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Case study of stress ball implementation to reduce pain in children with dhf during blood sampling

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Abstract

Background: Blood sampling is a common invasive procedure in children with suspected Dengue Hemorrhagic Fever (DHF). This procedure causes pain, non-pharmacological interventions to reduce pain with distraction techniques using stress balls.

Purpose: This study aims to describe the effect of stress ball implementation in reducing pain in children aged 3-6 years who undergo blood sampling in the emergency room with a medical diagnosis of suspected DHF.

Method: Descriptive method research in the form of a case study on one preschool child with a diagnosis of suspected DHF. Data were collected through interviews, observations, physical examinations, literature studies, and medical documentation.

Results: The results of the assessment of breathing frequency 26x/min, SpO2 96%, BP 95/65 mmhg, pulse frequency 78x/min, CRT <2 seconds, complaining of pain on a scale of 5, grimacing, looking restless, with acute pain nursing problems. The results of the study showed that the use of stress balls during the blood sampling process at preschool age was able to reduce the level of pain from a moderate pain scale to mild pain through observation of children's verbal and non-verbal responses.

Conclusion: Stress ball is proven to reduce pain during blood collection in preschool age.

Suggestion: Therefore, this intervention can be applied more widely in health care facilities as part of standard paediatric nursing services.

Keywords: Blood sampling; Children; DHF; Pain; Stress Ball.

INTRODUCTION

Dengue Hemorrhagic Fever (DHF), more commonly known as Dengue Hemorrhagic Fever (DHF), is a febrile condition accompanied by liver enlargement and bleeding (World Health Organization, 2023). This disease is caused by the dengue virus, which belongs to the arbovirus group, and enters the body through the bite of the *Aedes aegypti* mosquito. DHF is a disease of current public health concern. This disease has a direct relationship with the community and the surrounding environment, so its transmission can increase easily, especially with increasing mobility and population density (Sari, 2019).

The dengue virus is the cause of dengue fever (DHF). This virus belongs to group B, or arthropod-borne viruses, and is transmitted through the bite of the *Aedes aegypti* or *Aedes albopictus* mosquito, which is infectious when it sucks blood from a healthy individual. Within 3-14 days after the virus enters the body, the immune system will display signs and symptoms as a natural response. Common symptoms experienced by dengue fever sufferers include increased body temperature accompanied by chills, dizziness, and muscle pain (Shyntia, Elvira, & Novariza, 2024).

Dengue Hemorrhagic Fever (DHF) is a disease caused by dengue virus infection, transmitted through the bite of the *Aedes aegypti* and *Aedes albopictus* mosquitoes. This condition is characterized by a sudden high fever that appears over 2–7 days, accompanied by muscle and joint pain, and bleeding symptoms such as nosebleeds or red spots on the skin (petechiae). The diagnosis of DHF is based on an evaluation of clinical symptoms, a physical examination, and laboratory analysis. Blood tests typically show a low platelet count ($<100.000/\mu\text{L}$) and an increase in hematocrit of more than 20%, indicating plasma leakage. Furthermore, the NS1 antigen can be detected within the first 1–5 days of fever onset, while IgM/IgG serology or PCR is used to confirm the presence of the dengue virus (World Health Organization, 2009).

In more severe cases, DHF can progress to dengue shock syndrome (DSS), which is characterized by low blood pressure and impaired organ function. Therefore, rapid diagnosis and careful monitoring are essential in the treatment of DHF patients to prevent more serious complications (Ministry of Health of the Republic of Indonesia, 2022).

Blood samples in patients with DHF typically include platelet counts. Platelet counts are generally performed using venous blood, as they are often used in conjunction with other laboratory tests. However, survey results indicate that the increasing demand for blood cell counts, particularly platelet counts, in clinical laboratories has led to the use of capillary blood samples instead of venous blood. Capillary blood samples are often used in pediatric patients because venous blood collection can be difficult, requiring a large number of patients, and also to expedite the blood collection process. Therefore, research is needed to determine whether there are differences in platelet counts between venous and capillary blood samples (Prasetya, Dentri, & Sistiyo, 2016).

