Application of Katherine Kolcaba's Comfort Theory in Overcoming Fatigue in Children with Cancer Undergoing Chemotherapy

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Abstract. Background: Fatigue is defined as a person's feeling or mood that is manifested by feeling tired, losing energy, and/or not having the desire to do anything. Children with chronic diseases will more often experience fatigue, which can impact their quality of life.

Aim: to provide an overview of the application of Katharine Kolcaba's Comfort Theory in Nursing Care for Children with Fatigue. The innovation project intervention provides progressive muscle relaxation once a day, in the morning, with a duration of 15 min for 5 consecutive days.

Results: The results showed no effect of progressive muscle relaxation on fatigue. However, there was a change in the fatigue scores. A progressive muscle relaxation is a form of physical exercise that can be done in children with cancer undergoing chemotherapy.

Conclusion: Katherine Kolcaba's Comfort Theory approach and to look for Evidence Base Nursing Practice that can be used to overcome these problems.

Keywords: fatigue · children with cancer · progressive muscle relaxation

1 Introduction

Chemotherapy treatment in children with cancer causes various side effects, one of which is fatigue. Fatigue is influenced by various factors, namely individual, environmental, and disease factors during chemotherapy [1]. Individual factors include gender and developmental age. Environmental factors are related to the frequency of hospitalization during chemotherapy. Disease factors include the type of cancer and chemotherapy given [2, 3].

Other studies state that a person's level of depression also influences fatigue. Treatment and diagnosis of cancer can cause depression which will then affect the inflammatory response in the body and be involved in the pathophysiology of fatigue. Children with cancer who experience symptoms of depression will feel more severe fatigue [4].

Fatigue is defined as a person's feeling or mood which is manifested by feeling tired, losing energy, and or not having the desire to do anything. Unfortunately, fatigue felt by

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children is often not noticed by parents and nurses. One of the reasons for this condition is that children are unable to recognize the fatigue that is felt. Another reason is that children are unable to express their feelings [4, 5].

The resident nurse applied Kolcaba's Comfort Theory by conducting an assessment of three types of comfort, namely relief where children need specific comfort needs, ease where children are free from discomfort and increase their sense of comfort, and transcendence where children are able to adapt to the discomfort they feel, and four contexts of comfort, namely physical, psychospiritual, environmental, and sociocultural comfort [6, 7].

Nursing interventions carried out according to Kolcaba's Comfort Theory are divided into three types of comfort, namely standard comfort which is an intervention to maintain homeostasis, then coaching which is an intervention designed to reduce anxiety, provide information, and education to patients and families, and lastly comfort food for the soul which is an intervention designed to increase the calm and comfort of patients' soul [8].

One of the nursing interventions applied is to perform progressive muscle relaxation therapy. Evidence is now growing on the benefits of physical exercise to increase strength, cardiopulmonary exercise, reduce fatigue, and improve general physical function in the pediatric population with cancer. The application of nursing care aims to describe physical activity in the management of fatigue in children with cancer. Comfort is an important part of nursing because it is important in the quality of life.

2 Methods

The methodology used is a case study using a nursing care approach. Nursing care was carried out by applying Kolcaba's Comfort Theory covering the assessment of the contexts of comfort, including assessment of physical comfort, psychospiritual comfort, assessment of sociocultural comfort, and assessment of environmental comfort, with the level of relief, ease, and transcendence comfort. To determine the nursing action plan that will be carried out based on the Kolcaba's comfort assessment, standard comfort, coaching, and comfort food for the soul were used [9, 10]. The cases taken were five cases of children with cancer who underwent chemotherapy in the infection room of Dr. Cipto Mangunkusumo National Central Public Hospital.

