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Keeping Balance Body Temperature with The Application of Hyperthermia Management

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ABSTRACT
Background: Hyperthermia is a common nursing problem found in patients with typhoid fever. Nursing implementation through a nursing care approach is given to assist in decreasing body temperature. The purpose of this case study is to describe the implementation of hyperthermia management in patients with impaired body temperature balance. Methods: This research method is descriptive using the case study method. Implementation includes monitoring body temperature, and warm compresses, recommending bed rest, and collaborating on intravenous fluids and electrolytes. The research was conducted at a hospital in Palembang for typhoid fever patients with hyperthermia problems. Implementation is carried out 5 days in patient 1 and 3 days in patient 2. Result: the case study results showed a decrease in patient's body temperature, patient 1 from 38,5°C to 36,5°C while patient 2 from 39°C to 36,3 °C. Conclusion: The problem of hyperthermia in patients with typhoid fever can be resolved through an implementation approach to hyperthermia management.

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1. INTRODUCTION

Every living thing has basic needs, one of which is humans. According to Maslow, the first basic human needs are physiological needs, which are seen as the most basic human needs in sustaining life[1], [2]. One of these physiological needs is the need for body temperature regulation or thermoregulation. Thermoregulation is one of how mammals maintain body temperature in a self-regulated and tightly controlled manner regardless of external temperature [3], [4]. If it is not fulfilled, it will cause an imbalance in body temperature, it can even cause death (Atoilah et al., 2015). Disorders of body temperature balance are divided into two, namely hyperthermia and hypothermia (Mubarak et al., 2015).

A rising in body temperature over what is considered normal for the body is referred to as hyperthermia. The range of a healthy body temperature is 36.5°C to 37.5°C [5]. Hyperthermia is an increase in body temperature as measured by axillary temperature >37.5°C. Hyperthermia can be interpreted as an increase in temperature of more than 1oC from normal temperature[6][7]. This hyperthermia is induced by a change in the set point of the temperature control mechanism regulated by the hypothalamus. Under typical conditions, when the core temperature rises >37.5°C, the rate of heat dissipation will increase so that the body temperature will decrease to the set point level. Conversely, when the core temperature is <37°C, the rate of heat production will increase so that the body temperature will rise to the set point level. In this state, the hypothalamic thermostat shifts quickly from a normal level to a higher level due to the effects of cell injury, pyrogens, or dehydration on the hypothalamus. During the interval period, a heat production reaction frequently emerges, namely chills, chills, cold skin due to vasoconstriction, and chills which can cause an increase in body temperature and hyperthermia.

Several diseases also trigger an increase in body temperature, such as diseases caused by inflammation and infections such as infections of the thyroid [8]. As a reaction in the body against attacks from microorganisms that result in disturbed thermoregulation.

Typhoid fever is still quite high throughout Asia, especially in Asia. The risk factors for abdominal typhus infection in Southeast Asia and Africa are lack of handling body temperature, contact with typhus sufferers, consuming unhealthy and clean foods such as oily food and food sold on the roadside, and open and dusty food[9]. In 2016 the incidence of typhoid fever in Indonesia was 358,810/100,000 cases per year, and typhoid fever placed 3rd out of the ten most patterns of inpatient sickness [10]. Based on data obtained from the Province of South Sumatra, the number of people who experienced typhoid fever in 2015 was 805 people with typhoid fever, in 2016 there were 888 people with typhoid fever, in 2017 there and were 908 people with typhoid fever. Data from the Palembang City Health Office in 2017 recorded a total of 219 cases of typhoid fever.

At the Muhammadiyah Palembang hospital in 2021, there were 114 typhoid fever patients and in 2020 there were 220 patients diagnosed with typhoid fever, in 2019 there were 270 patients with typhoid fever. So the number of typhoid fever patients in the last 3 years is around 604 people at the Palembang Muhammadiyah hospital [11].

The impact of an increase in body temperature when good and comprehensive nursing care is not carried out because it may result in learning impairments, epilepsy, mental retardation, and brain damage, as well as hyperpyrexia, which may result in shock [12], prolonged hyperthermia can cause dehydration which will disrupt the electrolyte balance, in severe dehydration can cause shock or sepsis [13] and can be fatal to the point of death [14][15]. Thus, an increase in body temperature becomes a response in humans when the body temperature balance is not achieved and causes discomfort so health efforts are needed to manage this problem.

The treatment of hyperthermia is carried out by two actions, namely pharmacological actions, non-pharmacological actions, or a combination of both. Pharmacological action is giving antipyretic drugs while non-pharmacological actions are additional actions in lowering body temperature after being given antipyretic drugs but in several studies, antipyretics do not affect hyperthermia [16].

