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Application of Tripartite Collaborative Nursing in Enhancing Resilience Among Families of Pediatric Leukemia Patients

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Abstract: *Objective*: To investigate the efficacy of a tripartite collaborative nursing intervention in enhancing resilience among families of pediatric leukemia patients. *Methods*: Based on Walsh's family resilience theory and collaborative nursing principles, and after reviewing a large amount of literature, a tripartite intervention was constructed, which was led by the nursing team, coordinated by medical social workers, and supported by volunteers. Caregivers of pediatric hematology inpatients at a tertiary-level Class A hospital were selected as research subjects. which were divided into a control group (n = 30) and an experimental group (n = 30) according to a randomized block design. The control group are treated with standard nursing care, which included health education, counseling, and psychological support from nurses. The experimental group, in addition, was provided with a tripartite collaborative nursing intervention for 3 months. *Results*: The family resilience level, social support, and family function scores of the experimental group were higher than those of the control group, and the differences were statistically significant ($P \leq 0.05$). *Conclusion*: The implementation of tripartite collaborative nursing intervention improves the resilience of families of children suffered from leukemia.

Keywords: Caregivers; Collaborative nursing; Family coping capacity; Family resilience; Leukemia

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1. Introduction

The National Pediatric Oncology Surveillance Annual Report (2022) indicates that leukemia accounted for the highest proportion (48.07%) of all cancer discharges among children aged 0–19 years in China from 2019 to 2020. Among the incidence rates, leukemia in boys (41.85/million) and leukemia in girls (33.65/million) both rank first

among cancers, and have become a major disease threatening children's health [1,2].

Advances in medical technology have increased the five-year overall survival rate for children with leukemia to approximately 90%. Nonetheless, challenges such as managing complications, post-remission relapse, and diminished survival rates following recurrence continue to significantly impact the quality of life for affected families. Families universally experience multi-dimensional physical and psychological pressures related to taking care of the children. The family resilience, as a crucial capacity within the family system to cope with crises, has gained increasing research prominence.

Current domestic studies on family resilience primarily focus on building theory locally, analysis of influencing factors, and exploration of mediating effects, There are few intervention studies on family resilience [3]. Based on Walsh's Family Resilience Theory and Collaborative Care Theory, this study constructed a tripartite collaborative nursing intervention approach that led by the nursing team, coordinated by medical social workers, and supported by volunteers, aiming to systematically improve the resilience of families of children with leukemia [4,5].

2. Materials and methods

2.1. General data

60 primary caregivers of pediatric leukemia patients admitted to a Grade-A tertiary hospital between October 2024 and March 2025 were enrolled. The participants were randomized into control and experimental groups by a randomized block design. This study has been approved by the Research Ethics Committee of the hospital research department (Approval No.: 2025KS88).

Patient inclusion criteria:

(1) The diagnosis must adhere to the pediatric leukemia standards outlined in the Chinese Guidelines for the Diagnosis and Treatment of Chronic Myeloid Leukemia, (2016 Edition) [6];

(2) First onset.

Patient exclusion criteria: Presence of other severe neurological disorders.

Caregiver inclusion criteria:

(1) Primary caregiver (e.g, parent);

(2) Undertaking the main care of the child for a long time, ≥ 3 days a week ;

(3) Informed consent and voluntary participation in this study are required.

Caregiver exclusion criteria:

(1) Difficulty communicating;

(2) Significant physical or psychological illness in the caregiver.;

(3) Received other psychological interventions before;

(4) Experiencing other traumatic events in the past month.

Sample size estimation formula for two-sample mean comparison:

$$n_1 = n_2 = 2\,[(t_\alpha + t_\beta)\,\sigma/\delta]^2$$

"σ" represents the estimated standard deviation of the two samples, and "δ" denotes the difference between the two samples means. For a two-tailed test: α takes the value 0.05, β takes the value 0.10.

Calculation: $n_1 = n_2 = 27$.

Accounting for a 20% attrition rate, the final sample size was determined to be 30 participants for every group.

The comparative general characteristics of patients and caregivers in both groups are presented in **Table 1** and **Table 2**.

