

An Explanatory Case Report on Biopsychosocial Issues and the Impact of Innovative Nurse-Led Therapy in Children with Hematological Cancer

Nirmala G^{1,*}, Premavathy R², Rumesh Chandar³, Joseph Jeganathan⁴

¹Department of Nursing, Annamalai University, Chidambaram, Tamil Nadu, India.

²Nursing Department, College of Health and Sports Sciences, University of Bahrain, Zallaq, Kingdom of Bahrain.

³Department of Nursing, Rani Meyyammai College of Nursing, Annamalai University, Chidambaram, Tamil Nadu, India.

⁴Department of Medical Oncology, PSG Institute of Oncology, PSG Hospitals, Coimbatore, Tamil Nadu, India.

⁵Nursing Department, College of Health and Sports Sciences, University of Bahrain, Zallaq, Kingdom of Bahrain.
ngangadurai@uob.edu.bh¹, premamathi04@gmail.com², spectrumchandar@gmail.com³, jjeganathan@uob.edu.bh⁴

Abstract: Childhood hematological cancers are relatively rare but are still found to be the major cause of death in children aged 1-18 years. Children diagnosed with hematological Cancer and the survivors face various health issues; hence nurses should be empowered and trained to provide evidence-based nurse-led therapies to the children, which helps them cope with the psychosocial problems due to diagnosis and treatment. Children with Cancer have various physical and psychosocial issues, such as pain, fatigue, anxiety, and low self-esteem. Nurse-led psychological interventions prevent long-term physical, emotional and behavioural problems among children with hematological cancers. The Interventions such as digital storytelling, laughter therapy, and music therapy is conducted by a qualified nurse to help the children to overcome their problems and improve their Quality of life. This case report, obtained from three children, revealed that all of them had moderate to severe pain, higher fatigue, moderate to severe anxiety levels, and low self-esteem. The children who attended digital storytelling and laughter therapy had a reduction in pain from worst to moderate; regarding fatigue, children reported decreased fatigue from higher to moderate, anxiety slightly decreased and increased scores on the self-esteem scale. It was found that innovative nurse-led therapy was beneficial to children with biopsychosocial problems.

Keywords: Children; Hematological Cancer; Innovative Nurse Led Therapy; Digital Storytelling; Laughter Therapy; Biopsychosocial Issues; Pain; Fatigue; Anxiety; Self-Esteem.

Received on: 01/10/2022, **Revised on:** 07/11/2022, **Accepted on:** 05/01/2023, **Published on:** 01/02/2023

Cite as: G. Nirmala, R. Premavathy, R. Chandar, J. Jeganathan, "An Explanatory Case Report on Biopsychosocial Issues and the Impact of Innovative Nurse-Led Therapy in Children with Hematological Cancer," *FMDB Transactions on Sustainable Health Science Letters*, vol. 1, no. 1, pp. 1–10, 2023.

Copyright © 2023 G. Nirmala *et al.*, licensed to Fernando Martins De Bulhão (FMDB) Publishing Company. This is an open access article distributed under [CC BY-NC-SA 4.0](https://creativecommons.org/licenses/by-nc-sa/4.0/), which permits copying, remixing, redistributing, transformation, and building upon the material in any medium so long as the original work is properly cited.

1. Introduction

Cancers in childhood are best treated at Pediatric oncology units by specialized healthcare professionals. Regardless of advancements in treatment modalities and survival rates, children remain a vulnerable group that may be unable to effectively manage physical, psychological, and social stressors related to the disease. In order to cope with these difficulties, they open up to their doctors, loved ones, and community support organisations. Blood-forming tissues like bone marrow are the sites of origin for the cancers known as haematological malignancies. Despite their rarity, childhood blood malignancies are the leading cause of death among children. Indian Cancer Society (2022) stated that nearly 3 lakh children are diagnosed with Cancer annually. In India, nearly 50,000 new childhood cancer cases occur yearly. According to the National Cancer Registry Programme (NCRP), the country registered 13,32,207 cases of Cancer during 2012-2019, which is 7.9% of total cancer cases

*Corresponding author.

from children. In India, Cancer is the 9th most common cause of death among children between 5 to 14 years of age, accounting for 11.5 million Disability-Adjusted Life Years (DALY). An estimated 70%-80% survival rate is seen, with many survivors added to the population every year. Chennai (35.5) among boys aged 0-14 years, Delhi (30.7) had the highest AARpm (Age Adjusted Rates per million) for lymphoma, followed by registries from Chennai (24.5) [1].

The incidence rates for people aged 0–17 was provided by the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute. There are an estimated 13,060 new cases of cancer diagnosed each year in this age group, with an annual incidence of 176 cases per million people (table 1). Typically, children develop acute lymphoid leukaemia between the ages of three and six. Acute lymphoid leukaemia (1.2:1), Hodgkin lymphoma (1.2:1), and non-Hodgkin lymphoma (2.0:1) all have a higher frequency in males than in females [2].

Table 1: Annual Cancer Incidence Rates and Proportional Distribution in US Children 0-17

Sl. No.	Diagnosis	Annual Incidence/10 ⁶ Age 0-17 Years	Proportion
1.	Lymphoid leukemias	37.6	0.21
2.	Acute myeloid leukemia	8.1	0.05
3.	Chronic myeloproliferative diseases	1.0	0.01
4.	Myelodysplastic syndrome and other myeloproliferative	0.4	0.00

Source: National Cancer Institute's Surveillance, Epidemiology, and End Results Program for 1990–2016[2].