Rapid blood sampling is crucial for establishing a diagnosis, particularly in emergency situations. Delays in blood sampling can hinder a thorough understanding of the patient's clinical condition, leading to a delay in diagnosis and appropriate therapy. In some situations, such as severe infections, electrolyte imbalances, or bleeding, blood test results provide crucial information for determining subsequent medical treatment efficiently and

accurately. Therefore, accelerating the process of taking and analyzing blood samples is very necessary to improve patient safety and prevent the possibility of more serious complications (Surrena, 2010).

Failure to take a blood sample can have devastating consequences for both the patient and the healthcare facility. One of the main consequences is discomfort and trauma for the patient. Mistakes in this procedure can cause pain, anxiety, and even fear, potentially making the patient reluctant to undergo blood draws in the future (Alodokter, 2024). Furthermore, failure in this procedure can also hinder the diagnosis and treatment process.

Pain is a major stressor for hospitalized preschool children. Due to their developmental stage, preschoolers are highly vulnerable to threats to their bodily integrity. Their perception of pain is influenced by imaginative and egocentric thinking, leading them to perceive events in an exaggerated and frightening manner. Fear is an emotional reaction that occurs in children when their body feels threatened by a recognizable and specific object, such as an injection with a syringe (Laporte, Pan, Hoffmann, Wakschlag, Rohde, Miguel, & Salum, 2017).

Preschool children, between 3 and 6 years of age, often present unique challenges in medical pain management compared to other age groups. In terms of blood vessel condition, children at this age have small and easily damaged vascular structures, making it difficult to perform medical procedures such as IV drips or blood draws. This difficulty is compounded by the fact that preschool children typically have high levels of anxiety and are unable to rationally understand medical procedures due to limited cognitive development, which leads to them tending to refuse or resist when faced with painful procedures (Hockenberry, Wilson, & Rodgers, 2021).

Furthermore, limited verbal skills prevent them from clearly communicating their pain, which complicates pain assessment and management by medical personnel. Excessive emotional reactions to pain also risk long-term psychological trauma, such as fear of hospitals or healthcare professionals (Kuttner, 2010).

The results of a study conducted entitled "The Effect of Squishy Play Therapy on Pain Responses in Preschool Children During Blood Sampling at Curup Regional General Hospital," used a quasi-experimental method using a two-group with control group design. Results showed a difference in the

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average pain response of squishy play therapy in the control and intervention groups in preschool-aged children during blood sampling, with a p-value of 0.001 (Purnama, Samidah, & Murwati, 2022).

RESEARCH METHOD

This study used a descriptive method with a case study approach, presenting nursing care for preschool children (3–6 years old) undergoing intravenous fluid therapy and blood sampling in the Emergency Department (ER) of Cibabat Regional Hospital, Cimahi City. The study followed the nursing process, including assessment, establishing a nursing diagnosis, intervention planning, implementation, and evaluation. The study subjects were preschool children (3–6 years old) requiring invasive procedures such as intravenous access for fluid therapy and blood sampling. Case selection was purposive based on the suitability of patient characteristics to the study's objective, which was to describe the implementation of stress balls as a non-pharmacological distraction technique to reduce procedural pain in children.

The assessment was conducted through direct observation of the child's clinical condition and response during the procedure, interviews with parents, and a review of medical records. Pain levels were assessed using the Wong-Baker Faces Pain Rating Scale (WBFPRS), which consists of a 0–10 scale representing facial expressions representing the child's perception of pain. Measurements were taken before and immediately after the intravenous access and blood sampling procedures. The nursing intervention involved the use of a stress ball as a non-pharmacological distraction technique. The child was instructed to grasp and squeeze the stress ball during the intravenous line insertion and blood sampling procedures. The intervention was implemented by an emergency department nurse as part of the application of atraumatic care principles to reduce pain perception and increase the child's comfort during invasive procedures.