3 Results

3.1 Case Overview 1

JG, male, 5 years old, with stage III hepatoblastoma on high risk phase II chemo, neutropenia without fever, thrombocytopenia with clinical bleeding. The child was taken to the hospital because of the appearance of bruises on his hands and feet since one day before being admitted to the hospital. During the assessment, the child complained of nausea and no appetite. The mother said that the child only spent ½ to ¾ of the portion provided by the hospital. The mother said the child just wanted to lie down and could not do his activities (fatigue score 16/40). The results of the assessment of the physical aspect of the child were at relief; namely there were petechiae on the hands but had

improved, the child looked lethargic, 15 kg BW, 108 cm BH (standard BW based on age was 19 kg, BW/BH classification was 83% with criteria of poor nutritional status, normal stature, height of 4 years and 11 months). The results showed that the calculation of fluid balance/24 h (−) 197 mL, diuresis 1.65 ml/kgBW/h. Laboratory examination showed hemoglobin 9.4 g/dL, hematocrit 26.8%, platelet count 14 × 10^3/μL, leukocyte count 3.18 × 10^3/μL, neutrophil 10%, neutrophil count 0.32 × 10^3/μL, AFP (B) 767364.3 ng/mL. The psychospiritual aspect was at ease, meaning that the child was cooperative. The sociocultural aspect of the child was at relief that he looked shy. The environmental aspect of the child was at transcendence, namely the bed handrail was attached. Based on the taxonomic structure of comfort, the priority nursing problems were: 1) risk of bleeding, 2) risk of infection, 3) nutritional deficit, 4) risk of fluid imbalance, 5) fatigue, 6) readiness to increase knowledge, 6) verbal communication disorders. Nursing interventions were carried out based on 1) Standard of comfort, namely monitoring vital signs, monitoring laboratory results, weighing body weigh, checking nutritional status, collaboration with nutritionists, monitoring hydration status, calculating fluid balance for 24 h, collaboration in giving intravenous fluids 2) Coaching, namely teaching progressive muscle relaxation techniques, teaching clean and healthy living behavior 3) Comfort food for the soul, namely giving positive feedback on communication skills, providing comfortable environment. The evaluation results after the action's implementation for 5 × 24 h showed that the child's condition was relatively stable, where the child was able to carry out activities independently or with little assistance from parents (fatigue score 13/40). The child showed an increase in appetite but did not show weight gain, no signs of anemia, no petechiae, no fever, vital signs were within normal limits, hemoglobin 9.8 g/dL, hematocrit 28.3%, platelet count 148 × 10^3/μL, leukocyte count 17.33 × 10^3/μL, neutrophil 57.4%, neutrophil count 9.95 × 10^3/μL, SGOT 47 U/L, SGPT 18 U/L, AFP (B) 767364.2 ng/mL, fluid balance (−) 483 mL, diuresis 6.4 mL/kgBW/h.

3.2 Case Overview 2

ZF, female, 11 years old, with Osteosarcoma. The child was hospitalized for the 5th cycle of chemotherapy. The mother said that initially the child's illness had been due to a fall, at the moment the child had her right leg amputated. The results of the assessment of the physical aspect of the child were at relief, namely the child had complained of decreased appetite since the illness, at the moment the child complained of nausea, the child looked weak, MUAC 18.3 cm, BH 142 cm, (standard MUAC based on age was 22.4 cm, MUAC/A classification was 82% with criteria of poor nutritional status, normal stature, height of 10 years 3 months). The child said that all her activities were assisted by the parents (fatigue score 6/40). Laboratory examination showed hemoglobin 11.4 g/dL, albumin 4.12 g/dL, leukocyte count 3.95 × 10^3/μL, neutrophil 60.2%, neutrophil count 2.38 × 10^3/μL. The psychospiritual aspect of the child was at relief, namely the child felt sad to lose her leg. The child felt that everything had changed since being ill and hospitalized frequently. The child felt that the activities were limited and only relied on a wheelchair and assistance from the parents to carry out her activities. The sociocultural aspect of the child was at relief, namely the parents said that ZF rarely played with peers. The environmental aspect of the child was at transcendence, namely the mobilization of

