COMPRESSES FOR HYPERTHERMIA MANAGEMENT IN CHILDREN WITH DENGUE HEMORRHAGIC FEVER: A TWO-CASE STUDY

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Abstract

Background: Hyperthermia is a common nursing problem in children with Dengue Haemorrhagic Fever (DHF). If not treated promptly, a persistent rise in body temperature can lead to serious complications such as seizures, neurological disorders and severe dehydration. This study aims to analyse the use of warm compresses as a nursing intervention to reduce body temperature in children with hyperthermia through a case study. Methods: A descriptive case study involving two research subjects, namely An. AA (8 years) and An. AM (4 years), both diagnosed with DHF and presenting with hyperthermia as a nursing problem. Nursing care was provided over three days in accordance with the Indonesian Standards for Nursing Diagnosis (SDKI), the Indonesian Standards for Nursing Outcomes (SLKI), and the Indonesian Standards for Nursing Interventions (SIKI). Warm compresses were applied to body folds, such as the axillae, using washcloths soaked in warm water at a temperature of 37–40°C for 15–20 minutes. The interventions were carried out with the involvement of the mother as the child's primary carer, in accordance with the principles of family-centred care. Results: A reduction in body temperature was observed in both subjects. Patient AA's body temperature fell from 37.7°C to 36.7°C; whilst Patient AM's body temperature fell from 39.0°C to 36.8°C by the end of the third day of care. The nursing problem of hyperthermia was deemed resolved in both subjects. Conclusion: Warm compresses proved effective as a non-pharmacological intervention in reducing the body temperature of children with hyperthermia resulting from dengue infection. Nurses can apply warm compresses as a non-pharmacological therapeutic measure for children with hyperthermia, whilst also educating families on how to apply warm compresses independently to ensure continuity of care at home.

Keywords: Children, Family-Centred Care, Hyperthermia, Nursing Care, Warm Compress

1. INTRODUCTION

Fever is one of the most common health issues in children with Dengue Haemorrhagic Fever (DHF), representing the body's natural response to combat dengue virus infection. Fever in children with DHF is characterised by a rise in body temperature above 38°C [1]. Data from [2] indicate that the incidence of fever worldwide reaches 17 million cases per year, with 600.000 deaths, and 70 per cent of cases occurring in Asia. In Indonesia, infectious diseases accompanied by fever symptoms, such as DHF, remain a major public health issue, particularly amongst children. Data obtained from [3] reported 257.271 cases of DHF with 1,461 deaths in 2024. The highest proportion of deaths was recorded in the 5–14 age group (47.92 per cent), followed by the 1–4 age group (13.43 per cent). These figures highlight the high incidence of fever in children with DHF both globally and in Indonesia.

Health data reports at the provincial level show figures that do not differ significantly from global and national data. Central Java Province recorded 17.636 cases of DHF throughout 2024 and 6,226 cases by mid-2025, with a total of 54 deaths, the majority of which occurred among school-aged children [4]. The Ir. Soekarno General Hospital in Sukoharjo reported 180 cases of DHF between April and June

2025, with a total of 3 deaths (Sukoharjo Regency Open Data, 2025). These figures illustrate the high incidence of fever, which requires immediate attention.

Research findings indicate that fever is the primary cause of children being admitted to hospital, accounting for 74 per cent of cases. This is linked to the implications of fever, namely an increased risk of clinical complications in children if it is not managed promptly and appropriately. A high body temperature leads to a loss of appetite, resulting in reduced nutritional intake whilst energy requirements increase. If this persists for a prolonged period, it can lead to dehydration and nutritional status disorders [1,5]. A rapid rise in temperature can trigger febrile convulsions in toddlers. Recurrent seizures carry the risk of damaging brain nerve cells and impairing the child's neurological function. Children with a fever usually also feel uncomfortable, are often fussy, have difficulty sleeping, and are restless. This situation not only reduces the child's comfort but also increases the anxiety of the parents caring for them [6,7].

A common nursing issue found in children with DHF and a fever is hyperthermia associated with the disease process (SDKI: D.0130). This nursing problem can lead to other nursing problems such as the risk of nutritional deficit (SDKI: D.0032) and impaired comfort (SDKI: D.0074) [8]. These nursing problems require comprehensive management, including monitoring body temperature, ensuring adequate fluid intake, and educating parents on the management of hyperthermia at home. Appropriate nursing interventions are expected to help reduce the child's body temperature, thereby increasing appetite and improving overall comfort.

Nursing care for children with hyperthermia, according to (SIKI DPP Working Group, 2018), can be provided through pharmacological and non-pharmacological measures. Pharmacological measures involve administering antipyretic medication (to reduce fever); whilst non-pharmacological measures include providing a cool environment, loosening or removing clothing, wetting and fanning the body's surface, administering oral fluids, changing bed linen daily or more frequently in cases of hyperhidrosis (profuse sweating), and applying external cooling methods such as warm compresses [9].