Table 1. Comparison of general characteristics between pediatric groups

Aspects	Control group	Observation group	Statistical value	*P* value
n	30	30		
Gender				
Male	17	13	$\chi^2 = 0.067$	0.795
Female	13	14		
Age	6.23 ± 1.501	6.87 ± 1.697	t = -1.531	0.131
Continue of education				
Yes	27	26	$\chi^2 = 0.165$	0.688
No	3	4		
Type of medical insurance				
Residential medical insurance	18	21	Fisher	0.487
Commercial insurance	5	4		
Both	4	3		
None	3	1		

Table 2. Comparison of general characteristics of caregivers in two groups of pediatric patients

Aspects	Control group	Observation group	Statistical value	*P* value
n	30	30		
Gender				
Male	13	11	$\chi^2 = 0.278$	0.598
Female	17	19		
Age	33.63 ± 3.211	32.00 ± 3.353	t = 1.927	0.059
Marital status				
Marries	27	28	Fisher	1.000
None	3	2		
Educational attainment				
Junior high	0	0		
Secondary school or vocational college	5	5	$\chi^2 = 0.720$	0.698
College	11	14		
Bachelor's degree or higher	14	11		
Monthly household income level in the past year				
< 3000	6	4	$\chi^2 = 1.680$	0.432
3000–5000	13	18		
> 5000	11	8		
Number of children				
1	20	19	Fisher	0.830
2	8	10		
3	2	1		

Table 2 (Continued)

Aspects	Control group	Observation group	Statistical value	*P* value
Place of residence				
City	5	8	$\chi^2 = 1.874$	0.392
County town	10	12		
Rural	15	10		

2.2. Intervention method

The control group were treated with conventional nursing care, which primarily involved health education, counseling, and psychological support provided by nurses to patients' families. The content included:

(1) Upon admission, nurses will provide patients and their caregivers with an introduction to the hospital environment, medical insurance reimbursement policies, application procedures, precautions, etc.;

(2) During hospitalization, nurses explain the progression of the disease, treatment protocols, and prognosis to parents, thereby alleviating psychological burdens on the patients' families. At different stage of treatment, they provide guidance on how to assist with taking care of children, including skin management, minimizing bleeding, promptly reporting fever, dietary plans, and managing appearance;

(3) Nurses perform ward rounds more frequently, engaging with patients and their parents to evaluate psychological needs and offer timely emotional support;

(4) Nurses can offer comfort, reassurance, and practical help to foster confidence and resilience in families to overcome the illness from the perspective of the parents of sick children by the mindset of empathy and compassion;

(5) Considering the extended treatment period for pediatric leukemia, which typically lasts 2–3 years, and the fact that most maintenance therapy takes place at home following the hospital induction and consolidation phases, nurses are supposed to carry out biweekly telephone follow-ups, conduct home follow-up after discharge. This post-discharge home follow-up improves the compliance of children and their families and ensures the effective implementation of therapeutic measures.

For the experimental group, building upon the control group's nursing interventions and referencing the 2018 Pediatric Leukemia Diagnosis and Treatment Guidelines, Since the disease treatment mainly consists of 7 stages, the degree of risk and the length of treatment after each course of treatment are slightly different [7]. This group implemented a nurse-led tripartite collaborative care model involving nurses, medical social workers, and volunteers. The specific approach is detailed below.

2.2.1. Establishment of the tripartite collaborative working group

The group comprised one Head Nurse of Pediatric Hematology, four charge nurses, two medical social workers, four volunteers, two nursing postgraduates, two physicians, and two psychotherapists.

Prior to the formal implementation, group members underwent two rounds of standardized training, and then a preliminary experiment is conducted after passing the training, The formal experiment will be carried out after the preliminary experiment is feasible. Appoint the head nurse as the team leader, who responsible for overall planning, coordination, intervention quality control, and supervision. Physicians provided consultation and guidance during the implementation phase. Nurses, psychotherapists, medical social workers, and volunteers carried out specific intervention components. Nursing postgraduates assisted with completing literature reviews, data processing, and statistical analysis.