the child was in a wheelchair and was assisted by the parents. Based on the taxonomic structure of comfort, the priority nursing problems were: 1) risk of infection, 2) nutritional deficit, 3) nausea, 4) fatigue, 5) body image disturbance. Nursing interventions were carried out based on 1) Standard of comfort, namely monitoring vital signs, monitoring laboratory results, measuring mid-upper arm circumference (MUAC), checking nutritional status, collaboration with nutritionists, identification of nausea experiences, identification of factors causing nausea, collaboration in antiemetic administration. 2) Coaching, namely teaching progressive muscle relaxation techniques, recommending expressing self-image of body image 3) Comfort food for the soul, namely identifying body image expectations based on developmental stages, providing comfortable environment. The results of the evaluation after the implementation of the action for 3 × 24 h were that the child said she easely felt tired, the child had started to be able to move from bed to wheelchair with minimal assistance from the family, and sat assisted by the family (fatigue score 12/40). The mother said that the child's appetite was quite good, characterized by stable weight, moist mucous membranes, no signs of anemia, and the child was able to finish the provided portion. The child showed no fever, temperature 36.1 °C, skin did not appear reddish, vital signs were within normal limits, hemoglobin 11.4 g/dL, albumin 4.12 g/dL, leukocyte count 3.95 × 10^3/μL, neutrophil 60.2%, neutrophil count 2.38 × 10^3/μL, no hypersalivation occurred. ZF said her right leg had been amputated. At the moment, ZF had come to terms with this situation and had hope and confidence that one day she would be able to use prosthetic limbs.

3.3 Case Overview 3

SA, female, 14 years old, with Acute Myeloblastic Leukemia type II. The child had been diagnosed since 2017. The child was hospitalized for the consolidation phase of chemotherapy. The results of the assessment of the physical aspect of the child were at relief, namely the child looked lethargic, BW 33 kg, BH 153 cm (standard weight based on age was 51 kg, classification of BW/BH was 77% with criteria of poor nutritional status, normal stature, height of 12 years old one month). The child said her appetite decreased when treated. The child said she felt slow to count and easily forgot things (fatigue score 14/40). Laboratory examination showed hemoglobin 10.7 g/dL, albumin 4.10 g/dL, platelet count 120 × 10^3/μL, hematocrit 30.0%, SGOT 23 U/L, SGPT 22 U/L, leukocyte count 2.44 × 10^3/μL, neutrophil 60.3%, neutrophil count 1.47 × 10^3/μL. The psychospiritual aspect of the child was at relief, namely the child did not feel sad about his illness and was quite happy. The child felt anxious if there was no remission. The sociocultural aspect of the child was at transcendence, namely SA was sociable but sometimes the child prefered to be alone. The environmental aspect of the child was at transcendence; namely the bed handrail was attached. Based on the taxonomic structure of comfort, the priority nursing problems were: 1) risk of bleeding, 2) risk of infection, 3) nutritional deficit, 4) fatigue, and 5) readiness to increase knowledge. Nursing interventions were carried out based on 1) Standard of comfort, namely monitoring vital signs, monitoring laboratory results, weighing, checking nutritional status, and collaboration with nutritionists 2) Coaching, namely teaching progressive muscle relaxation techniques, teaching clean and healthy living behavior 3) Comfort food for the soul, namely providing a comfortable environment. The evaluation results after the action's

implementation for 3 × 24 h were that the child did not complain of weakness, the child was able to remember the history of previous illness, and the child was able to answer calculation questions correctly (fatigue score 11/40). At the moment, the child showed no petechiae, no fever, vital signs within normal limits, haemoglobin 10.3 g/dL, albumin 4.10 g/dL, platelet count 73 × $10^3/\mu L$, hematocrit 28.7%, SGOT 23 U/L, SGPT 21 U/L, leukocyte count 1.55 × $10^3/\mu L$, neutrophil 22.6%, neutrophil count 0.35 × $10^3/\mu L$.