One non-pharmacological method for children with hyperthermia is the nursing intervention of warm compresses. This method involves covering the skin with a soft cloth or towel soaked in warm water at a temperature of approximately 34°C–37°C [10]. The benefits of warm compresses for children include lowering body temperature, improving blood circulation, reducing pain, providing a sense of warmth, comfort and calm, as well as facilitating the discharge of exudate and stimulating intestinal peristalsis [11–13] . When carrying out this intervention, nurses need to involve the family through a Family-Centred Care (FCC) approach. Nurses play a vital role in providing clear information, establishing open communication, and encouraging parents to actively support their child during the procedure. This family involvement can also reduce anxiety caused by hospitalisation and enhance the child's comfort [14].

This warm compress nursing intervention is supported by evidence-based research. Findings from [15] a study indicate that applying warm compresses to the forehead and armpits of children with DHF reduced body temperature from 38.0°C on the first day to 36.5°C on the third day. Another study [16] states that warm compresses are clinically proven to be effective in reducing hyperthermia in children through the induction of peripheral vasodilation, conduction, and evaporation. Warm compresses applied to areas of high vascular constriction, such as the armpits, forehead and groin, are thus able to regulate the hypothalamic set-point and gradually reduce core temperature by 0.8°C to 1.0°C in cases of hyperthermia in children with febrile convulsions [17].

The effectiveness of this thermoregulation is consistent with findings on warm hydrotherapy, such as localised warm water compresses, which can cause peripheral vasodilation to dissipate core heat to the skin's surface, resulting in a significant reduction in mean axillary temperature from 38.88°C to the normothermic threshold of 36.85°C within 60 minutes [16]. In contrast to cold compresses, which can cause paradoxical vasoconstriction, shivering, and increased oxygen consumption, warm compresses can provide a gentle reduction in temperature and optimal comfort during the stable (plateau) phase of fever [18]. This literature review demonstrates that warm compresses are beneficial for reducing body temperature in children with hyperthermia.

The results of a preliminary study conducted in the Flamboyan Ward of the Ir. Soekarno General Hospital in Sukoharjo over a period of approximately one month identified around seven children admitted with a diagnosis of Dengue Fever (DF) or Dengue Haemorrhagic Fever (DHF). The data showed that all children presented with a primary complaint of elevated body temperature as the

dominant clinical manifestation; consequently, hyperthermia became a priority nursing issue requiring immediate attention. This reinforces the urgency of implementing effective, safe, and self-administered non-pharmacological interventions by both nurses and families, one of which is the use of warm compresses. This phenomenon formed the basis for the author's case study to analyse the use of warm compresses to reduce body temperature in children with hyperthermia.

This study aims to describe and analyze two pediatric cases to provide insight into the clinical characteristics, nursing challenges, and considerations in providing nursing care for these conditions. The two cases were selected because they are clinically relevant and provide an opportunity to identify similarities and differences in clinical manifestations, nursing assessments, and care management. Through the analysis of these two cases, this study is expected to provide a deeper understanding of the importance of individualized pediatric nursing care and to support evidence-based clinical decision-making. The results of this study are also expected to serve as practical guidance for pediatric nurses in identifying patient needs, planning appropriate nursing interventions, and improving the quality and safety of pediatric nursing care.

2. METHODOLOGY

The research design was a case study aimed at analysing the administration of the nursing intervention of warm compresses to reduce body temperature in children with hyperthermia. A case study was chosen because it involves a series of nursing care processes, beginning with an assessment to collect data, analysing the data to formulate nursing diagnoses, developing a nursing care plan, implementing nursing interventions, and subsequently conducting an evaluation. A final evaluation was carried out to assess the reduction in body temperature based on the set targets [19,20].

This case study was conducted at the Ir. Soekarno General Hospital in Sukoharjo from December to January 2026. The sampling technique used was purposive sampling with the following inclusion criteria [21]: (1) Subjects comprised two children, both male and female, aged between 1 and 14 years. These two cases were selected to illustrate differences in clinical manifestations, nursing needs, and care management across different age groups, thereby providing practical insights into the delivery of individualized pediatric nursing interventions; (2) Children diagnosed with dengue hemorrhagic fever (DHF) and experiencing hyperthermia—defined as a body temperature above 37.5°C—were included in the study. Body temperature was measured using a digital thermometer placed in the axilla (armpit). Measurements were taken immediately before the warm compress intervention and 20 minutes after the intervention; and (3) Children and their families who were willing to participate in the study. The exclusion criteria for this study were: (1) Children in a state of medical emergency; and (2) Parents who were unable to communicate verbally or non-verbally.

The concepts investigated in this case study are: (1) Nursing care for children with hyperthermia is a systematic nursing process for children who experience a rise in body temperature above the normal range due to thermoregulatory failure. The nursing process comprises the assessment of vital signs and physiological responses, the establishment of a diagnosis of hyperthermia, the formulation of a nursing care plan, the implementation of independent physical interventions (such as warm compresses) and collaborative antipyretic measures, and the monitoring of body temperature stability; (2) Hyperthermia is defined as a child experiencing a rise in body temperature above the normal limit of >37.5°C due to dengue haemorrhagic fever (DHF); and (3) A warm compress is a method involving the application of a soft cloth or towel soaked in warm water at a temperature of approximately 34°C–37°C to the skin's surface, thereby providing a warm, comforting sensation and reducing body temperature. Warm compresses can be applied to the forehead and body folds such as the knees, elbows, armpits, groin, or the back of the neck for 20 minutes.

