can cause pulmonary edema and shortness of breath, thus worsening respiratory function. The accumulation of uremic substances also impacts the central nervous system, characterized by decreased consciousness, confusion, and even seizures. Global study data shows that mortality in ARF patients is quite high, especially in those with advanced stages or requiring renal replacement therapy. Furthermore, the in-hospital mortality rate in patients with severe ARF is reported to reach tens of percent, depending on the severity of the disease and other accompanying medical conditions (6) Management of acute renal failure aims to identify and address the underlying cause, maintain fluid and electrolyte balance, and prevent further kidney damage. The management approach includes adequate fluid management, close monitoring of kidney function, correction of electrolyte disturbances, discontinuation of exposure to nephrotoxic substances, and administration of renal replacement therapy if necessary(7)

Pain is one of the main problems often experienced by patients after nephrostomy surgery. In addition to tissue trauma, post-nephrostomy pain is also influenced by edema around the catheter insertion site, nerve irritation, and traction or pressure from the catheter. Other factors such as restricted body position, patient anxiety about the invasive device, and individual differences in pain thresholds contribute to pain perception. If pain is not adequately managed, it can hinder mobility, disrupt rest, and slow the patient's recovery process. Therefore, appropriate pain management is a crucial aspect of nursing care for post-nephrostomy patients.(8).

Nursing practice is a service provided by nurses in the form of nursing care aimed at meeting the needs and independence of clients in self-care. In implementing nursing care, nurses carry out the nursing process, which includes nursing assessment, establishing a nursing diagnosis, planning nursing actions, implementing them, and evaluating the results of nursing actions.

Relaxation is a state of rest in the physical and mental aspects of a person, while the spiritual aspect remains actively working. In a state of relaxation, the entire body is in a state of homeostasis or balance, in a calm but not asleep state, and all muscles are relaxed with a comfortable body position. Relaxation techniques produce an integrated physiological response and also disturb part of consciousness known as the slow deep breathing relaxation response. Slow deep breathing relaxation is a non-pharmacological relaxation technique that is done by regulating breathing slowly, deeply, and controlled, aimed at increasing body relaxation, reducing tension, and reducing pain and anxiety. This technique works by activating the parasympathetic nervous system, so it can reduce the frequency of breathing, heart rate, and blood pressure, and increase the patient's sense of comfort. Slow deep breathing is often used in nursing care, especially in post-

operative patients, because it is easy to do, safe, and effective as a supportive therapy in pain management.(9)

Slow deep breathing relaxation therapy has several advantages over other relaxation techniques: it's easy to perform, requires no special equipment, and can be applied anytime and anywhere, including in post-surgery patients. This technique works by activating the parasympathetic nervous system, thereby reducing breathing rate, heart rate, and muscle tension, which contribute to pain perception. Compared with progressive muscle relaxation or meditation, slow deep breathing is quicker for patients to learn, is safe for a variety of health conditions, and is effective in simultaneously reducing anxiety and pain. Furthermore, this technique increases tissue oxygenation, which aids the healing process. Its simplicity and effectiveness make slow deep breathing a practical and efficient non-pharmacological intervention in pain management.(10)

Several studies have shown that slow, deep breathing relaxation can reduce pain intensity. The results of this study (11), where after the application of the slow deep breathing relaxation technique on the first day, the pain scale was 4 and on the second and third days the pain scale was 2. Based on the results of the pain scale assessment before and after the application of the slow deep breathing relaxation technique above, it shows that there is a decrease in the pain scale.

Case Overview

Based on the results of the assessment in the ICU room of Toto Kabila Hospital on Mrs. N aged 34 years with the main complaint of pain in the post-operative area and felt like being stabbed, the pain came and went and increased when moving, the pain was felt on a scale of 6. Based on experience and some information from nurses in the ICU Room of Toto Kabila Hospital, data obtained on the implementation of pain management in post-op patients was still dominated by the administration of analgesics, while the most frequently used non-pharmacological pain management was deep breathing relaxation techniques for patients experiencing pain. Researchers collaborated with nurses in the room to try non-pharmacological measures by providing slow deep breathing relaxation in pain management, especially in patients with post-operative pain. Based on this description, researchers were interested in researching "The Effect of Slow Deep Breathing Techniques on the Intensity of Acute Post-Operative Pain with a Diagnosis of Acute Kidney Failure in the ICU Room of Toto Kabila Hospital".

Method

This study employed a case study design with a nursing care approach. This design was used to directly illustrate the application of slow deep breathing to post-nephrostomy patients in the ICU of Toto Kabila Regional Hospital, through the stages of assessment, diagnosis, planning, implementation, and evaluation.

The sample in this study was one post-nephrostomy patient treated in the ICU of Toto Kabila Regional Hospital for acute pain. Respondents were selected based on their clinical condition, which aligns with the research focus, and their willingness to undergo the planned nursing interventions.

The instruments used in this study included a nursing care assessment format using the Numeric Pain Rating Scale (NPRS). Additionally, an evaluation sheet was used to record changes in the patient's condition before and after the intervention.

Intervention

Slow deep breathing is carried out for 3 days for 5-10 minutes and the patient rests for 30 minutes.

Data collection

Data collection was conducted through interviews to obtain subjective data, such as complaints of post-nephrostomy pain, and observation and physical examination to obtain objective data, such as pain in the surgical area. Data were collected before and after the intervention.

Data analysis

Data analysis was conducted descriptively by comparing patient conditions before and after the Slow Deep Breathing intervention. The observed changes were pain levels.

Ethical Principles

This study adhered to ethical principles by providing patients with an explanation of the procedures to be performed and obtaining informed consent before administering the intervention. Patient identities were kept confidential, and the data obtained were used solely for scientific purposes.