3.4 Case Overview 4

FZ, male, seven years old, with Acute Lymphoblastic Leukemia (ALL L2). The child was diagnosed in March 2021. The child was hospitalized for the consolidation phase of chemotherapy. The results of the assessment of the physical aspect of the child were relief, namely, the child appeared to be lying on the bed, the child easily felt tired, and the child was not strong enough to climb stairs (fatigue score 8/40). Currently, BW is 22.2 kg, BH 116 cm (standard weight based on age was 24 kg, the classification of BW/BH was 105% with criteria of good nutritional status, short stature, the height of 6 years and one month). Laboratory examination showed hemoglobin 10.7 g/dL, albumin 4.10 g/dL, platelet count 120 × $10^3/\mu L$, hematocrit 30.0%, SGOT 23 U/L, SGPT 22 U/L, leukocyte count 2.44 × $10^3/\mu L$, neutrophil 60.3%, neutrophil count 1.47 × $10^3/\mu L$. The psychospiritual aspect of the child was a relief, namely the parents said FZ asked about death due to his illness. The sociocultural aspect of the child was at ease, namely FZ was very close to his father. The environmental aspect of the child was at transcendence, namely the bed handrail was attached. Based on the taxonomic structure of comfort, the priority nursing problems were: 1) risk of bleeding, 2) risk of infection, 3) risk of nutritional deficit, 4) anxiety, 5) fatigue. Nursing interventions were carried out based on 1) Standard of comfort, namely monitoring vital signs, monitoring laboratory results, weighing, checking nutritional status, collaboration with nutritionists 2) Coaching, namely teaching progressive muscle relaxation techniques 3) Comfort food for the soul, namely monitoring signs of anxiety, creating a therapeutic atmosphere to foster trust, providing a comfortable environment. The evaluation results after implementing the action for 3 × 24 h were the child easily felt tired, the child was not strong enough to climb stairs, and the child was assisted in carrying out self-care activities (fatigue score 10/40). At the moment, the child showed no petechiae, no fever, vital signs within normal limits, hemoglobin 11.8 g/dL, and albumin 3.59 g/dL, platelet count 361 × $10^3/\mu L$, hematocrit 35.5%, SGOT 37 U/L, SGPT 22 U/L, leukocyte count 4.85 × $10^3/\mu L$, neutrophil 48.3%, neutrophil count 2.34 × $10^3/\mu L$.

3.5 Case Overview 5

BR, male, 4 years old, with Retinoblastoma. The child had been diagnosed since 2017. The child was hospitalized for chemotherapy with the third protocol in the third cycle. The results of the assessment of the physical aspect of the child were at relief, namely the child slept more, did not want to play, easily felt tired, was unable to climb stairs, and was assisted for self-care activities (fatigue score 17/40). The results of the examination were BW 17.7 kg, BH 106 cm (BW based on age was normal body weight −2 SD to + 1 SD, BH based on age was normal −2 SD to +3 SD, classification of BW/BH was −2

SD sd +1 SD with criteria of good/normal nutritional status, height of 52–53 months). Laboratory examination showed hemoglobin 9.8 g/dL, leukocyte count 10.44 × 10^3/μL, neutrophil 31.3%, neutrophil count 3.27 × 10^3/μL. The psychospiritual aspect of the child was at ease, namely the child was not fussy. The sociocultural aspect of the child was at relief, namely the child was quiet and shy. The environmental aspect of the child was at ease, namely the handrail of the bed was attached. Based on the taxonomic structure of comfort, the priority nursing problems found in the child were: 1) risk of infection, 2) risk of fall, 3) risk of nutritional deficit, 4) fatigue, 5) verbal communication disorder. Nursing interventions were carried out based on 1) Standard of comfort, namely monitoring vital signs, monitoring laboratory results, identifying risk factors for fall, calculating the risk of fall using the Humpty Dumpty Scale, installing bed handrails, weighing, checking nutritional status, collaboration with nutritionist 2) Coaching, namely teaching progressive muscle relaxation techniques. 3) Comfort food for the soul, namely giving positive feedback on communication skills, providing comfortable environment. The evaluation results after implementing the action for 3 × 24 h were that the child slept more, did not want to play, easily felt tired, was unable to climb stairs, and was assisted for self-care activities (fatigue score 23/40). The child showed no fever, vital signs were within normal limits, hemoglobin 9.8 g/dL, leukocyte count 10.44 × 10^3/μL, neutrophil 31.3%, neutrophil count 3.27 × 10^3/μL, risk of fall score 11.

4 Discussion

The resident assessed 5 childhood cancer patients undergoing chemotherapy in the non-infectious pediatric ward, first floor of Building A. The study was conducted using interviews, observation, physical examination, medical record data searching through the Electronic Health Record (EHR) and in collaboration with the medical team at the hospital. The resident conducted the assessment using an assessment format developed based on Kolcaba's Comfort Theory. The assessment was carried out in 4 comfort contexts, namely physical, psychospiritual, environmental, and social comfort [3, 11].

The context of physical comfort was assessed through physical examination and biological assessment. The physical examination results showed good general condition, compos mentis consciousness, and vital signs within normal limits. Although, in general, the children had no complaints when they came to the hospital, the reason the children went to the hospital was for chemotherapy. Research states that 65.5% of children with cancer diagnosis undergo hospitalization to continue chemotherapy.

