

# Evaluation of the Effectiveness of Pain Management Models for Children with Malignant Tumors in Qinghai Region

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**Abstract:** ***Objective:** To understand the current status of pain in children with tumors in Qinghai Province and its influencing factors, and to establish a pain management model suitable for Qinghai. **Methods:** A multidisciplinary pain management team was formed, consisting of physicians, nurses, pharmacists, volunteers, ethnic minority translators, and medical students, to implement multidimensional pain management. The effectiveness of this management model was statistically analyzed using questionnaires. **Results:** A total of 103 pediatric tumor patients were enrolled for the survey. The statistical analysis revealed the following results: 1) The intervention group's rates of regular pain assessment, pain assessment compliance, implementation and recording of analgesic measures, and pain management feedback were significantly higher than those of the control group ( $p < 0.05$ ). 2) Comparison of anxiety and depression scores between the two groups showed that after the intervention, the SAS and SDS scores of the observation group were lower than those of the control group ( $p < 0.05$ ). 3) Comparing pain relief effectiveness and satisfaction with pain control between the two groups, the total effective rate of pain relief in the intervention group was 88%, higher than the 54% seen in the control group ( $p < 0.05$ ); satisfaction with pain control was 72.7%, also higher than the control group's 48.8% ( $p < 0.05$ ). 4) Quality of life comparison between the two groups: physiological function, bodily pain, social function, and mental health scores of the observation group were significantly higher than those of the control group ( $p < 0.01$ ). **Conclusion:** Pain management through the palliative care model can alleviate the suffering of pediatric cancer patients during treatment, extend their lifespan, and improve their quality of life. This study provides clinical theoretical and data support for cancer pain management.*

## 1. Introduction

Cancer is the second deadliest disease worldwide [1]. From 2001 to 2010, the incidence rate of all types of cancer among children aged 0-14 years old was 135.6 per million [2]. The incidence rate of clinical malignant tumors in the world is increasing year by year, becoming the first factor affecting people's life and health [3]. Improving the quality of life of cancer patients is an urgent medical problem in China. The pain associated with childhood tumors (unpleasant feelings and emotional experiences related to actual or potential tissue damage or similar) is a major health issue [4]. The World Health Organization (WHO) guidelines for medication treatment of persistent pain in children state that childhood pain is a significant public health issue in most parts of the world. For decades, adequate procedural pain management for children has been a key focus of pediatric oncology treatment and care. In clinical practice, if cancer pain cannot be managed and controlled in a timely, standardized, effective, and long-term manner, it may worsen the condition and cause or exacerbate symptoms such as anxiety, depression, panic, unease, and insomnia in patients, seriously affecting their daily activities, social interaction, self-care ability, and overall quality of life. At the same time, pain directly or indirectly inhibits the immune function of the body, thereby promoting tumor progression, bringing enormous mental and psychological burden to patients and their families [5]. Therefore, analgesia plays an important role in cancer treatment. However, the pain problem of children with tumors, a special group, is easily overlooked in clinical practice. On the one hand, parents have poor understanding of analgesic drugs, and 54% are worried that using analgesic drugs will lead to addiction and cover up the condition [6]. When pain occurs, children are generally encouraged to be strong or shift their attention. On the other hand, children face obstacles in

appropriate pain management and may hesitate to accurately report pain [7].

Qinghai is located in a high-altitude area in the northwest of China and is a settlement of multiple ethnic groups (Han, Tibetan, Hui, Mongolian) with different ethnic customs and cultural beliefs. In addition, due to the sparse population and limited transportation and information, as well as relatively poor economic and medical conditions and cultural level, there is a lack of understanding of the importance of pain relief in the treatment of children. This causes many children with cancer to suffer from both physical and psychological torment caused by cancer pain. In order to better improve the pain management level and quality of life of children with cancer, this study aims to establish a multidisciplinary tumor pain management team with local characteristics. Through summarizing experience, continuous innovation, and taking measures, we will explore issues related to childhood cancer pain and find a localized pain management model suitable for high-altitude multi-ethnic areas. We hope to pay attention to the whole society of childhood cancer pain, eliminate patients' psychological and physical pain, and create a more fulfilling and comfortable life for patients and their families [8,9]. In addition, we hope to explore a soothing medical model that is suitable for high-altitude multi-ethnic areas.

## 2. Data and Methods

### 2.1 Research Object

The data for this study were collected from 103 children with malignant tumors accompanied by cancer pain who were admitted to the pediatric department of Qinghai University Affiliated Hospital from January 2018 to December 2024. Conduct a survey on the effectiveness of pain

management and quality of life in the form of a questionnaire. This study has been reviewed by our hospital's ethics committee, and both the patient's family and the patient have signed informed consent forms.