Primary data collection was carried out by assessing the child's medical history and main complaints through a medical history interview, observation (direct observation of the child) and physical examination (conducting a physical examination to obtain subjective and objective data through inspection, palpation, percussion and auscultation). Secondary data collection—including identity, demographics, diagnosis, and results of supporting examinations—was carried out by reviewing the child's medical records. The instruments used in the case study were an assessment form, a thermometer, a compress, the Standard Operating Procedure for warm compresses, and an observation sheet (respondent's name, age, gender, and body temperature measurements before and after the compress).

Data analysis was carried out using descriptive analysis presented in narrative and tabular form, with the aim of comparing the results of the case study on the use of warm compresses to reduce body temperature in children with hyperthermia with existing theories in the literature. Based on the data obtained, a nursing diagnosis was established— —in relation to existing theories on hyperthermia; subsequently, a care plan was drawn up, interventions were implemented, and an evaluation was carried out to determine whether these were consistent with existing theories.

This case study adhered to ethical principles in research. The researcher obtained informed consent in the form of a consent form signed or agreed upon between the researcher and the participants, with the consent form being provided to the child's parents. The researcher ensured the confidentiality of the case study subjects by only including the child's initials in the presented case study results, for example, An. X. This research was approved by the Health Research Ethics Committee of Dr Moewardi General Hospital, Surakarta, under Number: 2.371/XI/HREC/2025, on 20 November 2025.

3. RESULTS

3.1 First Case

A nursing assessment of An. AA was conducted on 23 December 2025 at 09:00 WIB in the Flamboyan Ward of the Ir. Soekarno General Hospital, Sukoharjo. An. AA is an 8-year-and-2-month-old girl of the Islamic faith, currently in Year 2 of primary school. The child was admitted to hospital on 21 December 2025 with a medical diagnosis of dengue haemorrhagic fever (DHF). The child's weight was 25.5 kg, and her height was 126 cm; her nutritional status, based on BMI-for-age, was in the median category.

The main complaint reported by the child's grandmother was that her granddaughter's fever had been fluctuating for the past 5 days. The grandmother stated that An. AA first developed a fever on the evening of 18 December 2025 at 19:00 WIB. On 20 December 2025 at 08:00 WIB, the child was taken to the A&E department at Ir. Soekarno General Hospital, Sukoharjo, where hospitalisation was recommended; however, the family declined. As the child's condition did not improve, the grandmother brought the child back for a check-up on 21 December 2025 because the fever persisted, accompanied by nausea and weakness. The child was subsequently admitted to the Flamboyan Ward at 21.20 with the following treatment plan: RL infusion at 65cc/hour, paracetamol injection at 250mg every 4 hours, ranitidine injection at 25mg every 12 hours, and ondansetron injection at 2.5mg every 8 hours.

At the time of the assessment on 23 December 2025, the child was alert and of sound mind and was neatly dressed. Examination of vital signs revealed a pulse rate of 121 beats per minute, a respiratory rate of 25 breaths per minute, and a body temperature of 37.7°C. The physical examination revealed the following: the lips appeared dry; the child's teeth were clean; there was no bleeding from the gums; and the tongue was clean. The skin was clean, with a reddish colour; there was no cyanosis of the nails; skin turgor was elastic; the skin felt warm to the touch; and there was no purpura or petechiae. The results of the haematology laboratory tests dated 23 December 2025 showed: haemoglobin 12.5 g/dL (normal, reference range 10.8–15.6), haematocrit 38.8% (normal, reference range 33–45), white blood cell count 3.7 × 10^3/µl (low, reference range 4.5–13.5), and platelet count 151 × 10^3/µl (low, reference range 184–488).

The nursing diagnosis established was hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C) and supported by subjective data: the child's grandmother reported that her grandchild had a high, fluctuating fever accompanied by dizziness, weakness and nausea. The nursing plan implemented included the application of warm compresses if the child's body temperature exceeded 37.5°C, for 15–20 minutes in the axillary region to stimulate the hypothalamus to lower the body's temperature set point; monitoring body temperature; administering oral fluids as required by the child; and advising the use of light, sweat-absorbent clothing. Collaboration with the medical team involved the administration of intravenous fluids (Ringer's Lactate infusion at 65 cc/hour and 48 cc/hour) and antipyretic medication (paracetamol infusion at 250 mg and 150 mg every 4 hours or when the child's body temperature exceeded 37.5°C). The care plan for Patient AA was implemented from 23 to 25 December 2025.

A summative evaluation was conducted on December 25, 2025. Subjective data obtained from the patient's grandmother indicated that the child had not had a fever since the previous night, was no longer complaining of dizziness, and had regained her appetite. Body temperature measurements were taken immediately before and 20 minutes after each application of a warm compress showed a decrease in temperature from 37.7°C to 37.5°C on the first day of the intervention and from 37.6°C to 37.1°C on the second day of the intervention. At the final evaluation on the third day, the child's body temperature was recorded at 36.7°C, indicating that it had returned to the normal range, making further application of warm compresses unnecessary. The final physical examination also revealed that the child's skin no longer felt warm to the touch, with a pulse rate of 105 beats per minute and a respiratory rate of 22 breaths per minute (Figure 1).

