

EDBEHOS SLEEP THERAPY ON SLEEP QUALITY IN CHILDREN WITH ACUTE LYMPHOBLASTIC LEUKEMIA DURING CHEMOTHERAPY

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ABSTRACT

This study aims to analyze the optimization of meeting children's rest/sleep needs by implementing EdBeHos Sleep Therapy. The method used is quasi-experimental with the application of Evidence-Based Nursing Practice EdBeHos Sleep Therapy. The study's results found a significant difference in sleep quality scores between the intervention and control groups ($p < 0.001$). In conclusion, the EdBeHos Sleep Therapy intervention can be applied to overcome sleep problems so that it can improve the quality of life of children with cancer.

Keywords: Edhebos, Sleep Quality, Acute Lymphoblastic Leukemia, Chemotherapy, Sleep Quality

INTRODUCTION

Acute Lymphoblastic Leukemia (ALL) is a type of cancer that affects the blood and bone marrow (Fernandes, 2020). The rising number of leukemia cases among children in several Indonesian hospitals. It has become the most prevalent form of childhood cancer in the country (Fernandes & Andriani, 2021). ALL is the most common type of pediatric cancer, and treatment is long and intensive (Steur et al., 2020).

Chemotherapy is one of the most effective treatments for ALL and has helped increase the chances of survival for many children (Fernandes & Andriani, 2021). Chemotherapy is used to treat cancer that cannot be treated with surgery or radiation therapy. It can kill cancer cells and prevent metastasis. Chemotherapy destroys cancer cells, but can also affect normal cells by inhibiting their performance. Common conditions experienced by children with cancer undergoing chemotherapy are fatigue, mucositis, nausea, pain, sleep disorders, depression, anxiety, mood changes, and behavioral changes (Sulistyawati et al., 2021). Sleep disorders are one of the most common problems experienced by children with cancer (Castelli et al., 2022).

The incidence of sleep disturbances in pediatric population have been reported to be around 35-46% globally (Kaushik et al., 2022). Children with leukemia who underwent chemotherapy experienced sleep disorders with moderate sleep quality (Fernandes & Andriani, 2021). According to the data, out of 167 children with acute lymphoblastic leukemia, 67 had sleep disorders, which is around 40.12%. On the other hand, out of six children with acute non-lymphoblastic leukemia, three had sleep disorders, which is approximately 50% (Xi et al., 2023).

Quality sleep is essential for physical and mental health (Xi et al., 2023). Sleep is a complex neurological process essential for restoration and recovery of physiological and mental functions of the body. It plays an important role in growth and development of children (Kaushik et al., 2022). It's crucial to maintain normal sleep patterns in children with

cancer as it helps increase protein synthesis and maintain the immune system, leading to improved long-term quality of life (Fernandes & Andriani, 2021).

These sleep problems can have numerous causes including cancer diagnosis, disruption of routine, pain, treatment side effects, and inpatient hospitalizations. Sleep can be affected by internal i.e., circadian rhythms, sleep homeostasis (Tucker et al., 2023). Various factors can cause sleep problems, but external factors such as parent knowledge, sleep health behavior and hospital environment seem to have the biggest impact (Tucker et al., 2023; Zhou et al., 2023). Nurses need to know the factors affecting children's sleep to develop appropriate interventions and improve their well-being (Fernandes & Andriani, 2021; Traube et al., 2020).

External factors can affect a child's sleep. To address this, sleep therapy uses interventions such as parent education, behavioral sleep medicine, and hospital-based interventions (Mogavero et al., 2020; Oliveira et al., 2020; Van Den Ende et al., 2022). So it can be called EdBeHos (Education, Behavior, and Hospital) Sleep Therapy.

Parent education programs play a crucial role in enhancing parents' understanding of children's sleep patterns. By gaining knowledge in this area, parents become better equipped to identify whether their child's sleep is adequate or not. This is particularly significant since sleep quality can have a significant impact on a child's overall health and well-being, including their cognitive development, emotional regulation, and physical health. Therefore, initiatives that promote parent education on children's sleep should be encouraged and supported as they can contribute to promoting healthier and happier lives for both parents and children (Oliveira et al., 2020).