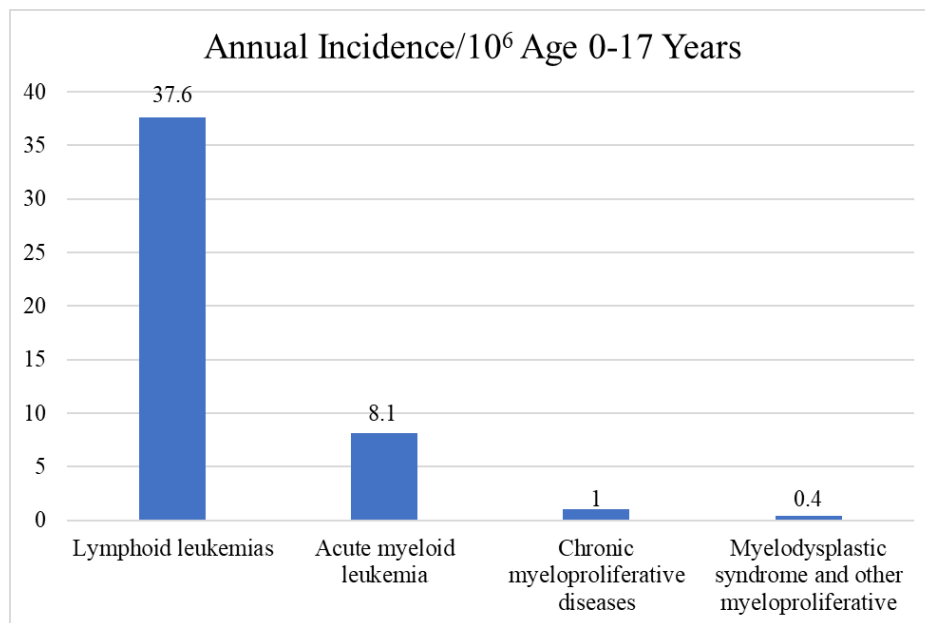


Figure 1: Annual Incidence Rates of Hematological Cancer among children

The incidence of childhood hematological cancer depends on various factors such as race/ethnicity, genetic predisposition, and socio-economic and cultural factors. In recent years, there has been steady development in the diagnostic procedures and contemporary treatment modalities for the treatment of childhood hematological cancer.

The cytotoxic drugs and other modalities used to treat juvenile cancers have been associated to risk for a wide range of chronic health issues, either appearing early in the course of treatment and persisting long-term or showing up years after therapy has ended. Toxicity from cancer treatments is generally connected to the dosage and type of treatment used. However, the health outcomes of cancer survivors vary depending on patient, cancer type, health care system, and cancer care provider [3].

The incidence of a wide variety of childhood diseases, both biological and psychological, is on the rise. Over half of all newly diagnosed childhood cancers are leukemias or lymphomas. Although the 10-year survival rate for all malignancies has increased to about 90-years now, this is not the case for many uncommon cancers. Targeted therapy can improve anti-leukemia efficacy and lessen treatment-related side effects [4].

Oncology in children who are having trouble conforming to treatment regimens are frequently in the care of nurses. As nurses, it is our responsibility to look out ways to assist children deal with difficult emotions and situations, such as chronic pain, social isolation, a lack of communication skills, or fear and anxiety (table 2). In the modern day, nurse-led therapies have become increasingly popular for the treatment of any condition. When it comes to helping children with cancer cope with the condition, nurses are at the forefront of assessing, caring for, and intervening (fig.2).

Table 2: Annual Cancer Incidence Rates and Proportional Distribution in US Children 0-17

Sl. No.	Diagnosis	Annual Incidence/10 ⁶ Age 0-17 Years	Proportion
1.	Hodgkin lymphoma	9.3	0.05
2.	Non-Hodgkin lymphomas	10.1	0.06
3.	Burkitt lymphoma	2.5	0.01
4.	Miscellaneous lymphoreticular neoplasms	0.2	0.00
5.	Unspecified lymphomas	0.3	0.00

Source: *National Cancer Institute's Surveillance, Epidemiology, and End Results Program for 1990–2016*[2].

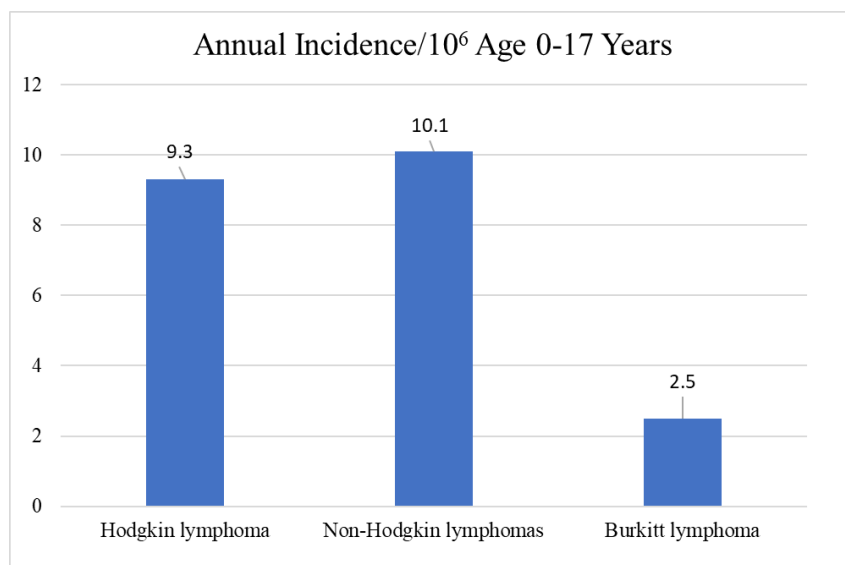


Figure 2: Annual Incidence Rates of Hematological Cancer among children

2. Biopsychosocial problems of Children with hematological Cancer

Disease patients and their loved ones face a wide variety of challenges during diagnosis, treatment, and survivorship, from adjusting to new routines and medications to coping with the fear that their cancer may return or that they will die. Because of the long-term nature of treatment, hospitalisation, and dealing with therapy's negative effects, childhood cancer is considered a chronic condition. Children undergoing treatment for cancer in a paediatric oncology environment confront a number of unique difficulties. They frequently undergo unpleasant procedures. They may no longer be able to make decisions about their own bodies and instead have to submit to the will of those who prescribe the operations they must endure, which may occur at inconvenient times.