The results of the biological assessment showed that the children looked lethargic. In interviews, the parents said that their child woke up earlier than usual to go to the hospital. The parents said they had asked their child to go to bed earlier, but the children had difficulty initiating Sleep. This condition was usually experienced by the children during treatment. Research states that the factors that affect a child's Sleep during hospitalization are illness, interactions with doctors/nurses, bedtime routines, physiological factors (pain, discomfort), psychological factors (stress, anxiety). For most children, the presence of parents and environmental factors (noise, lighting, temperature) also affect their Sleep during hospitalization.

The results of the assessment of nutritional status showed that 3 out of 5 children had poor nutritional status and the parents stated that their child's appetite decreased during

chemotherapy. Research shows that nutritional status is not related to fatigue levels. The role of parents is very important to regulate the activity level of children. Children with cancer also need ongoing support not only from parents, but also from peers, schools, and their environment.

The context of psychospiritual comfort was indicated by the expression of the children who said that they had accepted their situation, even though at first they felt sad because of their illness. Suffering due to illness diagnosis and repeated hospitalization has an impact on the emergence of spiritual needs. Children and adolescents have different spiritual needs during hospitalization such as the need to integrate meaning and purpose in life, realize hopes, express beliefs and practice religious prayers, find comfort at the end of life, and establish relationships with family and friends [11].

The parents also stated the same thing, namely they felt sad about their child's illness, but they had faith and hope for their child's health. The parents had faith based on their beliefs that the situation they were facing was a test from God, that we as humans must try and continue to pray. The result of the study showed different thing where 74.7% of parents with children suffering from chronic diseases in China have low family resilience because 69.7% of the parents do not believe in any religion.

The condition of the treatment room affects the context of environmental comfort. The results of the observation showed that the treatment room was clean, quiet, well lit, and the room temperature was warm. Each child was placed in their own bed according to their age. Each bed was equipped with handrail and fall risk sign. Research shows that the setting of the physical environment has an important influence on the healing process of patients in hospitals. Physical environmental factors include artworks and healing process, optimizing environmental lighting and scenery in the treatment room, noise prevention in the hospital, combining music therapy, therapeutic garden, the hospital design, attractive color selection, privacy and individual control, cleanliness and convenience of environmental care. These factors will create a therapeutic environment so that patients are able to achieve optimal levels of health.

The context of sociocultural comfort can be seen in the presence of families, namely parents who always accompany their children during hospitalization. This situation certainly impacts the family, so adjustments are needed in terms of lifestyle changes, interactions between family members, division of roles, sources of income, and quality of life of the family as well as each member in the family. Every family has its own way of playing a role in improving the physical, emotional, and social abilities of children with chronic diseases. Families need nurses' support to adapt to situations and disease processes experienced by children.

Most people in everyday life almost feel fatigue, and children are no exception. This type of fatigue is mild fatigue or temporary fatigue that can be relieved by rest and has minimal impact on daily life. However, for some individuals, especially children with chronic diseases, fatigue will be experienced more often and felt more severe. This type of fatigue will have a wider and deeper impact on the quality of life.

Fatigue is a person's feeling or mood manifested by feeling tired, losing energy, and/or not having the desire to do anything. The main symptoms and signs of this problem are feeling that energy does not recover even after sleeping, feeling less energetic, complaining of fatigue, unable to maintain routine activities, looking lethargic. Minor

symptoms and signs are feelings of guilt due to not being able to carry out responsibilities, decreased morale, increased need for rest.

Kolcaba's Comfort Theory can be used to provide comfort interventions for patients. This theory is integratively aims to meet the needs of comfort holistically. Kolcaba's Comfort Theory is integrative which is an approach by combining several methods that aim to provide comfort in four comfort contexts: Physical, psychospiritual, sociocultural, and environmental [11].

The intervention in Kolcaba is divided into three categories, namely standard of comfort, coaching and comfort food for the soul. These three categories of interventions can be used to address the problem of discomfort in the four comfort contexts that arise in the patient. The success of implementing interventions to overcome problems is strongly influenced by factors outside of nursing theory, such as the availability of infrastructure, the ability of families to participate in child care.