Behavioral Sleep Medicine Intervention is a specialized approach that involves cognitive-behavioral therapy (CBT) aimed at helping children with cancer develop and maintain healthy sleep habits. This intervention not only addresses the physical symptoms of insomnia but also targets the psychological factors that may be contributing to sleeplessness. By helping children manage their thoughts and emotions, this therapy can be an effective way to improve their sleep quality and overall well-being during cancer treatment (Mogavero et al., 2020). According to the findings of a systematic review of various interventions for sleep pattern disorders, CBT is recommended as an effective intervention for practice. Overall, the review suggests that CBT is a safe and promising intervention for sleep pattern disorders (Stavinoha et al., 2021).

Hospital Based Intervention is a comprehensive approach to creating a supportive environment for children undergoing cancer treatment in hospitals. It involves restructuring the hospital environment to minimize disruptions to children's sleep, which is essential to their overall well-being and recovery. This type of intervention includes measures such as reducing noise levels, adjusting lighting, and providing comfortable bedding to ensure that children can rest comfortably and receive the care they need (Van Den Ende et al., 2022). By implementing these interventions, hospital staff can help to reduce the stress and trauma associated with cancer treatment, which can have a positive impact on children's health outcomes. Overall, Hospital Based Intervention is an important strategy for providing safe, effective, and compassionate care to children with cancer (Steur et al., 2020).

This study aims to address the issue of sleep disturbances in children with cancer who are receiving chemotherapy in the pediatric ward. The researchers are using a comprehensive approach known as EdBeHos Sleep Therapy, which involves three activities that work together to improve sleep quality. The first activity is Parent Education, which aims to teach parents how to create a conducive sleep environment for their child. The second activity is Behavioral Sleep Medicine Intervention, which addresses behavioral factors that may be

contributing to poor sleep. Finally, the third activity is Hospital-Based Intervention, which focuses on creating a sleep-friendly environment in the hospital setting. By using this combination of nursing interventions, the researchers hope to improve the quality of life for children with cancer and their families.

RESEARCH METHOD

This study appears to be using a quasi-experimental method and non-probability sampling to select a sample of school-age children and adolescents (6 - 18 years) with a diagnosis of ALL who are undergoing chemotherapy and experiencing sleep disorders. The inclusion criteria involves selecting the entire sample, while the exclusion criteria includes pediatric patients with vision and hearing disorders, psychological disorders, developmental disorders, those using oxygen assistance, and those with decreased consciousness.

The study was conducted in the pediatric ward between May and September 2022, with a total of 50 participants divided into two groups - 25 in the intervention group and 25 in the control group, chosen through simple random sampling. Participants in the intervention group underwent the EdBeHos Sleep Therapy intervention, which included education about healthy sleep habits using a flip sheet, guidance on creating a sleep-promoting environment, and the provision of a sleep pouch containing an eye patch, a pair of ear plugs, and socks to support their sleep.

The results of the normality test are the basis for determining the bivariate analysis of data used for each variable. The homogeneity test was also carried out using the Levene test and to see the differences between the two groups an unpaired difference test (Independent T Test) was carried out.

RESULT

Sample Characteristics

Table. 1
Baseline Characteristics

Characteristics	Control Group (N=25)		Intervention Group (N=25)	
	n	%	n	%
Age				
School Age (6-12 tahun)	17	68 %	15	60 %
Adolescents (13-18 tahun)	8	32 %	10	40 %
Sex				
Male	18	72 %	12	48 %
Female	7	28 %	13	52 %
ALL Type				
<i>Standard Risk</i>	19	76 %	21	84 %
<i>High Risk</i>	6	24 %	4	16 %
Chemotherapy cycle				
Induction	12	48 %	9	36 %
Consolidation	6	24 %	7	28 %
Maintenance	7	28 %	9	36 %

Table 1 shows the descriptive demographic variables for the study sample. The statistics show that in the control group, the most common age group was school age children (68%). Additionally, the majority of the group was male (72%). Standard Risk was the most common type of ALL (76%). The intervention group showed similar results regarding the age group, with school age children being the most common (60%). However, the majority of the

group was female (52%). Standard Risk was also the most common type of ALL (84%). The chemotherapy cycles in this group were dominated by induction and maintenance cycles (36%).

Sleep Quality Scores

Table. 2
Sleep Quality Scores of Respondents

Sleep Quality Scores		Mean	SD	Min-Max
Control Group	Intervention Group	15.2	6,4	5-19
		4,8	4,6	1-5

Table 2 report the mean sleep quality score of the intervention group (4.8) was lower than the mean score of the control group (15.2). Therefore, the conclusion was that the intervention group had better sleep quality than the control group.