They have been uprooted from their usual routine of house, family, and friends. Barriers to effective communication with the treatment team may arise from social, emotional, and physical factors that are too difficult to process. Pediatric cancer patients face unique difficulties in navigating these concerns as they seek to adjust to the treatment environment, express themselves honestly to their healthcare providers, family, and community, and continue to develop their capacities and sense of self apart from their disease.

The demanding facts about childhood hematological cancer where it causes significant disruptions in daily routine and role functioning, which occurs because of adverse effects of the cancer treatment the child undergoes. These biopsychosocial issues among the children are associated with increased pain, chronic fatigue, anxiety, and depression related to fears about treatment

and prognosis of the hematological cancers; in addition, they also develop low self-esteem and ineffective coping strategies, as reported by the child and the parents.

These shifts coincide with the beginning of treatment and the diagnostic process. In order to help these children, develop healthier coping mechanisms, it is crucial to learn about the biological, environmental, and social factors that influence their health [5]. A sense of physical and/or emotional well-being, control, and suitable resources for communicating wants, worries, and social engagement are all linked to effective coping in children, as proposed by Man's stress and coping model.

Art interventions in the paediatric hospital setting can serve multiple therapeutic purposes, including providing a form of play that not only helps to improve social affiliation, relieve stress, promote cognitive development, and increase exploration, but also offers a safe space for expression through the projection and mastery of fears and anxieties onto the activities themselves. In this work, we examine the most common biopsychosocial challenges encountered by children with haematological cancer.

Children with cancer typically report experiencing discomfort at any point in the course of their condition, from the time of diagnosis to the end of life or beyond. Cancer-related pain can have numerous causes, including the disease itself, cancer treatment (such as chemotherapy and radiation), and procedures (such as postoperative pain, venipuncture, and lumbar puncture). Among children with cancer, 57.8 percent of pain was attributed to a treatment-related complication, 21.1% to factors other than cancer, and 21.1% to the disease itself [6,7].

Untreated pain in children with cancer has been linked to a variety of negative outcomes, as shown by studies [6,8]. These include impairments in health-related functioning, body image, and quality of life; trouble sleeping; heightened sensitivity to pain and procedural distress; limits placed on social activities; and the emergence of emotional and behavioural problems like anxiety and depression. A longitudinal observational study found that 70% of kids between the ages of 1 and 18 reported having clinically severe pain at least once, with 30% reporting it at least 50% of the time. There was no medicine utilised for 33.6% of children with pain ratings 4. There appears to be a correlation between pain intensity and the degree to which it disrupts regular activities [9].

The majority of children (93%) reported experiencing discomfort, which patients/families either attributed to the underlying malignancy (55%), to the procedures and therapy (30%), or to both (n =15%). The most painful procedures were the lumbar puncture and the bone marrow aspirate. Most patients/parents said that pain made it difficult to function in many areas of life [10].

Children undergoing cancer treatment and those who have finished treatment reported experiencing severe discomfort. When asked how they dealt with their child's suffering, parents said they relied more on physical and psychological methods than on pharmaceutical ones. Distraction was the most common physical/psychological approach, while acetaminophen was the most common pain medication. There was a negative correlation between parents' reports of their child's pain and the frequency with which their youngster reported receiving pain medication. Children with cancer continue to struggle with pain management during treatment and after [6], despite parents' best efforts to alleviate their suffering.

Seventy-eight percent of kids have felt pain that qualified as "clinically substantial" at least once, and 30% have said they feel that way at least 70% of the time. No medicine was utilised in 33.6% of cases with a score of 4. Severity of pain was observed to correlate with degree of functional impairment. Give caregivers access to training and guidance. Screening for pain as routine practise in the home [11].

Pain was reported by all children aged 4–7, with the highest and lowest means being 2 and 1.6, and by those aged 8–17, with the highest and lowest means being 50.1 and 39.5, respectively. The legs (26.5%), abdomen (16.6%), head/neck (16.6%), and back were the most prevalent sites of pain overall (14.2 percent). Medication, rest, temperature manipulation (both hot and cold), and massage were all used to alleviate pain. Common coping mechanisms include turning on the television, lying down, hoping the problem goes away, and confiding in a parent [12].

Fatigue in children with haematological cancer is a subjective feeling of exhaustion that interferes with the child's everyday activities or roles. Up to 30% of children who have survived cancer as a kid experience persistent fatigue as a late impact [13-14]. Predisposing factors for CRF are shown in Figure 1; these include genetic, gender, age, educational status, and family type. The factors were linked to the child's diagnosis of haematological cancer and their subsequent treatment. CRF (Cancer Related Fatigue) severity takes into account a wide range of sustaining elements, including physical activity, other medical conditions, body weight, pain level, physical strength, social activities, sleep habits, etc. All these things had some connection to chronic respiratory failure (fig.3).