2.2.2. Developing the intervention protocol

A literature search was conducted across databases including PubMed, Web of Science, Embase, CINAHL, PsycINFO, China National Knowledge Infrastructure (CNKI), Wanfang Datebase, VIP, and the Chinese Biomedical Literature Database. Keywords such as "family resilience," "collaborative nursing," "psychological problems," and "psychological intervention" were used to search and analyze relevant studies, based on the family resilience theoretical model proposed by Dr. Froma Walsh of the University of Chicago in the 1990s and further refined version in 2016, a preliminary intervention plan was formulated [8,9].

The research team leader convened a meeting with medical and nursing specialists from Pediatrics, Hematology, and the Mental Health Center to thoroughly discuss the rationality and feasibility of the proposed intervention measures in the draft plan, thereby the final implementation protocol was developed. Concurrently, the responsible nursing team leader conducted homogenization and standardized training on the intervention plan and methods. Nurses, medical social workers, and volunteers were permitted to participate only after passing assessments, ensuring the effective implementation of the intervention. The specific intervention plan is detailed in **Table 3**.

Table 3. Intervention protocol for enhancing resilience in families of pediatric hemophilia patients, grounded in Walsh's Family Resilience Theory

Key Process	Intervention Timing	Intervention Content	Implementing Personnel	Purpose
Needs Assessment	Within 2 days of admission	Nurses used psychological assessment scales to evaluate the psychological status of parents	Nurses	Understanding of current psychological state
Belief Framework	Twice weekly during hospitalization, each session lasts 30 minutes until discharge	Nurses systematically and comprehensively explained leukemia-related knowledge to family members, guiding them towards an objective and rational understanding of the disease while dispelling irrational or incorrect perceptions, provided parents with as much information as possible regarding access to positive care and effective treatment. Additionally, they emploied positive, constructive approaches to frame the meaning of disease management	Nurse	Assisting families in cultivating a sense of hope and control over the illness
		Psychotherapists and medical social workers leaded parents in mindfulness-based stress reduction and meditation training, guiding them to temporarily detach from life pressures and savor the present tranquility; for children with terminal illnesses, they provided spiritual or religious support	Psychotherapists and Medical Social Workers	Assist in reducing psychological stress
		Volunteers assisted parents in recognizing the positive changes they have noticed in their child or family throughout treatment, encouraging them to apply the knowledge they have gained to their daily lives	Volunteers	Cultivating positive psychological beliefs among family members
Organizational Model	Twice weekly during hospitalization, 30 minutes per session, until discharge.	Psychotherapists and medical social workers assisted parents in creating family structure diagrams and family ecosystem diagrams	Psychotherapists and medical social workers	Assist parents in recognizing the significance of the family and each family member
		Medical social workers and volunteers assisted the family members of children with leukemia by disseminating knowledge and providing case support. They helped these families understand the changes and pressures brought by the illness, encouraging them to gradually adapt to the life changes caused by the disease. They guided the reorganization of family roles with increased flexibility and facilitate joint life goal setting among family members. Additionally, they promoted mutual understanding between parents and between parents and children	Medical social workers and volunteers	Promote maintaining a positive outlook on life, foster mutual respect among family members, and establish connections and collaborative interactions within the family
		Through online platforms, policy education, and the Medical Social Work Department, they assisted families in identifying accessible socio-economic resources. Volunteers provided one-to-one guidance to parents, helping them explore their local support networks and reinforcing the understanding that "we are not fighting this battle alone"	Medical social workers and volunteers	Enhance parents' confidence in managing illness together

Table 3 (Continued)