Relationship of EdBeHos Sleep Therapy and Sleep Quality

Based on the results of the study, it appears that there was a notable difference in the mean sleep quality scores between the group that received sleep therapy and the group that did not. The control group had an average sleep quality score of 15.2, while the intervention group had an average score of 4.8. This means that there was a difference of 10.4 between the two groups, indicating that the sleep therapy had a significant impact on their sleep quality.

Furthermore, the obtained p value of 0.001 suggests that this difference was statistically significant. This means that the probability of obtaining results as extreme as these by chance alone is less than 0.1%. Therefore, the difference in sleep quality scores between the two groups is unlikely to be due to chance alone, and is more likely the result of the sleep therapy intervention.

DISCUSSION

Sleep Quantity

According to a recent study, it was found that the control group had significantly fewer hours of sleep than the intervention group. The study involved children of school-going age and teenagers, and the results showed that the intervention group had a sleep schedule that was well-planned and adhered to, promoting healthy sleep habits. The intervention group had a nap schedule in the afternoon and at night, with a recommended hour range of 9-11 hours/day for school-age children and 8-10 hours/day for teenagers. In contrast, the control group experienced sleep disturbances at night, which led to their children's sleep being less than the recommended range and needing to compensate for it by sleeping during the day.

Research indicates that sleep disorders are prevalent among children, with a general percentage of around 30%. This percentage further increases in children who suffer from chronic diseases such as cancer. Mereka mengeluhkan rasa kantuk yang sangat saat siang hari dan tidak jarang anak-anak tidur saat beraktivitas (Sulistiyawati et al., 2021).

Daytime napping is recognized as a determinant of sleep quality and regulation in young children and has been found to contribute to their social-emotional functioning. It is also considered to be compensatory for inadequate or poor-quality night sleeping. A study discovered that more frequent and longer naps were related to more night waking. Furthermore, the study established a significant correlation between the accumulated awake time and nap duration. The findings suggest that daytime napping is an important aspect of

young children's sleep quality and should be considered in managing sleep-related issues (Li, 2023).

Time to Fall a Sleep

The results of the study indicate that the intervention group had a significantly shorter time to fall a sleep compared to the control group. This could be attributed to the use of sleep aids in the intervention group, such as eye masks and earplugs. These sleep aids play a crucial role in masking environmental disturbances, such as bright light and loud sounds, which can be a major hindrance in falling a sleep quickly. By using these aids, the environment can be controlled to create a conducive atmosphere for sleep, thereby supporting the child's ability to fall asleep more easily and quickly (Van Den Ende et al., 2022).

The intervention group in a recent study was provided with sleep pockets that included an eye cover, ear plugs, and socks/blanket. This was done to address the issue of sleep disturbance caused by the hospital environment, which is known to negatively impact the quality of sleep in children undergoing treatment. Research has shown that factors such as light, sound, and temperature can disrupt sleep in children, and controlling these aspects of the hospital environment can be an effective way to address sleep disorders in children (Dun et al., 2022). By creating a sleep-supportive environment, it is possible to help children get the restful sleep they need to support their recovery (Chun et al., 2021).

Sleep Quality

The study findings indicate that the control group respondents had poor sleep quality, as indicated by their sleep quality score, which fell within the poor sleep quality category (5-19). The research conducted reveals that children with cancer are prone to experiencing disturbed sleep patterns (Tucker et al., 2023). Similarly, found that children aged 7 to 18 years who received chemotherapy also experienced sleep disturbances. The study further showed that the average person woke up for an hour a night, while the average child woke up six times during the night, which could negatively affect their overall well-being (Fernandes & Andriani, 2021). Sleep disturbances in children with cancer and those receiving chemotherapy are often linked to several factors, including illness, medication, and the child's age. Patients with cancer tend to experience sleep disturbances at a higher rate than the general population (Kudubes et al., 2023).

The study states that respondents who were part of an intervention group and received sleep therapy had an average sleep quality score falling within the category of good sleep quality (1-5). This indicates that sleep therapy was beneficial in improving the quality of sleep for the patients. Oncology nurses need to be knowledgeable about evidence-based practices that are effective in assessing and enhancing patient sleep quality. This is crucial as many cancer patients suffer from sleep disturbances, which can lead to adverse outcomes such as fatigue, depression, and impaired cognitive function (Steur et al., 2020). Therefore, ensuring adequate sleep quality is vital in improving the overall well-being of oncology patients.