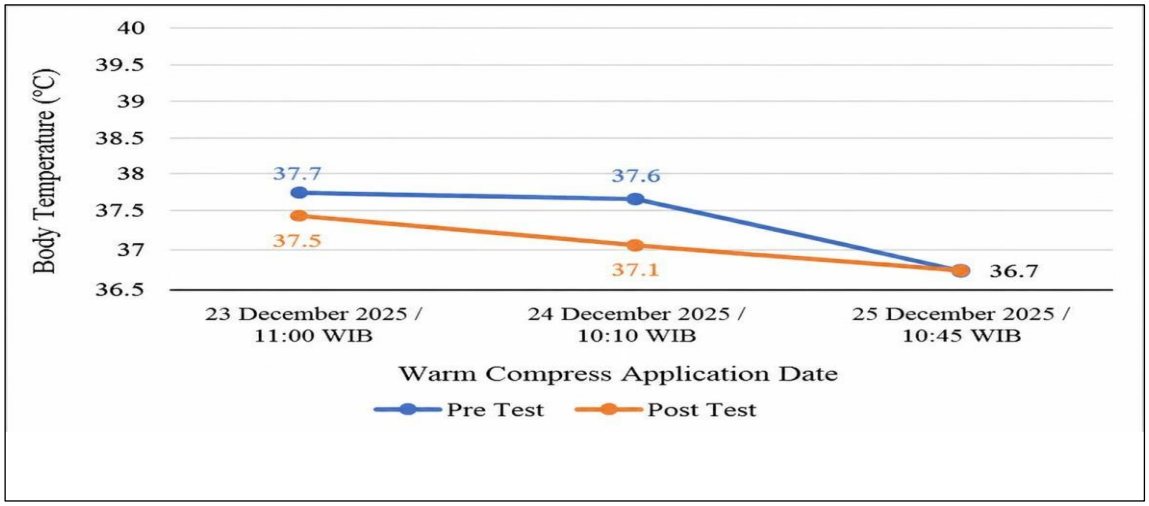


Figure 1. Evaluation of Body Temperature Reduction in Patient AA Before and After the Warm Compress Nursing Intervention

3.2 Case Two

A nursing assessment of Patient AM was conducted on 9 January 2026 at 11.00 WIB in the Flamboyan Ward of the Ir. Soekarno General Hospital, Sukoharjo. Patient AM is a 4-year-and-2-month-old girl of the Islamic faith, currently attending a pre-school (PAUD). The child was admitted to hospital on 8 January 2026 with a medical diagnosis of dengue haemorrhagic fever (DHF). Her weight was 13.5 kg, and her height was 100 cm. Her nutritional status, based on height-for-age (HAZ), was at -1SD; weight-for-age (WAZ) at -2SD; and weight-for-height (WHZ) at -1SD.

The main complaint reported by the child's mother was that her daughter's fever had not subsided. Based on the current medical history, the mother stated that An. AM had developed a fever on the morning of 6 January 2026 at 06:00 WIB. On 7 January 2026 at 18:00 WIB, the child was taken to the A&E department of Ir. Soekarno General Hospital, Sukoharjo, for examination and blood tests. The child was transferred to the Flamboyan Ward at 21:20 with the following treatment plan: RL infusion at 48 cc/hour, paracetamol injection at 140 mg every 4 hours, Ranitidine injection 15 mg every 12 hours, Ondansetron injection 1.5 mg every 8 hours, Paracetamol powder 140 mg every 4 hours, Ventolin nebuliser treatment every 8 hours, Gentamicin injection 35 mg every 12 hours, Nystatin drops 3 × 1 ml, and Cefotaxime injection 350 mg every 8 hours. Past medical history: An. AM had suffered from tuberculosis since the age of 2 and underwent treatment at Surakarta General Hospital from January 2023 to July 2023. The social environment history indicates that some neighbours have contracted dengue haemorrhagic fever and chikungunya.

At the time of assessment on 9 January 2026, the child was alert and oriented, and well-groomed. Vital signs revealed a pulse rate of 130 beats per minute, a respiratory rate of 24 breaths per minute, and a body temperature of 39°C. Physical examination revealed no bleeding from the gums, a clean tongue, a reddish skin colour, no cyanosis of the nails, elastic skin turgor, the child felt warm to the touch, and there were no purpura or petechiae. The results of the haematology

laboratory tests dated 10 January 2026 showed: haemoglobin 13.5 g/dL (normal, reference range 10.8–15.6), haematocrit 41.2% (normal, reference range 33–45), white blood cell count 3.1 × 10^3/µl (low, reference range 4.5–13.5), and platelet count 82 × 10^3/µl (low, reference range 184–488). Serological testing showed positive Anti-Dengue IgG (reference range: negative) and negative Anti-Dengue IgM, indicating a secondary dengue infection.

The established nursing diagnosis was hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C) and supported by subjective data: the child's mother reported that her child had a high fever that was not subsiding. On the second day of care, laboratory monitoring revealed that An. AM had experienced a drastic drop in platelet count to 82.10^3/µl, indicating that the child had entered a critical phase. Further findings included the family reporting that the child was drinking very little (inadequate oral fluid intake). In light of these circumstances, the researcher established a second nursing diagnosis: Risk of Shock, evidenced by the risk factor of the child's platelet count dropping drastically on the second day of care (82.10^3/µl).