The research found that the results of hyperthermia management interventions in respondents with hyperthermia problems decreased by 3.2°C on the third day. Similar research was also conducted on the effectiveness of hyperthermia management interventions, the patient's body temperature returned to normal after receiving a series of actions from nurses such as monitoring the patient's body temperature, doing warm compresses, recommending bed rest, and collaborating with intravenous fluids and electrolytes [17].

Based on the data above, the authors are interested in research to find out information by conducting a case study of a Scientific Paper about “Implementation of Hyperthermia Management in Patients with Body Temperature Balance Disorders".

2. RESEARCH METHOD

The design of this study used a descriptive method to explore the implementation of nursing with hyperthermia problems in patients with body temperature balance disorders in hospitals. The nursing care strategy involves assessment, nursing diagnoses, nursing interventions, nursing implementation, and nursing evaluation. The case study subjects were 2 patients with the same nursing cases and problems, namely patients with Body Temperature Balance Disorders with Hyperthermia Nursing problems at the Hospital, and carried out from 10-14 March 2022 for 5 days in patients 1 and 5 days in patient 2.

The data collection instrument in this case study uses a nursing care assessment format by applicable regulations. Data collection methods in this case study are interviews, observation, head-to-toe physical examination, and documentation study. In this case study, there are two types of subjective and objective data. In this case study, the data is presented in a narrative manner accompanied by verbal expressions from the patient as supporting data. The confidentiality of the respondent is guaranteed by obscuring the identity of the respondent. In this study, the researcher enforces the issue of research ethics where the consent sheet is given before the research is carried out to the object to be studied then must sign the consent form, but if the subject refuses then the researcher does not use and respect his rights as a subject.

3. RESULTS AND ANALYSIS

The study was conducted for 5 days on patient 1 starting from March 10, 2022 – March 14, 2022, and 3 days on patient 2 on March 11, 2022 – March 13, 2022. From the study on patient 1, the body temperature was 38.5ºC followed by minor symptoms. namely chills, reddened skin, tachycardia, tachypnea, and warm skin. Meanwhile, in patient 2, the study found that the body temperature reached 39ºC and was characterized by minor symptoms, namely tachycardia and warm skin.

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Table 1. Widal Test Laboratory Examination Results Check-up result

Immuno Serology Patient 1 (10/03/2022)		
Widal	**Check up result**	**Referral Value**
S typhi H	(+) 1/80	Negative
S typhi O	(+) 1/160	Negative
Immuno Serology Patient 2 (11/03/2022)		
Widal	**Check up result**	**Referral Value**
S typhi H	(+) 1/80	Negative
S typhi O	Negative	Negative

3.1. Nursing Diagnoses

Based on the data that has been obtained and collected, it can be concluded that nursing diagnoses that appear in male patients aged 54 years and 58 years include hyperthermia related to the disease process as evidenced by body temperature above normal values.

3.2. Nursing Interventions

Interventions determined in patients 1 and patient 2 based on SIKI are hyperthermia management. The following nursing interventions were conducted on both patients 1 and 2:

3.2.1. Observations

a. Identification of the causes of hyperthermia (such as dehydration, exposure to the hot environment, and the use of incubators)
b. Monitor body temperature
c. Monitor electrolyte content
d. Urine output monitor
e. Monitor complications due to hyperthermia

3.2.2. Therapeutics

1. Provide a cold environment
2. Loosen Or Undress
3. Wet And Fan Body Surface
4. Change linen daily or more if you have hyperhidrosis (excessive sweating)
5. Perform External Cooling (eg Hypotemic Blanket Or Warm Compress On Forehead, Neck, Chest, Abdomen, Axilla)
6. Indigenous Administration of Antipyretics or Aspirin
7. Give Oxygen, If Needed.

3.2.3. Education

Recommend bed rest.

3.2.4. Collaboration

Collaboration of fluids and electrolytes.

3.2.5. Nursing Implementation

a. Monitoring and Measuring Body Temperature

Handling body temperature is the handling of an abnormal increase in which the body temperature is higher than the normal limit of more than 38°C [18]. The results of the implementation of monitoring and measuring body temperature carried out by the author in patient 1 was 38.5ºC and patient 2 was 39ºC. Nursing care must be provided to check the patient's vital signs and conditions while keeping an eye on their body temperature [19]. This is updated to track patients' progress each day while they are in the hospital and to serve as a benchmark for assessing the overall health of typhoid fever patients [20]. Typhoid fever patients' hospital stays get longer when their body temperatures aren't managed properly. High fever can also be an early sign of infection. Fever, though, can also be brought on by other things including metabolic issues [19].

Monitoring and measuring body temperature is important to avoid a sudden increase in temperature or decrease in body temperature so that it can be an evaluation of the results of nursing implementation and a reference for future interventions.

b. Perform External Cooling (Warm Compress)

Compress is one way to lower the temperature or maintain body temperature by applying substances or devices that can make the area of the body that requires it feel warm or chilly. There are two categories of compresses: warm compresses and cold compresses. Warm compresses are intended to increase blood flow, lessen discomfort, warm, smooth, and soothe the patient. They also help exudate be expelled and promote digestive peristalsis [21].

