

# Effects of nursing intervention models on social adaptation capability development in preschool children with malignant tumors: a randomized control trial

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## Abstract

**Objectives:** The objectives of this study are to compare the effects of two nursing intervention models on the ability of preschool children with malignant tumors to socialize and to determine if these interventions improved their social adaptation capability (SAC) and quality of life.

**Methods:** Inpatient preschool children with malignant tumors admitted to the hospital between December 2009 and March 2012 were recruited and randomized into either the experimental or control groups. The control group received routine nursing care, and the experimental group received family-centered nursing care, including physical, psychological, and social interventions. The Infants-Junior Middle School Student's Social-Life Abilities Scale was used to evaluate SAC development of participants.

**Results:** Participants ( $n = 240$ ) were recruited and randomized into two groups. After the intervention, the excellent and normal SAC rates were 27.5% and 55% in the experimental group, respectively, compared with 2.5% and 32.5% in the control group ( $p < 0.001$ ). After the intervention, SAC in experimental group was improved compared with before intervention ( $54.68 \pm 10.85$  vs  $79.9 \pm 22.3$ ,  $p < 0.001$ ). However, no differences in SAC were observed between baseline and after intervention in the control group ( $54.70 \pm 11.47$  vs.  $52 \pm 15.8$ ,  $p = 0.38$ ).

**Conclusion:** The family-centered nursing care model that included physical, psychological, and social interventions improved the SAC of children with malignancies compared with children receiving routine nursing care. Establishing a standardized family–school–community–hospital hierarchical multi-management intervention model for children is important to the efficacy of long-term interventions and to the improvement of SAC of children with malignancies.

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## Introduction

As a consequence of lifestyles and environmental changes, the incidence of childhood malignancies has increased worldwide [1]. The first tumorigenesis peak is observed in preschool-aged children and coincides with a developmental period critical to socialization. A study of 2152 long-term childhood malignancy survivors and 2432 controls in Canada found that the physical health of long-term survivors of childhood malignancies was generally good, however, the psychological and social adaptability scores in these children were lower than the scores of the control population [2].

Our previous study examining social adaptation capability (SAC) refers to the adaptive capability of individuals on their surrounding environment and social needs, and the psychological and physical status of children with malignancies ( $n = 120$ ) and healthy children ( $n = 64$ ) showed that SAC of preschool children with a malignancy was significantly

lower than that of healthy children and school-aged children with a malignancy. Furthermore, preschool children presenting with malignancies had more behavioral problems than school-aged children presenting with malignancies because of various factors including the selection of caregivers, family relationships, parenting styles, and the coping methods of the parents and children [3,4]. Therefore, it was necessary to implement a family-centered model of care according to the growth and development of preschool children that incorporated their psychological and behavioral characteristics so that children with malignancies can heal as rapidly as possible while also reducing the burden on their families and society [5–13].

## Methods

### Participants

Preschool children presenting with malignant tumors between December 2009 and March 2012 were recruited

for the study by the Department of Oncology, Children's Hospital of Chongqing Medical University, Chongqing, China.

Inclusion criteria were as follows: (a) children with a clinical and pathological diagnosis of malignant tumors; (b) age 3–7 years; (c) no serious physical or mental illnesses influencing locomotor activity; and (d) signed informed consent obtained from the patient's parents or legal guardians. Exclusion criteria were as follows: (a) children with traumatic brain injury or intelligence deficiencies; (b) children with serious mental stress or diseases; or (c) death during the study. The study was approved by the Ethics Commission of the Affiliated Children's Hospital of Chongqing Medical University.

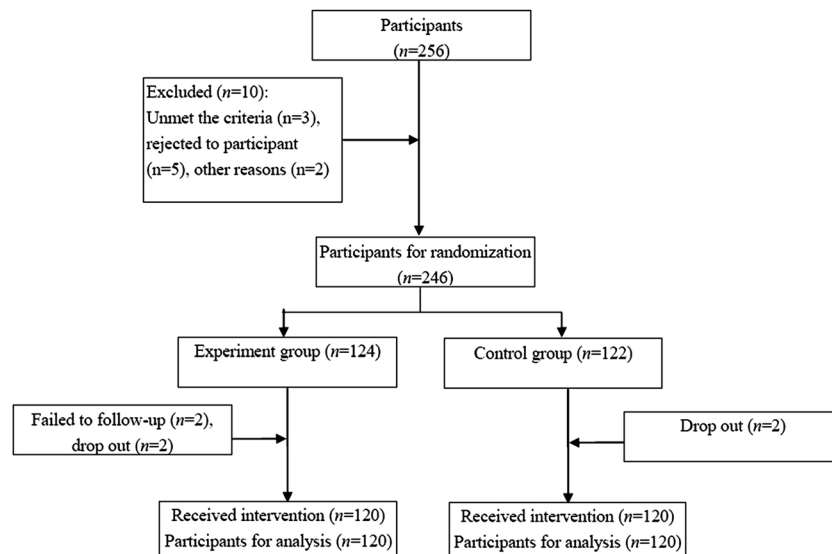
A statistical program was used to determine group assignment, and all participants were randomly divided into either the experimental or control groups ( $n=120$  cases per group) (Figure 1).