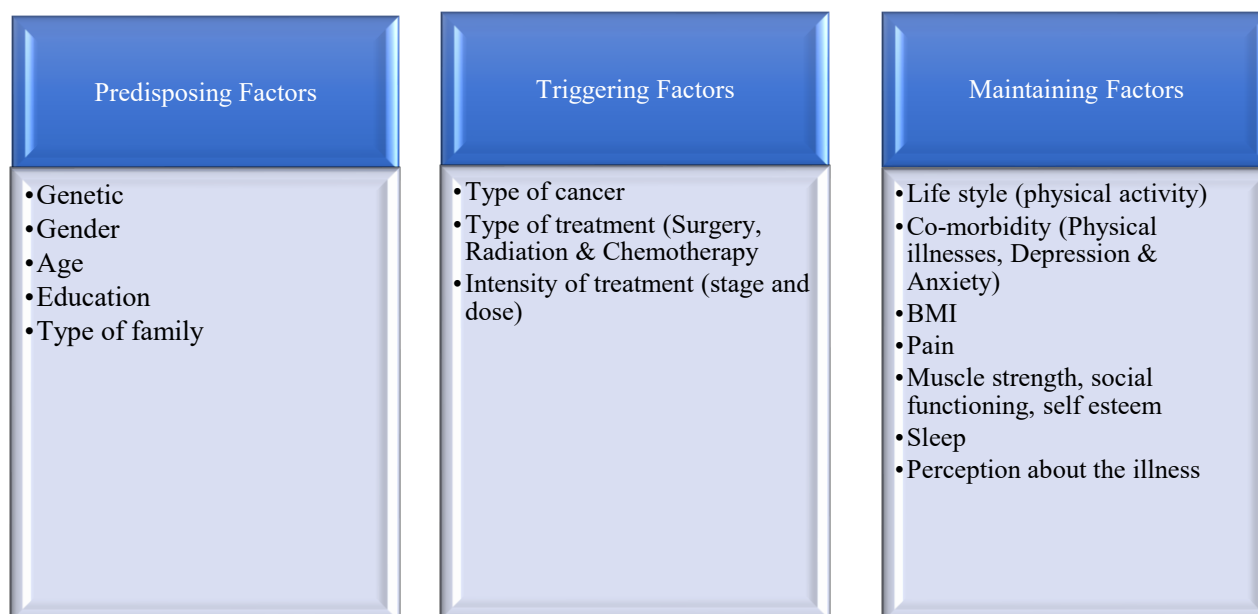


Figure 3: Factors related to the cause of fatigue among patients with hematological Cancer

In the final month of life, nearly all kids (96% to be exact) report feeling exhausted. Fifty percent had severe weariness because of their pain, dyspnea, anorexia, nausea/vomiting, diarrhoea, worry, depression, or fear, or because of the adverse effects of their pain or dyspnea medication. The variables that contribute to weariness, as well as the therapies that might help alleviate it, require further study and attention. Children cited things like medical procedures, chemotherapy, low blood counts, pain, and lack of sleep as the reasons they had trouble falling asleep. 41% of the kids experienced high-frequency weariness, 25% experienced severe exhaustion, and 34% experienced both. The majority of the kids, 84%, reported feeling tired all the time.

Age, haemoglobin, and distressing symptoms such as anorexia, nausea, disturbed sleep, depression, and irritability were all linked to fatigue [15]. Fatigue and Activities of Daily Living in Children with Cancer There is a correlation between greater exercise and decreased weariness in the survivors. It is recommended that risk factors for fatigue, such as tumour type or treatment regimens, be studied in larger samples of certain survivor groups [16]. Except for parent-proxy assessments, adolescent fatigue scores were significantly lower at baseline and four months and improved by 12 months. Patients' levels of physical activity increased throughout time, although they continued to be largely inactive. More exercise during follow-up was linked to less tiredness due to cancer [17]. More severe pain interference, depressed symptoms, and decreased mobility are all strong predictors of weariness in children undergoing active cancer therapy. To reduce pain interference, manage depressed symptoms, and promote physical mobility in children, culturally responsive therapies are required [15, 18].

Compared to the expected 15% in the general population, 24% of survivors had at-risk/clinically increased anxiety scores and 28% had elevated depression ratings for three months after stopping treatment ($p=0.03$ and 0.001 , respectively). Patients with high anxiety levels one month after diagnosis were more likely to have high anxiety levels off therapy ($p=0.02$), and patients with high depressive symptom levels six months after diagnosis were more likely to have low mood levels off therapy ($p=0.002$). Anxiety and depression were both linked to unhealthy family functioning ($p=0.008$) and to relying less on social support coping strategies ($p=0.009$). Overall, a large number of children undergoing treatment for ALL report experiencing emotional distress. As a result, children, family functioning, and coping abilities need early, focused screening and psychosocial interventions [19].

The average levels of worry, despair, hostility, and impulsiveness were about average for the general public. More than twice as many children as expected at one month (21.7 %, $p=0.022$), six months (28.6 %, $p0.001$), and twelve months (21.1 %, $p=0.032$) scored in the at-risk/clinical range for depression. At one month, more people than expected scored in the at-risk/clinical range for anxiety (25.2 percent vs. 15 percent, $p0.001$). Anxiety and despair were predictors of unhealthy family functioning. Hispanic ancestry, lower physical functioning, parental singlehood, and a lack of social support were all connected with increased anxiety.

Anxiety and depression at 12 months were predicted by emotional discomfort at 1 month. In the first months following diagnosis, anxiety is common in a subset of patients with Standard Risk -ALL, but depression persists for at least a year [20].

Overall, Health-Related Quality of Life (HRQL) was considerably decreased during therapy for children with acute lymphoblastic leukaemia (ALL). Additionally, HRQL enhanced throughout time, with the worst HRQL connected to more intense chemotherapy phases, corticosteroid therapy, greater toxicity, older age, and female sex [21].

Anxiety, procedure anxiety, and discomfort all decreased throughout the first year of treatment for children with ALL. Six months following diagnosis, nausea scores were higher than those at 1 and 12 months. Priorities should include reducing procedural anxiety in younger children and enhancing nausea management in older children and those undergoing more intensive treatment [22].