The final evaluation results showed that An. AM's hyperthermia and risk of shock had been successfully managed. Warm compresses were applied for two days, with body temperature measurements taken immediately before and 20 minutes after each application. The measurements showed a decrease in body temperature from 39°C to 37.8°C on the first day and from 38.5°C to 37.5°C on the second day. In the final evaluation on the third day, the child's body temperature was recorded at 36.8°C, indicating that the temperature had stabilized within the normal range and the skin no longer appeared flushed. Meanwhile, shock was successfully prevented during the critical phase even though the platelet count dropped to 64 × 10^3/µL. This was supported by adequate fluid intake—approximately 1,200 mL per day—as well as the administration of Ringer's Lactate solution via intravenous infusion. The child's circulatory stability was demonstrated by monitoring of pulse rate, warm hands and feet, adequate urine output, and the absence of signs of bleeding. Therefore, nursing interventions were discontinued and replaced with education for the family regarding meeting fluid needs.

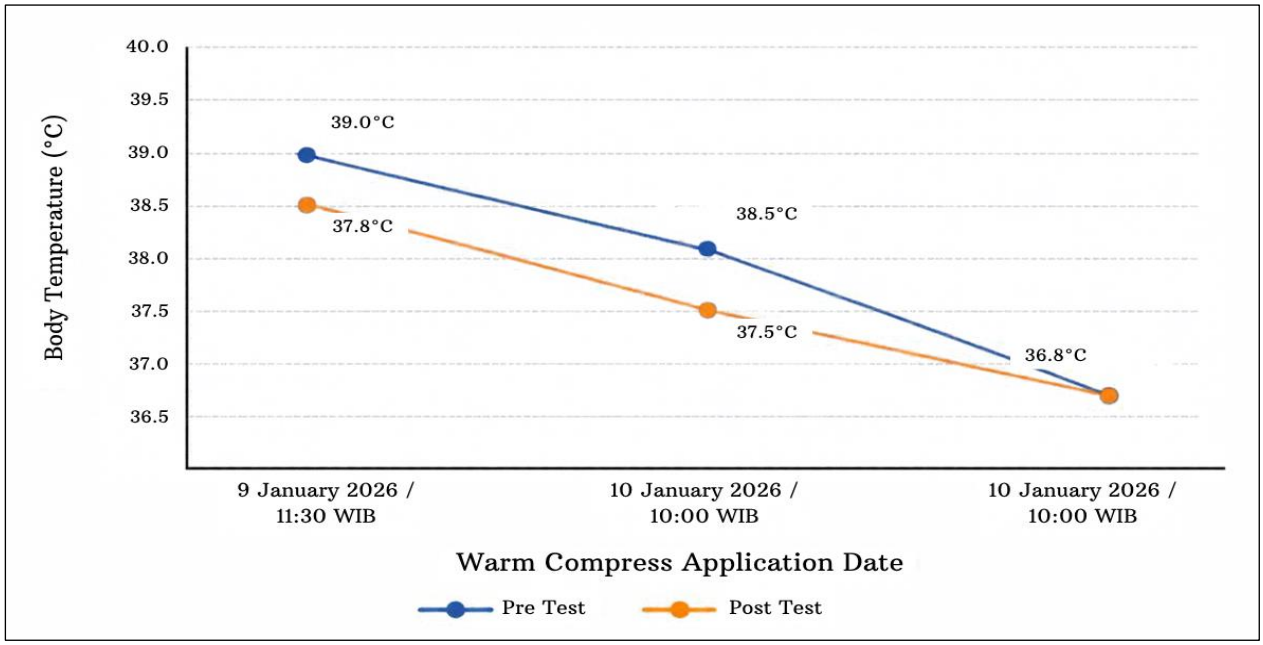


Figure 2. Assessment of Body Temperature Decrease in Patient AM Before and After the Warm Compress Nursing Intervention

4. DISCUSSION

4.1 Nursing Assessment

The results of the case studies on Patient AA and Patient AM in the Flamboyan Ward of the Ir. Soekarno General Hospital, Sukoharjo, revealed that both children experienced an elevated

body temperature as the primary manifestation of DHF. In Patient AA, the body temperature was recorded at 37.7°C with the skin feeling warm to the touch and appearing flushed; whilst in Patient AM, the body temperature reached 39°C accompanied by a pulse rate of 130 beats per minute and dry lips. Subjective data from the family indicated that the child's temperature had not subsided, that they were lethargic, and were drinking less.

The fever phase of dengue infection is characterised by a sudden rise in temperature to 38–40°C lasting 2–7 days, accompanied by malaise, anorexia and general weakness. These manifestations are consistent with the clinical findings observed in both children [22]. An elevated body temperature affects the cardiovascular system. Every 1°C rise in temperature can increase the heart rate by approximately 8–13 beats per minute as a compensatory response to increased metabolic demand. This is consistent with the findings in An. AM, who experienced tachycardia when their temperature reached 39°C. This response is a physiological mechanism by which the body maintains tissue perfusion and oxygen supply when metabolism increases due to fever [23].

In addition to the rise in temperature, patient AM was found to have a platelet count as low as 82,000/µL, indicating that the child had entered the critical phase of DHF. During this phase, increased capillary permeability may lead to plasma leakage and pose a risk of hypovolaemic shock. This condition is exacerbated by the fact that the child is not drinking enough and the mucous membranes of the lips appear dry, which confirms the presence of a risk of fluid volume depletion. The critical phase of DHF is characterised by plasma leakage, haemoconcentration, and a significant reduction in platelet count [22,24].