### Interventions

For the control group, routine care was implemented in accordance with international standards of care, such as the general disease care routine (for example, management of the environment, diet, rest, activity guidelines, psychological care, and health education), chemotherapy care routines including maintaining normal body temperature, nutrition improvement, infection prevention, care due to chemotherapy associated secondary effects, pain management, and monitoring for nursing-sensitive indicators (i.e., vomiting, diarrhea, constipation, and bone marrow suppression), and nursing care before and after surgery (routine preoperative preparation, correction of coagulopathy, postoperative airway management, wound care, and observing for complications).

Care of the experimental group was based on control group interventions resulting in the establishment of the family-centered care intervention model and of the family-centered care collaborative group. The director of the department, head nurse, and all medical staff and volunteers participated in the implementation of the nursing interventions. Furthermore, all staff were involved in the same professional training and obtained a qualification certificate. The specific intervention programs were as follows. (a) The participants in the experimental group were divided randomly by age as follows: 3 to 4 years, 4 to 5 years, 5 to 6 years, and 6 to 7 years with seven to eight participants in each subgroup. In each age group, a general superintendent was responsible for quality control for both groups. (b) Development of training courses. During the first 1 to 2 weeks, training courses involved presentations by the general superintendent based on the self-management manual on SAC for childhood malignancies. Video screenings and a demonstration were provided that were completed in four sections. The presentations lasted 30–60 min, and after each presentation, each subgroup discussed the content and the impact of the presentation on their daily habits, self-management practices, and possible difficulties and problems that may arise during the implementation of the behavioral changes described. Additional counseling was provided for participants not responsive to this approach.

During weeks 3 to 4, assessment of each participant's living conditions was evaluated to help them proactively identify problems and identify favorable and unfavorable conditions associated with SAC improvement. At the same time, on the basis of each participant's individual situation (including their living environment), a health intervention plan based on personalized medicine and their respective psychological and behavioral profiles



**Figure 1.** Study process flowchart

was discussed and developed. Furthermore, a QQ (social network software) group was developed that included doctors and patients designed to help solve any difficulties and problems encountered during SAC improvement and to strengthen self-management behavior.

During weeks 5–11, independent living skills training was carried out that included playing games and carrying out age-appropriate activities for each group, for example, building simple puzzles, reading picture books, listening to stories, and picking up toys (activities lasted 20–25 min). Furthermore, training on how to carry out daily activities independently (e.g., eating, washing, brushing teeth, dressing, and going to toilet) was provided by the general superintendent and medical staff. Before these activities have begun, a demonstration by a nurse was carried out, and the activities involved parents and children (under the guidance of nurses).

During the 12th week, SAC assessment was administered by trained professionals that had not participated in the intervention or evaluation process. For example, a 3-year old child with a malignant tumor requires a treatment approach based on assessment results of their respective SAC after having received various living skills trainings and interventions including the following: (a) interventions on independent living skills including eating, dressing and undressing, using the restroom, and individual and group hygiene skills; (b) interventions regarding athletic ability, including foot jumping, walking down stairs with railings, skipping over 10- to 15-cm high obstacles; (c) operational capability interventions, including preparation and cleaning of tableware, using paste, cutting with scissors, opening bottle caps, tying and untying shoelaces, and using a screwdriver and electrical equipment; (d) networking skill interventions, including speaking, making phone calls, and reading simple picture books; (e) interventions regarding group activities, including games and playing with other children; and (f) self-management skill interventions, including going to sleep on time, preventing requests of unreasonable demands, taking care to avoid illness, and independent planning.