Teens dealing with cancer are at increased risk for low self-esteem and academic difficulties. Most people's feelings about themselves were lower than average (58.5 percent), especially when it came to their connections with other people (75 percent). There were statistically significant variations in the mean scores of the emotionality and bodily experience scales, with AML (Acute Myeloid Leukemia) survivors having lower scores. Parents indicated that 43.5% of their children were having academic challenges. For them to get back on track, preventative treatments that boost their confidence and academic success are recommended [23]. Patients with haematological tumours had a significantly lower mean self-esteem score compared to the general population ($P < 0.01$). Self-esteem in these patients was found to be independently connected with factors like social connection maintenance, conscientiousness, extraversion, agreeableness, and proactive coping.

Self-esteem, negative psychological emotions, and quality of life can all be enhanced by the application of patient-centered and tailored interventions by healthcare practitioners [24]. The vast majority of kids (84.83 percent) have a severely poor level of self-esteem. Their parents were under a great deal of emotional duress. The factors of parental domains low competence, negative attachment to children, high restriction, high depression, poor relation to a spouse, and high social isolation were substantially correlated with the Parenting Stress Index (PSI). It was strongly connected to factors including the child's domains' high demandingness, low acceptance, and low diversion. Patients were harmed the most by the disease's protracted course [25].

There is mounting evidence that those who survive solid tumours have a lower survival rate and a shorter duration without disease compared to those who survive leukaemia. When compared to childhood leukaemia survivors, those who overcame solid tumours in childhood reported considerably lower mean ratings for self-esteem and HRQoL. Childhood cancer survivors dealing with solid tumours had a more difficult time of it than those dealing with leukaemia. Conclusions: Compared to childhood leukaemia survivors, those who overcame solid childhood tumours showed lower levels of psychological well-being and HRQoL (Health Related Quality of Life) [26]. Long-term negative effects of treatment for childhood Acute Lymphocytic Leukaemia (ALL) have gained prominence due to improvements in survival rates. All survivors reported greater levels of despair, anxiety, diminished quality of life, and a more unfavourable perception of themselves compared to their non-survivor siblings [27].

3. Psychosocial Intervention to improve the biopsychosocial functioning of the child

Thirty-one to eighty-four percent of children with cancer, according to international surveys, require psychological therapy on a regular basis to cope with the devastating effects of the disease and its treatment. Integrative cancer care sometimes includes mind-body therapy to help patients cope with the emotional and physical toll of treatment. New evidence suggests that 32% of cancer survivors employ mind-body therapies like yoga, meditation, and stress management to improve their overall health and quality of life. Innovative nurse-led therapy has been shown to improve the biopsychosocial well-being of children with haematological malignancies.

Successful cancer therapy is associated with an increased risk of late health repercussions for cancer survivors. Therefore, it is crucial to provide high-quality cancer survivorship care in order to either preserve the health of survivors or discover and treat late consequences sooner. This care, however, must be both long-term and economical. A registered nurse is in charge of the interventions, and she or he assists the survivors in combating their exhaustion and enhancing their Quality of Life (QoL).

The constant verbal connection between therapist and child during art-making, as noted by Massimo and Zarri (2006), boosts the child's self-esteem through social reinforcement and affirmation. Stress, low self-esteem, and other mental health problems can all be mitigated through the use of humour as a coping method. Chronic pain, anxiety, and other mysterious medical symptoms can all be alleviated via practising mindfulness.

There is promising evidence that Mindfulness-Based Interventions (MBIs) can help cancer patients better cope with their physical and mental health problems, as well as lessen the toll those symptoms take on their ability to carry out daily tasks and enjoy life [28-29]. When compared to children who did not receive distraction tactics, those who did reported significantly less pain ($F=54.11$, $p<0.001$), anxiety ($F=123.69$, $p<0.001$), and distress ($F=68.89$, $p<0.01$) [30].

Children 3-11 years old with AML who are undergoing a Bone Marrow Aspiration (BMA) and lumbar puncture report a significant decrease in distress after receiving Psychosocial Therapies (LP). The LP kid was compared to patients who did not get psychosocial therapies for BMA. Individuals who participate in the psychosocial or cognitive behavioural intervention learn and practise coping mechanisms like as diversion, storytelling, deep breathing, and guided visualisation. When compared to the average distress score of children who did not receive treatment, the number was much lower for those who did [31].

Children with cancer are finding new hope in a treatment called Digital Storytelling Therapy (DST). Future research on the use of DST for children with cancer can build on the narrative, digital storey, and field notes that formed the basis for this study [32]. Among children with recurrent or resistant cancer, digital storytelling or legacy intervention is an easily available intervention showing a small effect on adaptive coping mechanisms like primary-control and disengagement coping [33].

Preliminary effects on quality-of-life outcomes and the viability of a legacy-making intervention for children with cancer. Children who participated in the intervention fared better emotionally and academically than those who did not. It was stated by parents that their children benefited from their digital storey in a number of ways, including emotional support, improved parent-child communication, and the development of coping mechanisms. The intervention encouraged kids to talk about their emotions, which made them feel better about themselves [34].

Laughter Therapy is an easy and useful intervention; laughter yoga training reduces hopelessness and loneliness in children with leukemia. Laughter yoga significantly reduced the sense of hopelessness and loneliness. Laughter Yoga exercises effectively reduce feelings of frustration and loneliness [35]. The use of laughter therapy is effective in reducing anxiety and hopelessness. Music Therapy (MT) is an accessible and effective intervention in addressing functional and emotional goals for children of all ages undergoing cancer treatment [36]. MT is found to be beneficial for children with Cancer. MT helps the children regulate their mood and morale [37]. Therapeutic music reduces the level of anxiety in children [38]. MT lowered pain scores and heart and respiratory rates during and after the lumbar puncture, and the children had positive experiences, such as less pain and fear [39].