In this study, a warm compress was given to reduce the patient's body temperature. Giving warm compresses can be done on large blood vessels such as the armpits [22], the purpose of warm compresses is to stimulate the hypothalamus to lower body temperature [23]. The results of the study after giving a warm compress, the patient said he felt better and more comfortable and the evaluation of the action taken, patient 1's body temperature decreased from 38.5ºC to 37.8ºC and patient 2 decreased from 39ºC to 38.2ºC. Both temperatures were normal on the third day after the implementation of warm compresses. Based on the results of research, the implementation of warm compresses has a major effect in reducing the body temperature of patients with hyperthermia nursing problems [17]. This is in line with the research of Burhan et al., giving warm compresses to stabilize body temperature [23]. The same results were obtained in a study conducted by Zumiri, that warm compresses can reduce the temperature by 1oC on the third day [24]. Lismayanti e al. concluded that the warm compress intervention can reduce the patient's body temperature both when treatment is carried out and not [25].

c. Bed Rest Recommendation

The author suggests to patients do bed rest if they still feel weak and the author also conveys a message to the patient's family to make sure the patient gets enough sleep. The author suggests that patients limit their activities and patients are encouraged to do all activities in bed to speed up the healing process. Bed rest is done so that the patient can rest optimally. Bed rest is a treatment that involves the patient having to limit activities to prevent complications and require assistance to go to the toilet.

After implementing bed rest for 5 days for Patient 1 and Patient 2 for 3 days, the patient looks fresher and has been able to complete tasks without his family's assistance. The subjective results of the patient said that adequate rest made the healing process faster and the problem resolved. Bed rest was chosen as therapy in the intensive care unit [26]. Bed rest affects functional outcomes in both healthy people and people with acute and serious illnesses in a variety of cellular and systemic ways. In this management, bed rest by limiting activity can reduce the body's increased metabolic needs due to infectious disease processes and prevent complications.

d. Collaboration of Fluids and Electrolytes

The collaborative intervention made by the authors is to collaborate in the administration of intravenous fluids and electrolytes. The author collaborates with room nurses and doctors to provide electrolyte fluids on the first day in patient 1, namely NaCl 0.9 through an infusion tube so that the patient's fluids are met and ensure the patient's gtt is 20x/minute and replace fluids with electrolyte fluid RL on the next day. While in patient 2 the authors collaborated with room nurses and doctors to provide electrolyte fluids, namely RL through an infusion tube so that the patient's fluids were fulfilled and ensured the patient's gtt was 20x/minute.

Before the implementation of collaborative nursing, the provision of fluids and electrolytes was carried out in patient 1 and patient 2 who had a high fever. After the collaboration of giving fluids to patient 1 and patient 2, the body temperature decreased after being given collaboration in giving intravenous fluids and electrolytes, namely NaCl fluid on the first day of patient 1 and continued with RL fluids, while in patient 2, RL fluids were given during treatment. After the collaboration between the two clients experienced a decrease in fever, the patient looked fresher and the problem was resolved. Fever caused by typhoid can cause loss of body fluids [27], [28]. According to Karla et al., in patients with fever including typhoid fever, it is necessary to administer fluid administration to avoid dehydration [29]. It was proven in patient 1 and patient 2 in the results of the study that the authors did that the administration of fluids and electrolytes was effective in helping to lower the body temperature of both patients.

e. Nursing Evaluation

Researchers carry out the implementation based on the predetermined outcome criteria. The results obtained by the authors from the implementation of hyperthermia management with typhoid fever in both patients were resolved, but the rate of decline that occurred in the same number of days in the two patients was different. In patient 1 there was a decrease in body temperature from 38.5ºC to 36.5ºC which was characterized by chills down, decreased tachycardia, decreased tachypnea, improved body temperature, improved skin temperature, and blood pressure

improved on the third day, but due to factors such as the patient's condition, such as the age factor of patient 1 who has stepped on the elderly so that the activity of the immune system (immune system) decreases, the patient is not planned to go home until the fifth day. While in patient 2 the temperature dropped from 39ºC to 36.3ºC marked by decreased pallor, decreased tachycardia, improved body temperature, and improved skin temperature on the third day, and planned to go home. One of the reasons for this is the difference in age between the two patients where patient 1 is 62 years old and patient 2 is 25 years old. In this case With increasing age, the burden of disease increases. Longevity influences the development of several age-related pathologies [30].

4. CONCLUSION

The results of the evaluation of the intervention/implementation of hyperthermia management that has been carried out show that hyperthermia is related to the disease process and an increase in body temperature can be overcome with the management that has been given.

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