### Data collection

The revised 'Infants-Junior Middle School Student's SAC Scale' [14] was used to study the living, psychological, and physiological conditions and to evaluate SAC between the two groups. The scale reflects the child's SAC for children 6 months to 14 years of age with a reliability of 0.98 and a validity of 0.5. The scale has 132 items that can be divided into six categories including self-help, locomotion, occupation, communication, socialization, and self-direction. After the interventions, the SAC of the participants was tested and scored on the basis of the performance of children demonstrating mastery of a specific skill by trained professionals who were not involved

in the assessment or intervention and were blinded to treatment assignment. On the basis of the total score, there were three levels: abnormal ( $\leq 7$  scores), normal (8 to 10 scores), and excellent ( $\geq 11$  scores).

### Statistical analysis

EpiData3.0 (The Epidate Association, Odense Denmark) was used for data entry by two investigators to verify that data were entered correctly. SAS 9.0 (SAS Institute Inc., Cary, NC, USA) and SPSS (SPSS Inc., 233 South Wacker Drive, USA) 17 were used for statistical analyses, and data were expressed as the mean and standard deviation (SD) or frequency, respectively. The *t*-test, analysis of variance for repeated measurement data, and chi-square tests were used to compare the two groups as necessary. A  $p < 0.05$  was considered statistically significant.

### Results

A total of 240 children with malignant tumors were recruited with 146 (61%) boys and 94 (39%) girls. Each of the following age groups included 60 cases:  $>3$ - to  $\leq 4$ -year,  $>4$ - to  $\leq 5$ -year,  $>5$ - to  $\leq 6$ -year, and  $>6$ - to  $\leq 7$ -year olds. Of these, 120 (50%) cases were due to leukemia, 48 (20%) cases were due to lymphoma, 30 (12.5%) cases were due to neuroblastoma, 24 (10%) cases were due to nephroblastoma, and 18 (7.5%) cases were due to hepatoblastoma. All children were randomly divided into either the control group or the experimental group (120 cases per group). No statistical differences existed regarding age, gender, type of disease, education level of parents, or family economic status between the groups (Table 1).

No significant differences in SAC between the groups at baseline were observed ( $p > 0.05$ ). Following intervention in the experimental group, 33 (27.5%) children presented with excellent SAC levels compared with 3 (2.5%) children before the intervention. Sixty-six (55.0%) children presented with normal levels compared with 39 (32.5%) children before intervention, and only 21 (17.5%) children had abnormal levels compared with 78 (65.0%) children before therapy. There was a statistical difference in SAC development between the two groups ( $p < 0.001$ ) (Table 2).

After the intervention, the SAC in the experimental group was improved over baseline ( $54.68 \pm 10.85$  vs.  $79.90 \pm 22.30$ ,  $t = 7.70$ ,  $p < 0.0001$ ). However, no differences in SAC were found between baseline and after intervention in the control group ( $54.70 \pm 11.47$  vs.  $52.00 \pm 15.80$ ,  $t = -0.87$ ,  $p = 0.38$ ). Furthermore, scores corresponding to six categories including self-help, locomotion, occupation, communication, socialization, and self-direction in the experimental group were higher than in the control group ( $p < 0.01$  for all categories; Table 3).

**Table 1.** General characteristics of the participants

Items	Control group (n = 120)	Experiment group (n = 120)
Gender*		
Boy	70	76
Girl	50	44
Age (years)*		
>3 to ≤4	28	32
>4 to ≤5	31	29
>5 to ≤6	33	27
>6 to ≤7	28	32
Areas*		
City	52	56
Rural	68	64
Diseases*		
Lymphoma	84	84
Neuroblastoma	15	15
Nephroblastoma	12	12
Hepatoblastoma	9	9
Education level of parents*		
Primary school	31	32
Junior high school	49	48
Senior high school	29	30
University degree and above	11	10
Family economic conditions*		
Better	15	14
Ordinary	64	66
Worse	41	40

\* $p > 0.05$ , experiment group versus control group.

**Table 2.** Comparison of social adaption capability scores after intervention

Social-life ability	Control group (%)	Experiment group (%)
Excellent	3 (2.5)	33 (27.5)
Normal	39 (32.5)	66 (55.0)
Abnormal	78 (65.0)	21 (17.5)

Chi-square = 64.76,  $p < 0.001$ , comparison between the two groups.