Key Process	Intervention Timing	Intervention Content	Implementing Personnel	Purpose
Effective Communication	Twice weekly during hospitalization, 30 minutes per session until discharge.	Led by nurses, psychotherapists, and medical social workers, parents were facilitated in their interactions through icebreaker activities. Group agreements and rules are established, and short-term, achievable goals are collaboratively set with family members	Nurses, psychotherapists, and medical social workers	Facilitating effective communication among family members, expressing love and care, and sharing positive emotions
		Nurses instructed family members in additional communication methods and skills, guiding them to maintain positive and effective communication with gratitude and tolerance	Nurses	
		Psychotherapists, medical social workers, and volunteers conducted communication sessions twice weekly, providing individual counseling when necessary. They encouraged family members to express their thoughts and difficulties, assist parents in managing emotions, and guided members in transforming negative feelings into positive energy while learning self-regulation and healing techniques. Conflicts are addressed promptly to clarify and resolve issues. Enhanced information and emotional exchange fosters reconnection with family members	Psychotherapists, medical social workers, and volunteers	
		Share personal experiences and treatment insights with other families facing similar circumstances,within this supportive peer group, participants expressed themselves, seeked love and care, strengthened confidence in treatment, and alleviated anxiety	Medical social workers and volunteers	
Charitable Support	During hospitalization	Nurses performed initial assessments of the family's financial situation, income sources, and medical insurance coverage. Should the family be deemed rural impoverished, falled within the purview of major illness treatment assistance, or involved children with disabilities, this information is promptly communicated to the medical social work and volunteer service team	Nurses	Secure appropriate social support for families; foster a more inclusive social environment and a supportive atmosphere
		Medical social workers conducted in-depth interviews with parents to gain a thorough understanding of the family's financial circumstances. Simultaneously, based on policy eligibility and the severity of the child's condition, they assisted families in selecting suitable assistance programs or charitable funds to alleviate financial burdens for impoverished households wherever possible.	Medical Social Workers	
		Volunteers worked directly in clinical settings, guiding families through the completion of forms, refining application materials, explaining key considerations, and outlining subsequent claim procedures to ensure timely access to assistance for affected families	Volunteers	
		Medical social workers and volunteers actively identifed and consolidated social resources, including crowdfunding platforms like Qingsongchou and the Red Cross Foundation, while also seeking policy support. This involves coordinating with community or sub-district civil affairs departments to facilitate applications for minimum living allowances	Medical Social Workers and Volunteers	

2.2.3. Implementing the intervention program

During the child's hospitalization, nurses lead bi-weekly interventions that last for approximately 30 minutes each, which are conducted in collaboration with medical social workers and volunteers. Depending on the content of the intervention, sessions are conducted by one-to-one or in small group. Locations include the child's bedside or patient-doctor consultation rooms, which utilize tools such as videos, case studies, PowerPoint presentations, and reference materials.

Prior to each session, parents are contacted to schedule the time and location. Interventions are strictly conducted according to the plan. parents' feedback including family experiences and feelings are supposed to actively sought to be understand after each session, with timely assistance provided as required. After discharge, biweekly telephone follow-ups are supplemented by a dedicated WeChat communication group, and this group regularly disseminates information on leukemia-related knowledge and stress management techniques. One-to-one follow-up discussions are arranged as needed.

2.2.4. Quality assurance

Before implementation, all team members undergo standardized training. During hospitalization, paper-based assessment questionnaires are administered. Two nursing graduate students use unified, standardized, and homogeneous standards to guide the family members of the children to fill in the form on site, which will be collected immediately to ensure its completeness. Data collection was scheduled from parents at 1 and 3 months' post-intervention in advance, and was conducted during follow-up hospital visits or chemotherapy sessions via on-site surveys. When on-site collection proved unfeasible, telephone follow-ups will be instead. The collected data underwent standardized numbering and organization, with dual data entry and cross-verification.

2.3. Evaluation methods

The Family Resilience Scale, Social Support Scale, and Family Functioning Scale were used to evaluate family resilience levels at the child's admission, one month post-intervention, and three months post-intervention.

2.3.1 Family resilience level

The Chinese version of the Family Resilience Assessment Scale (FRAS-C), revised in 2016 by Chinese scholars including Li, was utilized to evaluate family resilience levels [10]. This scale is based on the original FRAS developed by Sixbey [11]. This assessment consists of 32 items across three dimensions: Utilization of Social Resources (3 items), Maintaining Positive Perspectives (6 items), and Family Communication and Problem Solving (23 items).

The scale utilizes a four-point Likert scale, scoring items from 'Strongly Disagree' to 'Strongly Agree' as 1 to 4 points, respectively. The total score spans from 32 to 128 points, with higher scores indicating greater family resilience. The Cronbach's alpha coefficient for this scale in the present study ranged from 0.787 to 0.960.