EdBeHos Sleep Therapy

A recent study has explored the effectiveness of EdBeHos Sleep Therapy, an evidence-based nursing practice, in improving the quality of sleep in children with cancer who are undergoing chemotherapy and experiencing sleep disorders. The results of the study indicate that the group of children who receive EdBeHos Sleep Therapy experienced a statistically significant improvement in the quality of sleep, as evidenced by a decrease in sleep quality scores ($p < 0.001$).

Furthermore, the study findings are in line with previous research on parental knowledge of children's sleep. According to this research, parents who are more knowledgeable about sleep are more likely to report their children's sleep conditions as good or bad (Zhou et al., 2023). This suggests that providing parents and caregivers with education and resources about sleep can play an important role in improving the quality of sleep in children, particularly those with cancer who are undergoing chemotherapy and experiencing sleep disorders. Educational programs that teach parents about healthy sleep can help children and adolescents improve their sleep patterns. By providing parents with information on how to promote healthy sleep habits, children and adolescents are able to get better rest (van Bindsbergen et al., 2022).

Cognitive Behavioral Therapy (CBT) has emerged as the most prominent non-pharmacological treatment approach for sleep disorders. CBT is a multi-component treatment that targets the behavioral, cognitive, and physiological factors that perpetuate insomnia. This approach aims to modify and change maladaptive behaviors and distorted beliefs about sleep, leading to a significant improvement in sleep quality (Chan et al., 2021; Chun et al., 2021).

A recent meta-analysis examined the effects of CBT specifically in cancer patients and found that it had small to moderate effects in improving sleep quality as measured by sleep diaries. Additionally, it had large effects in reducing patient-reported sleep disturbance symptoms. These findings indicate that CBT is an effective approach to improve sleep quality and reduce the symptoms of sleep disturbance (Chun et al., 2021).

Research has shown that hospital environments can have a significant impact on patient sleep. Distractions and light are among the most common disturbances that can affect patients' sleep quality in hospitals. However, it is possible to modify these factors and improve patients' sleep quality. One of the effective solutions is providing eye masks and earplugs, as they can help patients overcome lighting problems and distractions in hospitals (Chun et al., 2021; Van Den Ende et al., 2022).

Apart from the hospital environment, factors related to the treatment room can also contribute to sleep disturbance in patients. Environmental factors such as temperature and room disturbances can affect patient oncology, especially in hospital environments where treatment actions are unpredictable (Chun et al., 2021). To address these challenges, hospital-based interventions have been developed to protect patients' sleep while they receive cancer treatment. Hospital-Based Intervention is a comprehensive approach that involves restructuring the hospital environment to create a more conducive atmosphere for patients to sleep. This intervention is particularly effective for children receiving cancer treatment (Van Den Ende et al., 2022).

Implication for Nursing

The importance of fulfilling children's sleep needs cannot be overstated, particularly when they are undergoing treatment for diseases. Children need a good night's sleep to perform daily activities such as playing, studying, and performing tasks at home. When children are in the hospital, it can be challenging to get the rest they need due to the unfamiliar environment, medical equipment, and noise. Therefore, it's essential for parents to take an active role in ensuring that their child's sleep needs are met both in the hospital and at home.

The EdBeHos Sleep Therapy intervention is an excellent approach to improving children's sleep quality and addressing sleep disorders. This program has seen an increase in providing care to children with sleep disorders, including the use of valid instruments and technology to assess their sleep needs. The use of technology has made it possible to gather

accurate data on children's sleep patterns, which can be used to develop individualized care plans for each child.

Standard operating procedures have been developed for the EdBeHos Sleep Therapy intervention, which serves as a reference for nurses in providing nursing care. These guidelines ensure that all healthcare providers have a consistent approach to care, leading to better outcomes for children.

Future Direction

In the future, hospitals can prioritize case management by grouping children according to their cancer type and providing special treatment rooms for those with sleep disorders. Departments such as radiology, pharmacy, rehab medicine, and laboratory can coordinate to ensure that children's sleep is not disrupted during hospital treatment.

CONCLUSION

The study found that children with ALL who received chemotherapy experienced different sleep quality depending on whether they received EdBeHos sleep therapy. The intervention group showed an improvement in sleep quality, while the control group experienced a decrease. This suggests that EdBeHos sleep therapy can be an effective way to help children with ALL overcome sleep pattern disorders.

Additionally, training for nurses in providing sleep needs for children with cancer has been implemented, which is a step forward in improving their long-term quality of life. In summary, the EdBeHos Sleep Therapy intervention is a critical approach to improving children's sleep quality and addressing sleep disorders. Parents must take an active role in ensuring their child's sleep needs are met, both in the hospital and at home. With the use of valid instruments, technology, and standardized procedures, healthcare providers can provide better care, leading to better outcomes for children.