A comparison of the two cases shows that although both children experienced hyperthermia as the primary manifestation of DHF, their clinical conditions and nursing priorities differed. Patient AA had a relatively mild increase in body temperature (37.7°C), accompanied by warm skin and a flushed appearance, whereas Patient AM had a higher body temperature (39°C), tachycardia, dry lips, and a greater risk of fluid volume deficit during the critical phase. These differences highlight the importance of individualized pediatric nursing assessment, as managing body temperature alone is insufficient to meet the clinical needs of children with complex DHF.

4.2 Nursing Diagnosis

The assessment findings for Patient AA and Patient AM led to the establishment of the primary nursing diagnosis: hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C). This diagnosis was based on subjective data, including complaints of fluctuating fever, weakness, and inadequate fluid intake, as well as objective data, including elevated body temperature (37.7°C in Patient AA and 39°C in Patient AM), skin that felt warm to the touch, redness, and an increased pulse rate.

According to the Indonesian Nursing Diagnosis Standards (SDKI Working Group, DPP PPNI, 2016), hyperthermia is a condition in which body temperature rises above the normal range due to a failure of thermoregulatory mechanisms. This diagnosis is established when major signs—such as an elevated body temperature and warm skin—are present, and may be accompanied by minor signs such as tachycardia and flushed skin. These findings are also consistent with the research [25] which states that hyperthermia is a priority nursing issue in children with dengue haemorrhagic fever (DHF), where children generally exhibit a body temperature above 38°C accompanied by warm skin and an increased pulse rate as identifiable major signs. The clinical data for both children met these major and minor characteristics; therefore, both theoretically and clinically, the diagnosis of hyperthermia associated with the disease process (dengue virus infection) – evidenced by a body temperature above the normal range (>37.5°C) – is valid and can be established [26].

In the case of An. AM, an additional diagnosis was also established, namely risk of shock, evidenced by the risk factor of a drastic drop in the child's platelet count on the second day of treatment (82.10³/µl). This diagnosis arose because, on the second day of treatment, there was a significant decrease in platelets to 82,000/µL, indicating the critical phase of DHF, accompanied by clinical findings of reduced fluid intake and dry lip mucosa. The critical phase of dengue is characterised by increased capillary permeability, leading to plasma leakage and posing a risk of hypovolaemic shock if not adequately managed [22].

According to the Indonesian Nursing Diagnosis Standards (SDKI Working Group, DPP PPNI, 2016), the risk of shock is defined as a condition at risk of experiencing inadequate tissue perfusion due to circulatory impairment. Risk factors supporting this diagnosis include fluid loss, increased capillary permeability, and severe infectious disease. Laboratory findings, such as thrombocytopenia, and the child's clinical condition support the diagnosis of risk of shock [27]. The diagnostic priority in this case remains focused on hyperthermia as the immediate problem, as an elevated body temperature directly affects the child's comfort, increases metabolic demands, and accelerates fluid loss. This aligns with the principle of prioritising nursing problems based on urgency and the threat to the child's physiological stability. Meanwhile, the risk of shock in An. AM is a potential diagnosis requiring close monitoring to prevent complications [6].

The main difference between the two patients lies in the additional diagnosis of risk of shock in An. AM, which was not found in An. AA. Although both patients met the clinical criteria for hyperthermia, An. AM exhibited more severe clinical manifestations, including a higher body temperature (39°C), tachycardia, decreased fluid intake, dry lips, and a significant decrease in platelet count (82,000/µL). In contrast, An. AA primarily presented with mild hyperthermia (37.7°C), warm and flushed skin, and no additional clinical issues such as those found in An. AM. These differences indicate that diagnoses and nursing care priorities must be determined based on each patient's individual clinical findings, not merely on the shared diagnosis of dengue hemorrhagic fever (DHF). Therefore, Patient AM requires more intensive monitoring of hydration status, circulation, and potential signs of plasma leakage, whereas nursing care for Patient AA primarily focuses on managing body temperature and monitoring clinical responses.

4.3 Nursing Plan

Based on the nursing diagnosis of hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C), the planned nursing interventions for An. AA and An. AM focus on the management of hyperthermia through a non-pharmacological approach and close monitoring of the children's physiological condition. This plan was drawn up with reference to the outcomes set out in the Indonesian Nursing Outcomes Standards (SLKI Working Group, DPP PPNI, 2019), namely thermoregulation (L.14134) with indicators of a body temperature within the normal range (36.5–37.5°C), a pulse rate within the normal range for the child's age, no skin redness, and the child appearing more comfortable.

The main planned intervention is Hyperthermia Management (I.15506) in accordance with the Indonesian Nursing Intervention Standards (SIKI Working Group, DPP PPNI, 2018). To achieve the outcomes, the actions undertaken include: monitoring body temperature, monitoring vital signs, applying warm compresses to the axillary area, recommending increased fluid intake as tolerated, and providing education to the family regarding the warning signs of dengue fever. This intervention was selected because it is supportive, safe, and appropriate for children [26].