The nurses are expected to be able to innovate to overcome all existing limitations. In implementing the intervention of progressive muscle relaxation therapy, the nurses involved the family and taught relaxation movements through a video with a duration of ±7 min that explained the principles, goals, benefits, and steps of the progressive muscle relaxation movements. In addition, the nurses involved parents in assisting children to do progressive muscle relaxation once a day in the morning between 08.00–09.00 for five consecutive days. The expected outcome criteria were that the children did not look weak, did not complain of being tired, did not looked lethargic, the respiratory rate was in the normal range of 20–24×/min.

Standard of comfort by identifying a quiet and comfortable place, monitoring regularly to ensure muscles were relaxed, monitoring for indicators of not relaxing such as movements, heavy breathing. Coaching by demonstrating and practicing progressive muscle relaxation techniques, motivating children and parents to do progressive muscle relaxation once a day after waking up at 07.00–09.00 for 10–15 min. Comfort food for the soul by creating a calm environment during therapy, providing a comfortable position.

Progressive muscle relaxation therapy was carried out for 5 consecutive days starting on the first day of chemotherapy until the fifth day in the morning at 08.00–09.00 after the child woke up for 15 min. Effective progressive relaxation therapy was carried out for 5 consecutive days from the first day of chemotherapy until the fifth day. It is in line with previous studies that provide progressive muscle relaxation for 5 consecutive days starting when chemotherapy drugs are given.

Katharine Kolcaba defines nursing as a process for assessing patient comfort needs, developing and implementing appropriate nursing interventions and evaluating patient comfort after nursing interventions are given. The ultimate goal of nursing is to increase comfort to the patient. By reassessing the patient's comfort level, nurses can evaluate the success of the interventions that have been carried out.

Nursing evaluation is the final stage in the nursing process that is carried out to assess the effectiveness of nursing interventions that have been carried out based on predetermined goals. The evaluation for nursing fatigue problems was carried out on the fifth day since chemotherapy was given. The evaluation was done by asking the child

and parents about the fatigue felt by the child. The evaluation of the five cases showed different results where 3 out of 5 children showed an increase in fatigue scores.

Fatigue in children with cancer is divided into 3 fatigue dimensions: general, rest/Sleep, and cognitive fatigue. The children experienced more sleep/rest fatigue compared to other fatigue dimensions. Sleep/rest fatigue was caused by hospital noise such as the sound of the telephone, the alarm from the infusion pump, the sound of crying, the activities of nurses at the nurse station, slamming doors, and other disturbances that often occur during hospitalization. Complaints felt by the children such as pain, nausea, vomiting, diarrhea, or increased frequency of urination can also interfere with sleep/rest.

The results of interviews with the children and the parents stated that the fatigue felt was reduced. The fatigue felt by the children was influenced by the higher intensity of chemotherapy and treatment related to the symptoms felt. Medical procedures during hospitalization such as lumbar puncture, bone marrow aspiration, and repeated blood draws can cause pain and stress that triggers fatigue.

Adolescents reported that the hospital environment and the absence of pleasurable activities were the main causes of fatigue. Changes in physical activity and changes in negative feelings such as anger and sadness also cause fatigue during hospitalization. According to the perspective of parents, anorexia due to chemotherapy can also cause fatigue in their children.

5 Conclusions

The conclusions of the application of nursing care using Kolcaba's Comfort Theory in children with fatigue are:

a. Based on the results of the study conducted in the context of physical, psychospiritual, environmental, and sociocultural comfort, all selected cases experienced fatigue problems.
b. The nursing interventions and implementations were carried out by looking at the patients holistically with standard comfort approach to maintain homeostasis, coaching to provide progressive muscle relaxation education, and comfort food for the soul to take actions that could increase patient comfort and to pay attention to the environment that could increase patient comfort.
c. The nursing evaluations showed that all of the children experienced a decrease in the level of fatigue after being given progressive muscle relaxation.
d. The nursing care based on Kolcaba's Comfort Theory can be applied to children with fatigue.

In addition to focusing on the physical problems that children complain about due to treatment or cancer itself, nurses are also expected to explore children's experiences with other problems that arise due to cancer and treatment through a comprehensive and holistic approach. Nurses are expected to be able to provide nursing care for children with cancer with fatigue problems through Katherine Kolcaba's Comfort Theory approach and to look for Evidence Base Nursing Practice that can be used to overcome these problems. In addition, it is hoped that more supporting facilities and infrastructure will be available for children to carry out activities and channel hobbies while in the hospital.

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