Evaluation was conducted by comparing pain levels before and after the intervention using the WBFPRS (Wide-Based Pain Response Score) and observing the child's behavioral responses during the procedure, such as facial expressions, crying, body movements, and level of cooperation. Data were analyzed descriptively to describe changes in pain levels and the child's responses after the stress ball

intervention. The entire nursing care process was implemented after obtaining informed consent from the patient's parent or guardian and maintaining patient confidentiality in accordance with ethical principles of health care and research in children undergoing blood sampling in the emergency room at Cibabat Regional Hospital, Cimahi City.

RESEARCH RESULTS

1. Assessment

The assessment conducted on client An. M through direct interviews, observation, and physical examination revealed an alert response, with the patient responding with full consciousness. Physical examination revealed a clear airway. Breathing was spontaneous, with a respiratory rate of 26 breaths per minute, SpO₂ of 96%, no chest wall retractions, no use of accessory muscles, no chest wall deformities, symmetrical chest expansion, no crepitations, resonant percussion sounds in all lung fields, and no wheezing. Circulation was normal, with no bleeding, blood pressure 95/65 mmHg, pulse rate 78 beats per minute, and CRT <2 seconds. Disability: Consciousness composmentis GCS 15 E:4 M:6 V:5 pupil diameter = +3/+3 mm isochoric, responsive to light. Exposure: No deformities, no open wounds, no swelling, pain in the right arm due to the stab wound, blood sampling, and IV line placement, with a scale of 5.

Secondary assessment (SAMPLE): Subjective findings revealed that the patient's parents reported a fever for 3 days, vomiting 7-10 times today at home, and a lack of appetite due to nausea. Allergies: No drug or food allergies. Medications: The patient's parents reported previously being given antipyretics. Past illnesses: The patient's mother reported no history of past illnesses. Last Meal: The patient's mother reported consuming cold drinks. Leading Event: The patient's mother reported a fever for 3 days.

2. Nursing Diagnosis

Based on the assessment conducted on An. M in the Emergency Department of Cibabat Regional Hospital, the author established a nursing diagnosis of Acute Pain (D. 0077) related to a physical injuring agent, characterized by subjective and objective data. The subjective data found was that the patient complained of pain in the hand for which a blood sample was taken on a scale of 5, while the objective

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data found was that the patient looked restless, the patient complained of pain, the patient looked grimacing, vital signs were BP: 95/65 mmHg, Temperature: 39.5°C, N: 78x/minute, SpO₂: 96x/minute, and RR: 26x/minute.

3. Nursing Interventions

The interventions focused on Pain Management (I. 08238) in accordance with the SIKI (National Infectious Diseases) manual. Supportive interventions included administering a stress ball during blood sampling and prior to pharmacological therapy.

4. Nursing Implementation

Based on the planned interventions, the author implemented Pain Management to address the nursing problem of acute pain related to physical injury agents on Wednesday, February 19, 2025. The interventions were administered at 5:40 PM WIB (Western Indonesian Time), including administering a stress ball to reduce pain during blood sampling. The patient was distracted by the stress ball. At 5:43 PM WIB, the author identified the patient's nonverbal pain response and the location, characteristics, duration, frequency, quality, and intensity of the pain. The patient's examination revealed grimacing and pain in the right arm. The pain was attributed to a sharp object and did not radiate. At 17.45 WIB, the pain scale was identified in the patient with a pain scale result of 5. At 17.55 WIB, the success of the complementary therapy that had been given was monitored with the result that the pain scale decreased to 3 after being given distraction using a stress ball, the assessment was carried out using the Wong-Baker Faces Pain Rating Scale and Numeric Rating Scale.

5. Evaluasi Keperawatan

Evaluasi dari implementasi keperawatan yang telah dilakukan selama 1 x 6 jam pada tanggal 19 Februari 2025 pukul 17.40 WIB dengan masalah keperawatan nyeri akut berhubungan dengan agen pencedera fisik didapatkan hasil sebagai berikut: S: Pasien mengatakan nyeri berkurang. O: Skala nyeri menurun dari 5 menjadi 3, gelisah menurun, meringis menurun, TD: 100/70 mmHg, Suhu: 39,5°C, N: 88x/menit, SpO₂: 97x/menit, dan RR: 26x/menit. A: Masalah nyeri akut teratasi sebagian. P: Intervensi dilanjutkan.