2.3.2 Social support

The Social Support Rating Scale (SSRS), developed by Chinese scholar Xiao Shuiyuan, was utilized [12]. This scale is widely used both domestically and internationally [13,14]. It comprises three dimensions: objective support, subjective support, and utilization of social support, with a total of 10 items. The scale uses a 1–4 rating system, where higher scores across dimensions and the total score indicate greater social support received. Generally, a total score less than 20 indicates low social support, 20–30 denotes moderate support, and a score of 30 or above signifies satisfactory social support. The scale exhibits good reliability, with an internal consistency coefficient of 0.79 and a test-retest reliability of 0.920 [15].

2.3.3 Family functioning assessment

The Family Assessment Device (FAD), developed by Epstein et al. in 1983, was utilized [16]. This 60-item scale comprises seven subscales: Problem Solving, Communication, Roles, Emotional Reaction, Emotional Involvement, Behavioral Control, and Overall Functioning. Scores range from 1 to 4, corresponding to Strongly Agree, Agree, Disagree, and Strongly Disagree, respectively. Higher total scores suggest more negative assessment outcomes and poorer family functioning.

Scores between 60–120 indicate good family functioning, 121–180 indicate average functioning, and scores above 181 indicate poor family functioning. This scale needs to be completed by each family member aged 12 years or older.

2.4. Statistical methods

Data were entered by two operators using Epidata software and analyzed statistically with SPSS 23.0. Normally distributed quantitative data were described using means and standard deviations (SD) Intergroup comparisons employed independent samples t-tests at a significance level of $\alpha = 0.05$.

3. Results

Comparisons of family resilience, social support, and family functioning scores between the two groups before and after intervention are presented in **Table 4, 5**, and **6**. At admission, differences in family resilience, social support, and family functioning scores between the control and experimental groups were not statistically significant ($P > 0.05$). 1 month and 3 months after intervention, the experimental group demonstrated significantly higher scores than the control group in family resilience, social support, and family functioning ($P \leq 0.05$).

Table 4. Comparison of family resilience scores before and after intervention in both groups (points, $\bar{x} \pm s$)

Group	n	Family Resilience Scale (FRAS)		
		Pre-intervention	1 month post-intervention	3 months post-intervention
Control group	30	90.367 ± 3.68	94.367 ± 1.712	97.267 ± 2.099
Observation group	30	91.167 ± 3.55	98.467 ± 2.609	105.0 ± 2.853
t-value		- 0.856	- 7.196	- 11.958
P-value		0.395	0.000	0.000

Table 5. Comparison of social support scores before and after the intervention in both groups of children (points, $\bar{x} \pm s$)

Group	n	Social support		
		Pre-intervention	1 month post-intervention	3 months post-intervention
Control group	30	21.900 ± 1.605	24.700 ± 1.803	28.200 ± 2.107
Observation group	30	22.533 ± 1.852	28.867 ± 3.137	34.400 ± 3.233
t-value		- 1.415	- 6.307	- 8.799
P-value		0.162	0.000	0.000

Table 6. Comparison of family functioning scores before and after intervention in both groups of children (points, $\bar{x} \pm s$)

Group	n	Family function score		
		Pre-intervention	1 month post-intervention	3 months post-intervention
Control group	30	147.167 ± 7.553	141.000 ± 8.094	131.933 ± 4.667
Observation group	30	145.867 ± 4.904	126.633 ± 5.986	101.033 ± 9.884
t-value		0.791	7.925	15.484
P-value		0.432	0.000	0.000

4. Discussion

4.1. Tripartite collaborative care enhances the level of social support for families of pediatric leukemia patients

Pediatric leukemia patients typically undergo multiple courses of chemotherapy within 1 month to 2 years of hospital admission, each causing varying degrees of psychological distress for both the child and their caregivers. Throughout this process, the level of family support plays a crucial role in combating the disease [17].

Family social support involves multidimensional mutual assistance and protection among family members, encompassing emotional, material, informational, behavioral, and social resources. This support aids families in managing life's pressures and challenges, enhancing individual mental health, coping abilities, and life satisfaction [18]. It also includes stress reduction, improved depressive symptoms, and increased well-being [19].