4. Case report: 1

A 5-year-old male child was diagnosed with stage – 1 BALL (Beta Cell Acute Lymphocytic Leukemia) for 2 ½ years. The duration of hospital admission during the first year was 3-6 months to receive chemotherapy and other treatment. Later the duration of the visit was reduced to once every four weeks, eight weeks, three months, six months and follow-up as needed. The child was assessed during follow-up therapy in the inpatient oncology facility of the PSG Hospitals. Bio- Psychosocial problems like pain, fatigue, anxiety, self-esteem, and coping were assessed. Before the administration of the intervention by the mother, the child reported having moderate pain and fatigue while waking and getting up from bed after excessive sleep and having difficulty.

The child reported having moderate anxiety, and the reason for anxiety was mostly related to therapy. Regarding self-esteem, the child scored lower on the self-esteem scale, indicating poor self-esteem. While deeply looking into the psychosocial factors, the child was separated from his younger brother and family members during treatment; it may be due to younger age, the need for more attention to the sick child, or to avoid side effects of medication and hospital exposure. During pain, the child's mother tried to divert the child by providing snacks and favourite food items and allowing them to watch their favourite videos on YouTube. The mother also allowed the child to play with toys with sound and light. The child reported decreased pain, which was effective for a short period of 10 -15 minutes. But none of these activities reduced the anxiety or fatigue in the child. Hence this raises a thought to design nurse-led interventions that could affect the above parameters, thus supporting the child's recovery at its earliest possible time (table 3).

Table 3: Impact of Innovative Nurse-Led Therapy on Biopsychosocial Problems among Children with hematological Cancer

Sl. No.	Biopsychosocial Problem	Pre-Intervention	Post Intervention
1.	Pain	Moderate (VAS-6/10)	Mild (VAS-4/10)
2.	Childhood Fatigue	Severe (CFS-41/70)	Severe (CFS-40/70)
3.	Anxiety	Moderate (STAIC-43/60)	Moderate (STAIC-42/60)
4.	Self Esteem	Higher the score better the self-esteem (RSE-25/40)	Higher the score better the self-esteem (RSE-26/40)

Visual analogue scale (VAS), Childhood fatigue scale (CFS), Anxiety Inventory for Children State Scale (STAIC-S) and Modified Rosenberg's Self Esteem scale (RSE).

5. Case study: 2

A 10-year-old female Child diagnosed with stage 1 BALL for six months was admitted to the hospital with low blood cell counts. She was on continuous chemotherapy and developed adverse effects due to chemotherapy, such as alopecia, diarrhoea, anorexia, nausea and vomiting, hyperpigmentation of the skin and insomnia. She was withdrawn, irritable, refused to communicate, and frequently fought with the healthcare personnel during therapy. The child was assessed during therapy in the PSG Hospitals' inpatient oncology facility. Biopsychosocial problems like pain, fatigue, anxiety, and self-esteem were assessed. Before the administration of Nurse-led therapy, the child had severe pain, fatigue and severe anxiety levels with low self-esteem. The mother was from low socio-economic status and lacked a support system to cope with the child's illness. Following using storytelling as a Nurse-led intervention, the child started showing changes in the above parameters. The child previously viewed videos on YouTube to reduce her pain and as an attempt for diversional activities. The child was given structured digital storytelling. The child was asked to select the e-story from the collections, and the child was allowed to view the same for 30 minutes daily for one week.

Following storytelling therapy, the child showed interest in sitting in a place, listening, communicating and responding to commands willingly. The child showed a gradual reduction in pain to a moderate level, with anxiety under control, reduced fatigue and progress toward improvement in self-esteem like "I have good things about me" and "I can do things like other children". Originally children between 9-10 years are emotionally focused, as in this child but with storytelling, the child had moved to be problem-focused as more mature children, which could support positive coping and quicker recovery (table 4).

Table 4: Impact of Innovative Nurse-Led Therapy on Biopsychosocial Problems among Children with hematological Cancer

Sl. No.	Biopsychosocial Problem	Pre-Intervention	Post Intervention
1.	Pain	Worst Pain (VAS-10/10)	Severe Pain (VAS-4/10)
2.	Childhood Fatigue	Severe (CFS-52/70)	Severe (CFS-44/70)
3.	Anxiety	Mild (STAIC-48/60)	Mild (STAIC-34/60)
4.	Self Esteem	Higher the score better the self-esteem (RSE-33/40)	Higher the score better the self-esteem (RSE-29/40)

6. Case study: 3

A 9-year-old female child with a 5-year-old younger brother is studying in grade 4. She was followed up in the inpatient oncology facility of PSG hospitals for having been diagnosed with Stage 2 BALL a year back. She has a lower socio-economic background. She was accompanied by her father, who is a daily wageer. The child was assessed for biopsychosocial problems like pain, fatigue, anxiety, and self-esteem. The child had moderate pain, mild anxiety and moderate fatigue, occasionally marking poor self-esteem. The child was given laughter therapy as a nurse-led intervention for 30 minutes, including warm-up, stepwise activities, and cool-down. The child initially showed reluctance, but when encouraged and with parent involvement actively participated and was able to repeat the therapy to perfection. She also showed enjoyment in performing the therapy daily when followed up. After the activity, the child showed reduced pain, fatigue, and mild anxiety, especially after performing the therapy. The father shared, "Child appears more energetic and happier" following therapy. Generally, laughter therapy is attempted in adult patients. Still, when administered to children, it stimulated laughter through giggling, instigating humour on certain steps like "monkey laughter", showing positive changes to therapy followed by kids with Cancer (table 5).