Inclusion criteria:

- (1) Age  $\leq$  18 years old, pathological diagnosis of tumor, and expected survival period  $\geq$  3 months;
- (2) According to the diagnostic criteria for cancer pain in the "Diagnosis and Treatment Standards for Cancer Pain (2018 Edition)" issued by the Ministry of Health, children with tumors with a score greater than 0;
- (3) Born and residing in Qinghai Province for a long time ( $>$ 1 year);
- (4) Before entering our hospital, I did not receive formal standardized management of cancer pain;
- (5) Capable of effective language communication (including language translation guidance).
- (6) Patients and their families are aware of the treatment process and sign an informed consent form.

This study involved 103 pediatric patients who participated in the investigation. Among the 103 pediatric cancer patients, there were 51 cases (49.04%) of leukemia, 15 cases (14.65%) of lymphoma and reticuloendothelial cell tumors, 4 cases (3.82%) of central nervous system (CNS) and other intracranial and spinal cord tumors, 3 cases (3.18%) of sympathetic nervous system tumors, 2 cases (1.91%) of retinoblastoma, 4 cases (3.82%) of kidney tumors, 1 case (1.27%) of liver tumors, 14 cases (14.01%) of malignant bone tumors, 4 cases (3.82%) of soft tissue sarcoma, 2 cases (2.55%) of germ cell, trophoblast cell, and other gonadal tumors, and 2 cases (2.55%) of cancer and other malignant epithelial tumors. Example (1.27%), 1 case (0.64%) of other and unspecified types of malignant tumors.

## 2.2 Investigation Tools

The survey tool is a questionnaire survey, which includes four parts: (1) Basic characteristics of children: including children's gender, age, parents, family income, general status, education, brothers and sisters, etc; (2) Pain Scale. (3) Anxiety and depression scores. (4) Quality of Life Assessment Form.

## 2.3 Investigation Method:

Selected by professionally trained investigators from the inclusion and exclusion criteria, relevant survey questionnaires were collected through one-on-one interviews with the survey subjects. All questionnaires were collected on the spot after completion.

## 2.4 Statistical Analysis

Statistical processing

Perform statistical analysis using SPSS 28.0 software. The

measurement data that conforms to normal distribution is measured using  $\bar{x} \pm s$ , and t-test is used for comparison between two groups; Quantitative data that conforms to skewed distribution are represented by M (P25, P75), multiple group comparisons are represented by Kruskal Wallis test, count data are represented by rate or composition ratio (%), and inter group comparisons are represented by  $\chi^2$  test or rank sum test.  $P < 0.05$  indicates a statistically significant difference.

## 3. Results

### 3.1 Basic Characteristics of Childhood Tumors in Sample Area

In this study, there were 103 children with malignant tumors, including 55 Han (53.3%), 23 Tibetan (22.3%), 19 Hui (18.4%), 3 Tu (2.9%), 2 Salar (1.9%), and 1 Mongolian (1%). The 103 patients were located in the following regions: 43 cases (41.7%) in Xining City, 24 cases (23.3%) in Haidong City, 12 cases (11.6%) in Hainan Tibetan Autonomous Prefecture, 8 cases (7.8%) in Yushu Tibetan Autonomous Prefecture, 6 cases (5.8%) in Haixi Tibetan Autonomous Prefecture, 3 cases (2.9%) in Golog Tibetan Autonomous Prefecture, 4 cases (3.9%) in Haibei Tibetan Autonomous Prefecture, and 3 cases (2.9%) in Huangnan Tibetan Autonomous Prefecture. 51 cases (49.04%) of leukemia, 15 cases (14.65%) of lymphoma and reticuloendothelial cell tumors, 4 cases (3.82%) of central nervous system (CNS) and other intracranial and spinal cord tumors, 3 cases (3.18%) of sympathetic nervous system tumors, 2 cases (1.91%) of retinoblastoma, 4 cases (3.82%) of kidney tumors, 1 case (1.27%) of liver tumors, 14 cases (14.01%) of malignant bone tumors, 4 cases (3.82%) of soft tissue sarcoma, 2 cases (2.55%) of germ cell, trophoblastic and other gonadal tumors, 2 cases (1.27%) of cancer and other malignant epithelial tumors, and 1 case (1.27%) of other and unspecified types of malignant tumors. (0.64%). Divided into an observation group for comprehensive management and a control group for routine pain management based on parental participation awareness.