SUGGESTION

It is necessary to conduct research that compares the effectiveness of this intervention with other interventions and evaluates the impact on sleep quality in children. Future research should also explore the use of technology for measurement, which will be a key area of focus.

REFERENCE

- Castelli, L., Elter, T., Wolf, F., Watson, M., Schenk, A., Steindorf, K., Bloch, W., Hallek, M., Joisten, N., & Zimmer, P. (2022). Sleep Problems and Their Interaction with Physical Activity and Fatigue in Hematological Cancer Patients During Onset of High Dose Chemotherapy. *Supportive Care in Cancer*, 30(1), 167–176. <https://doi.org/10.1007/s00520-021-06377-5>
- Chan, N. Y., Chan, J. W. Y., Li, S. X., & Wing, Y. K. (2021). Non-Pharmacological Approaches for Management of Insomnia. *Neurotherapeutics*, 18(1), 32–43. <https://doi.org/10.1007/s13311-021-01029-2>
- Chun, W., Chao, D., Qi, H., Dongliang, Z., Zhenmei, L., & Jia, L. (2021). Pharmacological and Non-Pharmacological Treatments for Insomnia. *Medicine*, 100(31), e26678. <https://doi.org/10.1097/md.00000000000026678>
- Dun, L., Xian-Yi, W., Si-Ting, H., & Xin-Yuan, Y. (2022). Effects of Sleep Interventions on Cancer-Related Fatigue and Quality of Life in Cancer Patients: A Systematic Review And Meta-Analysis. *Supportive Care in Cancer : Official Journal of the Multinational Association of Supportive Care in Cancer*, 30(4), 3043–3055.

- <https://doi.org/10.1007/s00520-021-06563-5>
- Fernandes, A. (2020). Kelelahan pada Anak dengan Leukemia Limfoblastik Akut dalam Menjalani Kemoterapi Fase Induksi. *Perintis's Health Journal*, 7(1), 69–74. <https://jurnal.upertis.ac.id/index.php/JKP/article/view/411>
- Fernandes, A., & Andriani, Y. (2021). Faktor-Faktor yang Mempengaruhi Terjadinya Gangguan Tidur pada Anak dengan Leukemia Limfoblastik Akut (LLA) yang Menjalani Kemoterapi. *Jurnal Keperawatan Silampari*, 5(1), 196–206. <https://doi.org/10.31539/jks.v5i1.1807>
- Kaushik, P., Sharma, S., Shah, N., Kutty, P. K., & Ghildiyal, R. (2022). Sleep Disturbances and Childhood Cancer- A Tertiary Care Experience. *Pediatric Hematology Oncology Journal*, 7(3), 103–107. <https://doi.org/10.1016/j.phoj.2022.05.001>
- Kudubes, A. A., Bektas, M., & Gerceker, G. Ö. (2023). The Predictive Power of Pain Characteristics and Sleep Quality on Fatigue in Adolescents with Cancer. *Journal of Pediatric Hematology/Oncology*, 45(6), 301–308. <https://doi.org/10.1097/MPH.0000000000002707>
- Li, D. (2023). Characterization of Parental Knowledge on Early Child Sleep and Association with Child Sleep Quality: A Cross-Sectional Pilot Study in Chongqing, China. *Risk Management and Healthcare Policy*, 16(May), 851–864. <https://doi.org/10.2147/RMHP.S408428>
- Mogavero, M. P., Bruni, O., Delrosso, L. M., & Ferri, R. (2020). Neurodevelopmental Consequences of Pediatric Cancer and Its Treatment: The Role of Sleep. *Brain Sciences*, 10(7), 1–15. <https://doi.org/10.3390/brainsci10070411>
- Oliveira, E. S., Oliveira, L. M., Oliveira, D. T., Viana, T. R. F., Silva, L. K. C., Bezerra, C. M., & Cardoso, M. (2020). Child Sleep: Assessment of the Knowledge of Parents of Children Aged Zero to Two Years. *European Journal of Public Health*, 30(Supplement_5), ckaa165.1186. <https://doi.org/10.1093/eurpub/ckaa165.1186>
- Stavinoha, P. L., Olsthoorn, I. M., Swartz, M. C., Nowakowski, S., Wells, S. J., Hicklen, R. S., Sheikh, I., & Jang, H. J. (2021). Non-Pharmacological Sleep Interventions for Pediatric Cancer Patients and Survivors: A Systematic Review Protocol. *Systematic Reviews*, 10(1), 1–7. <https://doi.org/10.1186/s13643-021-01724-3>
- Steur, L. M. H., Kaspers, G. J. L., van Someren, E. J. W., van Eijkelenburg, N. K. A., van der Sluis, I. M., Dors, N., van den Bos, C., Tissing, W. J. E., Grootenhuis, M. A., & van Litsenburg, R. R. L. (2020). The Impact of Maintenance Therapy on Sleep-Wake Rhythms and Cancer-Related Fatigue in Pediatric Acute Lymphoblastic Leukemia. *Supportive Care in Cancer : Official Journal of the Multinational Association of Supportive Care in Cancer*, 28(12), 5983–5993. <https://doi.org/10.1007/s00520-020-05444-7>
- Steur, L. M. H., Kaspers, G. J. L., Van Someren, E. J. W., Van Eijkelenburg, N. K. A., Van Der Sluis, I. M., Dors, N., Van Den Bos, C., Tissing, W. J. E., Grootenhuis, M. A., & Van Litsenburg, R. R. L. (2020). Sleep-Wake Rhythm Disruption is Associated with Cancer-Related Fatigue in Pediatric Acute Lymphoblastic Leukemia. *Sleep*, 43(6), 1–9. <https://doi.org/10.1093/sleep/zsz320>
- Sulistiyawati, E., Allenidekania, A., & Gayatri, D. (2021). Effect of Progressive Muscle Relaxation on Sleep Quality and Side Effects of Chemotherapy in Children with Cancer: Randomized Clinical Trial. *Open Access Macedonian Journal of Medical Sciences*, 9(T4), 300–308. <https://doi.org/10.3889/oamjms.2021.5774>
- Traube, C., Rosenberg, L., Thau, F., Gerber, L. M., Mauer, E. A., Seghini, T., Gulati, N., Taylor, D., Silver, G., & Kudchadkar, S. R. (2020). Sleep in Hospitalized Children with