Table 5 illustrates that at both 1 month and 3 months post-intervention, the social support levels within families of children with leukemia in the observation group were significantly higher than those in the control group ($P \leq 0.05$). Research indicates that increased levels of familial, community, and societal support, along with relationship quality and life satisfaction, contribute to enhanced family resilience [20]. Following a child's diagnosis with leukemia, family members especially parents often experience a "sense of existential crisis", characterized by shock, fear, and feelings of powerlessness, along with significant physical distress such as insomnia and loss of appetite.

Despite their profound distress, parents frequently display remarkable resilience and love. During this challenging time, coordinated scientific interventions by nurses, medical social workers, and volunteers can help families adjust their mindset and transition roles by providing effective resources, implementing support measures, and actively seeking societal backing. Furthermore, heightened family resilience alleviates the patient's symptom burden, caregiver burden, psychological distress, and perceived stress, while also enhancing emotional and social support and quality of life for family members [21,22]. Scholars advocate that healthcare professionals prioritize the crucial role of social and familial resources in delivering appropriate support and interventions to foster psychological resilience and mental health development [23].

4.2. Tripartite collaborative care enhances family functioning in pediatric leukemia households

Family functioning refers to the dynamic capacity of the family system to achieve internal stability and external adaptation through processes such as normative interaction, emotional bonding, effective communication, and role coordination [24,25].

As indicated in **Table 6**, the experimental group displayed significantly higher levels of family functioning than the control group at both 1 month and 3 months post-intervention ($P \leq 0.05$). Strong family functioning enhances psychological coping abilities among patients and caregivers, mitigates the impact of adverse events, and fosters positive familial relationships, which aligning with the findings from Huang's research [26]. Families with a higher overall functional capacity demonstrate greater resilience in maintaining and improving family cohesion when facing adverse events [27]. The tripartite collaborative care approach addresses not only the child's physical and mental health but also focuses on the psychological needs and well-being of the parents. It provides a platform for parents to communicate and share, and encourage family members to raise issues, engage in open dialogue, express feelings, and convey affection. This enhances role recognition among parents and relatives, utilizes familial bonds for intervention, strengthens family relationships, and increases confidence in overcoming

the illness.

Consequently, family functioning is improved, fully harnessing the family's proactive capacity to elevate its resilience, which aligns with existing scholarly conclusions that healthcare professionals should strive to enhance family resilience and communication skills to foster optimal family functioning [28,29].

4.3. Tripartite collaborative care enhances the resilience of families with children diagnosed with leukemia

Upon the diagnosis of acute leukemia, the uncertainty surrounding treatment, the protracted duration of therapy, and the substantial financial burden often led to anxiety, depression, or acute post-traumatic stress syndrome in parents during the initial phase. Concurrent physical symptoms, such as dizziness, nausea, and abdominal pain, may further diminish the family's overall resilience.

Family resilience refers to the core characteristic where household members, through continuous adaptation and resource integration within stressful contexts, stimulate coping capacities. This facilitates the family's elastic recovery from adversity and achieves optimized functioning of both the family unit and its institutional relationships [30]. It constitutes a dynamic process that enables families to undergo systemic restructuring during crises, achieving functional leaps post-adversity through effective adaptation [31,32].

Table 4 demonstrates that at both 1 month and 3 months post-intervention, the experimental group exhibited significantly higher family resilience levels than the control group ($P \leq 0.05$), which aligns with findings from Lei regarding family resilience in pediatric leukemia patients [33]. This study employed a multidisciplinary team-based collaborative nursing approach, utilizing family resilience process information to provide guidance on behavioral, physical, psychological, and social growth care services. This approach promoted family harmony and enhanced resilience levels, consistent with findings by Zhang [34,35].

5. Conclusion

The nurse-led collaborative care intervention, which includes nurses, medical social workers, and volunteers, effectively enhances the overall resilience of families with children undergoing leukemia treatment. However, this study has its limitations, when considering the prolonged treatment cycle for leukemia and the constraints on time, manpower, resources, and the intervention lasted only 3 months. Moreover, family resilience is a dynamic process, Further research could adopt a longitudinal approach to explore this topic in greater depth and detail.

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