Results and Discussion

The results of the study showed that there were changesat this stage the patient's pain scale is 6 (0-10)After slow deep breathing, the patient reported a slight decrease in pain, from a 6 (0-10) to a 5 (0-10). This improvement suggests that this therapy can be a viable treatment for patients with post-operative pain.

The results of the study showed that there were changesat this stage the patient's pain scale is 5 (0-10)After slow deep breathing, the patient reported a slight decrease in pain, from a 5 (0-10) to a 4 (0-10). This improvement suggests that this therapy can be a viable treatment for patients with post-operative pain.

The results of the study showed that there were changesat this stage the patient's pain scale is 4 (0-10)After slow deep breathing, the patient reported a slight decrease in pain, from a 4 (0-10) to a 3 (0-10). This change suggests that this therapy can be a viable treatment for patients with post-operative pain.

Observations during nursing care for post-nephrostomy patients indicate that slow deep breathing helps patients become more relaxed and comfortable compared to their pre-intervention condition. During the technique, patients appeared calmer, gradually reduced muscle tension, and were able to control their breathing patterns more regularly. Patients also reported a decrease in pain intensity at the nephrostomy site after performing slow, deep breathing exercises. Physiological responses, such as respiratory rate and heart rate, tended to be more stable, indicating reduced stress from pain. This intervention facilitates nurses' ongoing assessment of patient comfort. Furthermore, slow deep breathing helps patients maintain a more relaxed body state, thus supporting the post-operative recovery process. Based on these practical results, slow deep breathing is considered effective as a non-pharmacological nursing intervention in pain management in post-nephrostomy patients.The above results are in line with research conducted by(11), shows that slow deep breathing relaxation has an effect on reducing pain intensity. Where after applying the slow deep breathing relaxation technique on the first day, the pain scale was 4 and on the second and third days the pain scale was 2. Based on the results of the pain scale assessment before and after applying the slow deep breathing relaxation technique above, it shows that there was a decrease in the pain scale.

Based on several relevant research findings and studies, researchers believe that slow deep breathing in patients with acute kidney failure who have undergone nephrostomy surgery is an effective non-pharmacological intervention to help reduce pain intensity and increase body relaxation. This breathing technique can stimulate the parasympathetic nervous system, thereby reducing the stress response, decreasing muscle tension, and diverting the patient's focus from post-operative pain. Furthermore, slow deep breathing also helps stabilize breathing patterns and increase tissue oxygenation, contributing to increased patient comfort during recovery. With a more relaxed body and more controlled pain, patients can rest optimally and participate better in the care process, thereby accelerating recovery after nephrostomy.

A nephrostomy is performed to relieve obstruction by creating a direct drainage channel from the kidney to the outside of the body. After a nephrostomy, the patient's urine output generally begins to gradually increase, indicating improved kidney excretory function. However, in the early postoperative phase, patients are still at risk of fluid and electrolyte imbalances, as well as pain due to the invasive procedure.(12).

Post-nephrostomy pain can be moderate to severe, especially in the first 24–48 hours after the procedure. Therefore, effective pain management is necessary, not only through pharmacological therapy but also safe and easy-to-implement non-pharmacological interventions, one of which is the slow deep breathing relaxation technique. Pain management in post-nephrostomy patients using the slow deep breathing technique has been shown to help reduce pain intensity, increase comfort, and accelerate the recovery process. This intervention works by relaxing the nervous system and diverting focus from pain. With consistent application and appropriate evaluation, slow deep breathing becomes an important part of holistic nursing care for post-nephrostomy patients.(12)

In nursing management, non-pharmacological therapy can support the rehabilitation process, especially in patients with severe symptoms. One example of this therapy is the slow deep breathing technique, a form of physical breathing exercise designed to minimize patient symptoms and can be performed easily and practically (13)

Slow deep breathingis a slow, deep breathing technique that aims to increase body relaxation, decrease sympathetic nervous system activity, and improve tissue oxygenation. This technique involves inhaling slowly through the nose, holding the breath briefly, and then exhaling slowly through the mouth. Physiologically, slow, deep breathing can stimulate the parasympathetic nervous system, thereby reducing muscle tension, reducing anxiety, and suppressing pain perception. This technique also helps increase patient focus on breathing patterns, thereby diverting attention from post-operative pain.(14)

After regularly practicing slow, deep breathing, patients generally report a decrease in pain intensity from moderate to mild. Patients appear calmer, are able to rest better, and demonstrate increased comfort when moving or performing light activities. Physiologically, there is a decrease in muscle tension and stress responses, as indicated by stable blood pressure and heart rate. This therapy also increases patient participation in the recovery process because better controlled pain allows for early mobilization and more optimal self-care. Nurses play a crucial role in properly teaching this technique, motivating patients to practice it regularly, and evaluating the results continuously. Family education is also crucial so they can help remind and support patients in practicing breathing exercises at home.(15)

Conclusion

The implementation of nursing interventions in the form of slow deep breathing showed a decrease in the pain scale. This was indicated by a decrease in the pain scale on the first day of the intervention, with a pain scale of 6 (0-10), after the intervention, it decreased to a pain scale of 5 (0-10), and on the second day before the intervention, with a pain scale of 4 (0-10) and after the intervention, it decreased to a pain scale of 3 (0-10).

It is hoped that the results of this discussion can be used as consideration in improving the quality of nursing services, The results of this discussion are expected to be a source of reference and learning material for nursing students in understanding nursing care, especially regarding the application of slow deep breathing as a non-pharmacological intervention in pain management in post-nephrostomy surgery patients. The results of this discussion are expected to be a source of initial data and references for future researchers who wish to study non-pharmacological interventions.

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