- Cancer: A Cross-Sectional Study. *Hospital Pediatrics*, 10(11), 969–976. <https://doi.org/10.1542/hpeds.2020-0101>
- Tucker, P., Loew, M., Russell, K., Tynes, B. L., Mandrell, B. N., Witcraft, S. M., Schwartz, L. E., & Crabtree, V. M. (2023). Sleep Health Behaviors in Pediatric Patients with Newly Diagnosed Cancer. *Journal of Psychosomatic Research*, 172, 111413. <https://doi.org/https://doi.org/10.1016/j.jpsychores.2023.111413>
- Van Bindsbergen, K. L. A., van der Hoek, H., van Gorp, M., Ligthart, M. E. U., Hindriks, K. V., Neerinx, M. A., Alderliesten, T., Bosman, P. A. N., Merks, J. H. M., Grootenhuis, M. A., & van Litsenburg, R. R. L. (2022). Interactive Education on Sleep Hygiene with a Social Robot at a Pediatric Oncology Outpatient Clinic: Feasibility, Experiences, and Preliminary Effectiveness. *Cancers*, 14(15). <https://doi.org/10.3390/cancers14153792>
- Van Den Ende, E. S., Merten, H., Van Der Roest, L., Toussaint, B., Van Rijn, Q., Keesenberg, M., Lodders, A. M., Van Veldhuizen, K., Vos, I. E., Hoekstra, S., & Nanayakkara, P. W. B. (2022). Evaluation of Nonpharmacologic Interventions and Sleep Outcomes in Hospitalized Medical and Surgical Patients: A Nonrandomized Controlled Trial. *JAMA Network Open*, 5(9), E2232623. <https://doi.org/10.1001/jamanetworkopen.2022.32623>
- Xi, L., Wu, G., & Du, X. (2023). Analyzing Sleep Status in Children with Acute Leukemia. *Italian Journal of Pediatrics*, 49(1), 1–8. <https://doi.org/10.1186/s13052-023-01409-8>
- Zhou, E. S., Valenzuela, A. F., Robbins, R., Page, J. M., & Bona, K. (2023). Gaps in Parental Understanding of Sleep Disturbances During Maintenance Therapy for Pediatric Acute Lymphoblastic Leukemia. *Journal of Pediatric Hematology/Oncology Nursing*, 40(6), 369–378. <https://doi.org/10.1177/27527530231168587>