Table 5: Impact of Innovative Nurse-Led Therapy on Biopsychosocial Problems among Children with hematological Cancer

Sl. No.	Biopsychosocial Problem	Pre-Intervention	Post Intervention
1.	Pain	Moderate Pain (VAS-6/10)	Mild Pain (VAS-4/10)
2.	Childhood Fatigue	Severe (CFS-50/70)	Severe (CFS-47/70)
3.	Anxiety	Moderate (STAIC-48/60)	Mild (STAIC-34/60)
4.	Self Esteem	Higher the score better the self-esteem (RSE-27/40)	Higher the score better the self-esteem (RSE-25-/40)

7. Conclusions

The most typical type of hematological malignancy among children is ALL. Children getting treatment in a pediatric oncology environment face numerous difficulties not common to experiences connected to their age. They undergo painful diagnostic and treatment procedures frequently during illness. Children with hematological Cancer deal with unrelenting pain, fatigue, fear, or anxiety. Despite improvements in treatment modalities and survival rates, children continue to be a vulnerable group that may not be able to successfully manage physical, psychological, and social stressors connected to the condition. Pediatric oncology nurses regularly care for children who have difficulty adjusting to their treatment regimens. Understanding the biopsychosocial determinants of children's health is crucial for nurses and implementing psychosocial interventions that help these children develop more adaptive coping mechanisms. The application of integrative therapies improves the effectiveness of conventional cancer treatments, manages the adverse effects of cancer therapy, and offers emotional support for coping with a cancer diagnosis. Nurses should explore the benefits of Innovative nurse-led therapy by integrating the available and emerging psychological therapies. Nurses should implement these therapies to help the children manage the side effects associated with cancer therapy, augment the efficacy of conventional medications, and provide psychological support for coping with the diagnosis of hematological Cancer.

Acknowledgement: The support of all my co-authors is highly appreciated.

Data Availability Statement: This study uses online benchmark data to conduct the research. This is a fresh study done by the authors.

Funding Statement: No funding has been obtained to help prepare this manuscript and research work.

Conflicts of Interest Statement: No conflicts of interest have been declared by the author(s). This is the authors' fresh work. Citations and references are mentioned as per the used information.

Ethics and Consent Statement: The consent has been obtained from the colleges during data collection and has received ethical approval and participant consent.

References

1. Introduction to Childhood Cancer, Indiancancersociety.org. [Online]. Available: <https://www.indiancancersociety.org/cancer-information/childhood-cancer8>. [Accessed: 19-Sep.-2022].
2. L. Aiuppa, T. Cartaxo, and C. M. Spicer, "Childhood Cancer and Functional Impacts Across the Care Continuum," in *Epidemiology of Childhood Cancer in the United States*, vol. 2, Washington (DC; US: National Academies Press, 2020.
3. S. B. Dixon et al., "Factors influencing risk-based care of the childhood cancer survivor in the 21st century," *CA Cancer J. Clin.*, vol. 68, no. 2, pp. 133–152, 2018.
4. T. M. Gibson et al., "Temporal patterns in the risk of chronic health conditions in survivors of childhood cancer diagnosed 1970-99: a report from the Childhood Cancer Survivor Study cohort," *Lancet Oncol.*, vol. 19, no. 12, pp. 1590–1601, 2018.
5. S. Folkman, "Stress: Appraisal and Coping," in *Encyclopedia of Behavioral Medicine*, New York, NY: Springer New York, 2013, pp. 1913–1915.
6. P. R. Tutelman et al., "Pain in children with cancer: Prevalence, characteristics, and parent management," *Clin. J. Pain*, vol. 34, no. 3, pp. 198–206, 2018.
7. S. C. Elliott et al., "Epidemiologic features of pain in pediatric cancer patients: a co-operative community-based study. North Central Cancer Treatment Group and Mayo Clinic," *Clin. J. Pain*, vol. 7, no. 4, pp. 263–268, 1991.
8. N. M. Alberts, M. M. Gagnon, and J. N. Stinson, "Chronic pain in survivors of childhood cancer: a developmental model of pain across the cancer trajectory," *pain*, vol. 159, no. 10, pp. 1916–1927, 2018.
9. D. H. P. Julia, R. A. A. Simon Femke, and S. Gina, "Pain at home during childhood cancer treatment: Severity, prevalence, analgesic use, and interference with daily life," *Pediatr Blood Cancer*, vol. 67, pp. 1–9, 2020.
10. N. Khoubila et al., "Pain management in children with cancer: National surveys of practices and perceptions in Morocco," *Open Access Maced. J. Med. Sci.*, vol. 8, no. B, pp. 723–730, 2020.
11. J. D. H. P. Simon et al., "Pain at home during childhood cancer treatment: Severity, prevalence, analgesic use, and interference with daily life," *Pediatr. Blood Cancer*, vol. 67, no. 12, p. e28699, 2020.
12. L. Van Cleve, E. Bossert, P. Beecroft, K. Adlard, O. Alvarez, and M. C. Savedra, "The pain experience of children with leukemia during the first year after diagnosis," *Nurs. Res.*, vol. 53, no. 1, pp. 1–10, 2004.