The warm compress intervention was chosen because it is supportive, safe, and appropriate for children. Warm compresses work by stimulating vasodilation of peripheral blood vessels, allowing body heat to be released through the skin. This intervention can be used as a non-pharmacological therapy to help reduce body temperature before or alongside pharmacological therapy, depending on the child's condition [16]. A study conducted by Marlina et al. (2023)on children with hyperthermia demonstrated a reduction in average body temperature of 1–2°C following a single application. These findings support the implementation of warm compresses as an evidence-based intervention in pediatric nursing practice.

Further interventions were carried out for Patient AM to manage the risk of shock; close monitoring of haemodynamic status was planned, including monitoring of blood pressure, pulse rate, capillary refill time (CRT), fluid balance, and laboratory results for platelet count and haematocrit (SIKI Working Group, DPP PPNI, 2018). Adequate fluid replacement is a crucial part of management, as fever can increase fluid loss from the body. This is consistent with findings emphasising that adequate fluid management is vital in preventing dengue cases from progressing to severe dengue in children. Appropriate management aims to maintain fluid balance and prevent complications during the fever phase [16,18].

The management of hyperthermia also indirectly supports efforts to prevent the risk of shock in children with DHF. During the fever phase, uncontrolled high fever is one of the main challenges as it can accelerate fluid loss, thereby worsening hypovolaemia, which carries a risk of leading to

shock [22]. Fever control is an important part of supportive management, given that high fever during the critical phase of DHF contributes to haemodynamic instability through mechanisms involving increased vascular permeability and an uncontrolled cytokine response. Effective management of hyperthermia using warm compresses not only reduces body temperature but also helps maintain the child's fluid balance and prevents deterioration into hypovolaemic shock [22,27].

The main difference in the planning of nursing interventions for the two patients lies in the additional focus on circulation and fluid management for Patient AM. Both patients received warm compresses, body temperature monitoring, vital sign checks, and hydration education to address hyperthermia. However, An. AM required additional monitoring of hemodynamic status, fluid balance, platelet count, and hematocrit due to the risk of shock and clinical signs suggesting possible fluid deficiency. In contrast, the care plan for An. AA primarily focused on regulating body temperature and maintaining adequate hydration. These differences highlight the importance of tailoring pediatric nursing interventions to individual clinical conditions, particularly regarding the risk of complications during the critical phase of DHF.

4.4 Nursing Implementation

Nursing care for Patient AA and Patient AM was provided over three days of hospitalisation, with the primary focus on the management of hyperthermia through the application of warm compresses and close monitoring of the children's physiological conditions. The implementation of these measures was based on an intervention plan drawn up in accordance with the Indonesian Nursing Intervention Standards (SIKI Working Group, DPP PPNI, 2018), specifically the intervention for hyperthermia management (I.15506). On the first day, the interventions carried out included measuring body temperature, monitoring pulse and respiratory rates, and applying warm compresses to the axillary area for 15–20 minutes using lukewarm water (±32–34°C). The choice of location for the compresses took into account areas with large blood vessels to accelerate the process of heat dissipation through peripheral vasodilation. Following the application of the warm compress, Patient AA's body temperature decreased from 37.7°C to 36.7°C; whilst Patient AM's decreased from 39°C to 36.8°C. This response indicates a physiological effect in the form of increased heat transfer from the body to the environment [18].

An increase in skin surface temperature can physiologically stimulate vasodilation of peripheral blood vessels, thereby accelerating heat loss mechanisms via conduction and evaporation. Conversely, exposure to cold temperatures can cause vasoconstriction and shivering. It is this mechanism that forms the scientific basis for why warm compresses are more strongly recommended in the non-pharmacological management of hyperthermia in children, as they work in harmony with the body's natural thermoregulatory system; whereas cold compresses actually trigger a counterproductive compensatory response [13].

On the second day, the intervention continued with regular monitoring of temperature and vital signs, as well as the reapplication of warm compresses when the temperature exceeded 37.5°C. In patient AM, there was a drop in platelet count to 82,000/µL, indicating the critical phase of DHF. Other hyperthermia interventions included close monitoring of haemodynamic status, including central venous pressure (CRT), fluid balance, and observation for signs of bleeding. The critical phase of dengue is a period of high risk for plasma leakage and shock; therefore, intensive monitoring is essential even as the temperature begins to fall [22].

This warm compress applies Myra E. Levine's Energy Conservation Nursing Theory Model. The principle of energy conservation is achieved through a warm compress that dilates blood vessels without triggering a shivering response, thereby conserving the child's metabolic reserves. A gradual reduction in body temperature safeguards brain nerve cells from the threat of febrile convulsions, thereby preserving structural integrity. The conservation of personal integrity is achieved by providing a soothing sensation of warmth, whilst minimising the child's fear and stress. The conservation of social integrity is implemented by actively involving parents during the application of the compress to reduce family anxiety and to foster independence in self-care at home [24,28].

During the application of warm compresses, nurses actively involve parents as part of the implementation of the Family-Centred Care concept; the family acts as a partner in the delivery of nursing care to support the child's comfort and cooperation during hospitalisation [23,29,30]. This is relevant to the conditions observed in both children, where, at the start of the warm compress

procedure, the children displayed fussy and uncooperative behaviour. Such reactions are commonly observed in children undergoing hospitalisation, as the unfamiliar hospital environment can trigger anxiety, fear and resistance to nursing interventions [30–32].