**Table 3.** Comparison of social adaption capability scores

Items	Control group (n = 120)		Experiment group (n = 120)	
	Baseline	After the intervention	Baseline	After the intervention
Self-management	5.38 ± 1.33	4.80 ± 2.60	5.32 ± 1.37	7.80 ± 2.40 <sup>ab</sup>
Participating in group activities	7.33 ± 1.67	6.40 ± 2.80	7.39 ± 1.69	9.70 ± 3.20 <sup>ab</sup>
Sports	5.50 ± 1.91	5.80 ± 2.80	5.27 ± 1.50	8.80 ± 2.60 <sup>ab</sup>
Independent living	19.18 ± 5.23	16.60 ± 6.90	19.12 ± 4.06	23.40 ± 7.30 <sup>ab</sup>
Homework	7.33 ± 1.75	8.60 ± 2.30 <sup>b</sup>	7.27 ± 1.50	11.60 ± 2.90 <sup>ab</sup>
Networking	10.88 ± 2.83	9.80 ± 3.80	10.54 ± 2.48	18.60 ± 3.90 <sup>ab</sup>
Total scores	54.70 ± 11.47	52.00 ± 15.80	54.68 ± 10.85	79.90 ± 22.30 <sup>ab</sup>

<sup>a</sup> $p < 0.01$ , versus control group.

<sup>b</sup> $p < 0.05$ , versus baseline.

## Discussion

The present study compared the effects of two nursing intervention strategies on SAC in preschool children presenting with malignant tumors and demonstrated that the family-centered nursing care model improved the SAC of children with malignancies more effectively than in children subjected to routine nursing care.

Children of preschool age are at a critical developmental stage that can affect their ability to develop skills associated with observation, attention, memory, cognitive ability, imagination, and emotion. Impairments to development at this stage may lead to emotional conflicts that may detrimentally affect a child's behavior and emotional stability later in life resulting in social problems. Therefore, it is critical to pay attention to the physical and mental development of preschool children, particularly if they are also presenting with a malignancy.

Impaired development in this stage can lead to increased emotional conflicts that if not resolved can result in personality disorders and interfere with SAC development. Therefore, physical and mental development of preschool children with malignant tumors is of great concern because this population is subject to additional pressures.

After long-term repeated hospitalization and invasive treatment, preschool children with malignant tumors develop a reduced psychological tolerance; therefore, timely and appropriate psychological interventions can change their state of mind and improve quality of life [15,16]. Measures can be taken to maintain elevated spirits during treatment that in turn result in improved psychological development as a consequence of a healthy, positive, and friendly environment. Such measures include participating in painting games, story-telling contests (that develops imagination), creative games (such as role playing to develop intelligence), and distracting children by having them watch cartoons or other videos.

The family unit creates an important environment for children, impacting their lives and education because parents are child's first teachers and are critical to SAC development in preschool children. It is therefore natural that children with diseases desire their parent's company because it provides them support and guidance. However, because of diseases and other factors, parents of children with malignant tumors usually have negative emotions such as self-blame, blame of the child, or are generally pessimistic [17], making it difficult for the parents to be patient and provide guidance for their children. This leads to impaired physical development and the presentation of mental development disorders [18,19]. Therefore, providing psychological and behavioral support for parents is especially important. The model of family-centered nursing care can allow parents to be involved in the medical care of their children, undertake a nurse care role, and discuss

the child's medical treatment with the medical staff. It also provides the children with positive guidance, allowing the children to develop self-reliance thereby allowing them to develop good habits that facilitate the development of SAC [20].

This study had some limitations. First, all participants were recruited from one hospital, which might limit data interpretation. Second, the study did not collect data on parent characteristics such as age that might also influence the intervention results. Finally, because of the sample size, the effect of the intervention on different diseases was not analyzed. Further studies will address these issues in collaboration with multiple centers and larger sample sizes. With the development of the Health System Reform in China, the extension of nursing care to children with malignant tumors, and the establishment of a standardized home-school-community-hospital classification management intervention model, will facilitate these types of studies.

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## Conclusion

This study demonstrated that the implementation of a family-centered, physical, psychological, and social intervention plan for children and parents improved the SAC and development of SAC of children with malignant tumors. Establishment of a standardized family-school-community-hospital hierarchical multi-management intervention model has important significance to the success of long-term intervention strategies and to the improvement of various social abilities in children with malignancies.

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## Conflict of interest

All authors declare no conflicts of interest.

## Supporting information

Additional supporting information may be found in the online version of this article at the publisher's web site.