13. B. Zeller, J. H. Loge, A. Kanellopoulos, H. Hamre, V. B. Wyller, and E. Ruud, "Chronic fatigue in long-term survivors of childhood lymphomas and leukemia: persistence and associated clinical factors: Persistence and associated clinical factors," *J. Pediatr. Hematol. Oncol.*, vol. 36, no. 6, pp. 438–444, 2014.
14. C. K. Ullrich et al., "Fatigue in children with cancer at the end of life," *J. Pain Symptom Manage.*, vol. 40, no. 4, pp. 483–494, 2010.
15. C. K. Ullrich et al., "Self-reported fatigue in children with advanced cancer: Results of the PediQUEST study: Child-Reported Fatigue in Cancer," *Cancer*, vol. 124, no. 18, pp. 3776–3783, 2018.
16. M. Tanriverdi and F. B. Çakir, "Cancer-related fatigue and daily living activities in pediatric cancer survivors," *J. Pediatr. Hematol. Oncol.*, 2022.
17. E. M. Van Dijk-Lokkart et al., "Longitudinal development of cancer-related fatigue and physical activity in childhood cancer patients," *Pediatr. Blood Cancer*, vol. 66, no. 12, p. e27949, 2019.
18. L. Cheng et al., "Self-reported fatigue in Chinese children and adolescents during cancer treatment," *J. Pediatr. Oncol. Nurs.*, vol. 38, no. 4, pp. 262–270, 2021.
19. S. Alicia et al., "Prevalence and predictors of anxiety and depression after completion of chemotherapy for childhood acute lymphoblastic leukemia: A prospective longitudinal study," *Cancer*, vol. 122, no. 10, pp. 1–26, 2016.
20. R. M. Myers et al., "A prospective study of anxiety, depression, and behavioral changes in the first year after a diagnosis of childhood acute lymphoblastic leukemia: a report from the Children's Oncology Group: A report from the Children's Oncology Group," *Cancer*, vol. 120, no. 9, pp. 1417–1425, 2014.
21. J. E. Fardell et al., "Health-related quality of life of children on treatment for acute lymphoblastic leukemia: A systematic review: Fardell et al.," *Pediatr. Blood Cancer*, vol. 64, no. 9, p. e26489, 2017.
22. L. L. Dupuis et al., "Anxiety, pain, and nausea during the treatment of standard-risk childhood acute lymphoblastic leukemia: A prospective, longitudinal study from the Children's Oncology Group: Anxiety, Pain, and Nausea in ALL," *Cancer*, vol. 122, no. 7, pp. 1116–1125, 2016.
23. M. Tremolada, L. Taverna, S. Bonichini, G. Basso, and M. Pillon, "Self-Esteem and Academic Difficulties in Preadolescents and Adolescents Healed from Paediatric Leukaemia. *Cancers (Basel)*," vol. 9, 2017.
24. J. Yu, H. Dong, Q. Wu, Y. Yang, and H. Pi, "Factors associated with low self-esteem among patients with hematologic malignancies: A cross-sectional study," *Front. Psychiatry*, vol. 12, p. 683894, 2021.
25. L. M. Sherief et al., "Psychological impact of chemotherapy for childhood acute lymphoblastic leukemia on patients and their parents," *Medicine (Baltimore)*, vol. 94, no. 51, p. e2280, 2015.
26. L. K. Laurie et al., "Comparing the Impact of Cancer and Treatment-Related Effects on Psychological Well-being and Quality of Life between Hong Kong Survivors of Childhood Solid Tumours and Leukaemia. 2018.
27. B. Birol, A. Çigdem, C. K. Arzu, S. E. Melike, and M. G. Adalet, "Health-Related Quality of Life, Depression, Anxiety, and Self-Image in Acute Lymphocytic Leukemia Survivors," *Turk J Hematol*, vol. 33, pp. 326–330, 2016.
28. L. M. Massimo and D. A. Zarri, "In tribute to Luigi Castagnetta-drawings. A narrative approach for children with Cancer," *Ann. N. Y. Acad. Sci.*, vol. 1089, no. 1, pp. xvi–xxiii, 2006.
29. C. R. Rouleau, S. N. Garland, and L. E. Carlson, "The impact of mindfulness-based interventions on symptom burden, positive psychological outcomes, and biomarkers in cancer patients," *Cancer Manag. Res.*, vol. 7, pp. 121–131, 2015.
30. R. Christina, "A study to assess the effectiveness of Distraction techniques on pain, anxiety and distress among children with cancer undergoing chemotherapy admitted in tertiary care hospitals", Bangalore; Chidambaram, Tamil Nadu, 2020.
31. H.-J. Hsiao et al., "Psychosocial interventions for reduction of distress in children with leukemia during bone marrow aspiration and lumbar puncture," *Pediatr. Neonatol.*, vol. 60, no. 3, pp. 278–284, 2019.
32. D. K. Wilson, S. Hutson, J. M. Hall, and K. Anderson, "Examining the Digital Story Created by an Adolescent with Cancer: Insights and Ideas from a Case Story," *Open Journal of Nursing*, vol. 6, pp. 426–434, 2016.
33. E. Cho et al., "Effects of a web-based pediatric oncology legacy intervention on the coping of children with cancer," *Am. J. Hosp. Palliat. Care*, vol. 40, no. 1, pp. 34–42, 2023.
34. T. F. Akard et al., "Digital storytelling: an innovative legacy-making intervention for children with cancer: Legacy-Making Intervention for Children With Cancer," *Pediatr. Blood Cancer*, vol. 62, no. 4, pp. 658–665, 2015.
35. Z. Sabori, F. Khayatan, and M. Ghanavat, "The Effect of Kataria Laughter Training (Laughter Yoga) on Hopelessness and Loneliness in Children with Leukemia," *Child Ment Health*, vol. 5, no. 4, pp. 182–193, 2019.
36. Z. Sadeghi, N. Mikaeili, and A. Atadokht, "The effectiveness of laugh therapy on anxiety and hopelessness children with cancer," *IJCA*, vol. 2, no. 2, pp. 45–53, 2021.
37. K. C. Wong, B. W. Z. Tan, J. W. K. Tong, and M. Y. Chan, "The role of music therapy for children undergoing cancer treatment in Singapore," *Healthcare (Basel)*, vol. 9, no. 12, p. 1761, 2021.
38. S. Polat, "The effect of therapeutic music on anxiety in children with acute lymphoblastic leukemia," *Indian Journal of Traditional Knowledge*, vol. 14, no. 1, pp. 42–46, 2015.
39. N. N. Thanh, N. Stefan, and H. Anna-Lena, "Music Therapy to Reduce Pain and Anxiety in Children With Cancer Undergoing Lumbar Puncture: A Randomized Clinical Trial," *Journal of Pediatric Oncology Nursing*, vol. 27, no. 3, pp. 146–155, 2010.