DISCUSSION

According to information gathered by the author, the following is a problem found in An. M: blood pressure of 95/65 mmHg without any associated target organ damage. This is explained theoretically Pain is a major stressor for hospitalized preschool children. Based on their developmental stage, preschool children are highly vulnerable to threats to bodily integrity. Their perception of pain is influenced by imaginative and egocentric thinking, leading them to view events in an exaggerated and frightening manner (Laporte et al., 2017).

Dengue Hemorrhagic Fever (DHF) is a disease caused by dengue virus infection, transmitted through the bite of the *Aedes aegypti* and *Aedes albopictus* mosquitoes. This condition is characterized by a high fever that appears suddenly over a period of 2–7 days, accompanied by muscle and joint pain, and bleeding symptoms such as nosebleeds or red spots on the skin (petechiae) (World Health Organization, 2009).

The results of the supporting examination on February 19, 2025, on the patient showed laboratory results: Hemoglobin 11.6 g / dL, Leukocytes 7,800 / mm³, Hematocrit 35%, Platelets 334,000 / mm³, Erythrocytes 4.38 million / uL. From the data above, the author established a diagnosis of acute pain as the main nursing problem because it was adjusted to the patient's situation in the field. From the problems that emerged, there was a need for complementary therapy in addition to pharmacological therapy. After the patient was given non-pharmacological techniques, there was a change in the patient. And other according to it has been shown that intravenous cannulation is the most common source of pain in children, and they may remember it as the most painful procedure they have ever experienced (Friedrichsdorf, Postier, Eull, Weidner, Foster, Gilbert, & Campbell, 2015). Providing relaxation will provide comfort to the patient (Badrujamaludin, Rismayanti, Ismafiaty, & Bangun, 2025).

The intervention provided in this study was the administration of a stress ball. This intervention involved administering a stress ball to the patient during blood sampling. An evaluation of the patient's pain level was then conducted, and the results showed a decrease from moderate pain (scale 5) to mild pain (scale 3).

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There were differences in the intervention between the SIKI and the case study; in this case, an additional intervention, namely the administration of a stress ball, was necessary. According to the theory discussed a stress ball is a small object that can be grasped and squeezed to reduce stress and ease muscle tension. Stress balls are generally made of soft, flexible materials, such as foam, gel, or rubber. Although called a "stress ball," their shape is not always round and can vary depending on the available design. This action is intended to distract children and reduce pain during the blood sampling process (Amelia, 2024).

This was revealed The results found that a survey of blood test procedures undertaken by children. The survey results indicated that preschool children (3-6 years old) experienced moderate to severe pain during venous blood draws (Purnama et al., 2022). According to other research the use of non-pharmacological techniques has a significant impact on pain management in children. To make pain more tolerable and manageable for children, non-pharmacological methods can be used, either in conjunction with pharmacological ones (Setiawati & Novikasari, 2021).

CONCLUSION

Emergency nursing care for patients with suspected DHF at the Cibabat Regional Hospital in Cimahi City, A.n.M., using a stress ball, showed that during blood sampling, pain assessment using the Wong-Baker Faces Pain Rating Scale and Numeric Rating Scale decreased to a 3 after the stress ball was administered. This value indicates that implementing a stress ball to reduce pain in children during blood sampling can help reduce pain. The use of a stress ball simplifies the blood sampling process in preschool children and helps expedite diagnosis by reducing the risk of failure during blood sampling. This study can be used as a reference by hospitals in managing preschool children who experience mild to moderate pain during blood sampling. For nurses, these findings can support the use of non-pharmacological therapies such as stress balls to help relieve pain. Future researchers are expected to conduct quantitative experimental studies to test the effectiveness of stress ball use in similar contexts.

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