The differences in the implementation of nursing care for the two patients were primarily evident in the need for monitoring and additional interventions based on their respective clinical conditions. For Patient AA, the interventions over the course of three days focused primarily on managing hyperthermia through the application of warm compresses, monitoring body temperature, and vital signs. Meanwhile, for Patient AM, in addition to receiving the same hyperthermia management interventions, more intensive monitoring was required for hemodynamic status, fluid balance, platelet count, hematocrit, and signs of bleeding due to the risk of shock during the critical phase of DHF. Family involvement was also implemented for both patients to help improve the children's comfort and cooperation during procedures. These differences demonstrate that although the primary interventions provided were the same, the implementation of nursing care needed to be tailored to the severity of the condition and the risk of complications in each patient.

4.5 Nursing Evaluation

A nursing evaluation was carried out to assess the extent to which the planned outcomes were achieved following the application of warm compresses to Patient AA and Patient AM, who were diagnosed with hyperthermia related to the disease process (dengue virus infection), as evidenced by a body temperature above the normal range (>37.5°C). The evaluation refers to the Thermoregulation outcome (L.14134) in accordance with the Indonesian Nursing Outcome Standards (SLKI Working Group, DPP PPNI, 2019), the indicators of which include a body temperature within the normal range (36.5–37.5°C), a pulse rate within the normal range for their age, no skin redness, and the child appearing more comfortable.

On the first day, following the application of warm compresses for 15–20 minutes, both children's body temperatures decreased, although they had not yet fully returned to the normal range. Patient AA's temperature dropped from 37.7°C to 37.5°C, whilst Patient AM's fell from 39°C to 38.5°C. On the second day following the application of warm compresses, Patient AA's body temperature also fell further from 37.6°C to 37.1°C and showed no signs of excessive redness. Meanwhile, An. AM's temperature also fell from 37.8°C to 37.5°C, and the patient was in the critical phase with a platelet count of 82,000/µL. A decrease in body temperature in children still requires high vigilance, as during the critical phase of dengue, the risk of plasma leakage and shock increases. This is consistent with research by [33] which confirms that a drop in temperature in DHF does not always indicate improvement, but may instead be an early sign of the critical phase. Therefore, assessment should not only focus on body temperature, but also on the child's haemodynamic stability and fluid status.

On the third day, both children's body temperatures were within the normal range (Patient AA 36.8°C and Patient AM 37.1°C), their pulse rates were age-appropriate, their skin was no longer flushed, and they appeared more comfortable and were no longer fussy. Based on the indicators in the SLKI, it can be concluded that the thermoregulation outcome has been achieved. The results of the analysis indicate that the hyperthermia issue in both children has been resolved. The warm compress treatment administered was in line with the Hyperthermia Management guidelines (I.15506), namely monitoring temperature at regular intervals, applying external cooling (warm compresses), and recommending increased fluid intake. The evaluation results indicate that this intervention was effective in gradually reducing body temperature without causing side effects such as shivering. The findings of this case study are also consistent with the research by Marlina et al. (2023),which demonstrated that warm compresses are effective in significantly reducing the body temperature of children with hyperthermia within 15–20 minutes of treatment.

The results of the evaluation for both patients showed that the nursing outcome of thermoregulation was achieved after three days of intervention, as indicated by body temperature returning to the normal range, the skin no longer appearing red, a pulse rate appropriate for their age, and the children appearing more comfortable and less fussy. The difference lay in the response to the decrease in temperature and the accompanying clinical conditions. Patient AA reached a temperature of 36.8°C on the third day, while Patient AM reached 37.1°C with a condition requiring further monitoring due to a decrease in platelet count to 82,000/µL. Thus,

although the thermoregulation outcome was achieved in both patients, the evaluation of Patient AM continued to include monitoring of hemodynamic status and fluid balance to anticipate the risk of shock.

This case study has several limitations. First, the study findings are based on only two pediatric patients; therefore, their generalizability to the broader population of children with DHF remains limited. Second, the absence of a control group means that the observed decrease in body temperature cannot be definitively attributed to the warm compress intervention. Third, both patients also received other interventions simultaneously as part of the standard management of DHF, which may have contributed to changes in their clinical condition. Therefore, the independent effect of warm compresses on body temperature cannot be isolated. Further research with a larger sample size and an appropriate control group is needed to determine the effectiveness of warm compresses as a supportive intervention in the management of DHF in children.

5. CONCLUSIONS

This case study describes the application of warm compresses to the axillary region (at a temperature of 37°C–40°C for 15–20 minutes) in two children with dengue hemorrhagic fever (DHF) who were experiencing hyperthermia. After the intervention was carried out for three consecutive days, both patients showed a gradual decrease in body temperature until it reached the normal range (36.7°C–36.8°C), accompanied by an improvement in associated symptoms. These findings indicate that the application of warm compresses is associated with improved body temperature regulation in both cases. This intervention may be considered as a complementary nursing measure in the management of fever, involving families through a Family-Centered Care approach to support body temperature monitoring and home care for children. However, these findings are limited to two cases and therefore cannot definitively prove the intervention's effectiveness or its impact on the prevention of complications.

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