### 3.2 Pain Control and Management of Sample Population

**Table 1:** Pain Control and Management Status [n (%)]

variable	project	Observati on group (n=55)	control group (n=48)	$\chi^2$	<i>p</i> value
Do you receive regular pain assessments	no	6(30)	14(70)	5.4 60	0.019
	yes	49(59)	34(41)		
Whether to cooperate with pain assessment	no	11(37.9)	18(62.1)	3.8 80	0.049
	yes	44(59.5)	30(40.5)		
Have appropriate pain relief measures been taken and recorded	no	9(33.3)	18(66.7)	5.9 20	0.015
	yes	46(60.5)	30(39.5)		
Is there feedback on the pain relief after processing	no	5(26.3)	14(73.7)	5.5 97	0.018
	yes	50(59.5)	34(40.5)		

Comparison of pain control and management between two

groups of patients. The observation group had significantly higher average rates of regular pain assessment (whether they received pain assessment regularly), pain assessment cooperation (whether they cooperated with pain assessment), pain relief measures and recording rate (whether corresponding pain relief measures were given and recorded), and pain treatment feedback rate (whether they reported pain relief after treatment) compared to the control group ( $p < 0.05$ ).

### 3.3 Analysis of Anxiety and Depression in the Sample Population

**Table 2:** Anxiety and Depression Scores (points,  $x \pm s$ )

variable	Observation group	control group	t	pvalue
Anxiety rating	62.036±7.36 9	61.354±8.35 0	0.441	0.661
Post intervention anxiety score	50.927±6.73 5	54.833±7.87 8	-2.71 3	0.008
Depression rating	61.418±6.00 8	61.875±6.87 2	-0.36 0	0.720
Post intervention depression score	53.764±6.81 5	57.042±6.37 5	-2.50 9	0.014

Comparison of anxiety and depression scores between two groups of patients. Before intervention, there was no statistically significant difference in SAS and SDS scores between the two groups of patients ( $p > 0.05$ ), but both groups of patients had a certain degree of anxiety and depression (SAS average score  $\geq 50$ , SDS average score  $\geq 53$ ); After intervention, the SAS and SDS scores of the observation group were lower than those of the control group ( $p < 0.05$ ).

### 3.4 Analysis of Pain Relief Effect and Pain Satisfaction in Sample Population

**Table 3:** Pain relief effect and pain satisfaction in pediatric patients [n (%)]

variable	project	Observation group (n=55)	control group (n=48)	$\chi^2$	pvalue
Pain relieving effect	invalid	11(33.3)	22(66.7)	8.01 1	0.017
	remarkable	11(68.8)	5(31.2)		
	effective	33(61.1)	21(38.9)		
Satisfaction with pain control	dissatisfied	15(36.6)	26(63.4)	8.54 6	0.012
	very satisfied	14(73.7)	5(26.3)		
	satisfied	26(60.5)	17(39.5)		

Comparison of pain relief effects and satisfaction with pain control between two groups of patients. The total effective rate of pain relief in the observation group was 88%, which was higher than the 54% in the control group ( $p < 0.05$ ); The satisfaction rate of pain control in the observation group was 72.7%, which was higher than the 48.8% in the control group ( $p < 0.05$ ).

### 2.5 Analysis of Quality of Life of Sample Population

variable	Observation group	control group	t	pvalue
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physiological function	89.455±6.871	80.938±9.799	5.157	< 0.01
body pain	89.145±7.730	80.021±10.636	5.023	< 0.01
social function	89.618±9.138	79.396±12.158	4.859	< 0.01
Mental health	87.836±8.856	79.312±12.360	4.059	< 0.01

Comparison of physiological function, physical pain, social function, and mental health between two groups of patients. The quality of life score of the observation group was higher than that of the control group, and the difference was statistically significant ( $p < 0.01$ ).

## 4. Discussion

Childhood pain is a significant public health issue. Almost all children will experience pain at some point in their cancer trajectory, whether due to their disease itself, side effects of treatment, or the results of procedures related to their care. Pain remains one of the most common, severe, and painful symptoms [10]. The main reason is related to the side effects of invasive surgery and medication [11]. Common treatment side effects include inflammation, chemotherapy-induced neuropathic pain, and pain associated with steroid withdrawal [12]. As is well known, invasive procedures and treatment side effects are very painful and often traumatic for children and adolescents. This pain can be caused by excessive awakening of the nervous system, leading to increased sensitivity to pain and a decrease in quality of life [13]. In clinical practice, if cancer pain cannot be managed and controlled in a timely, standardized, effective, and long-term manner, it may worsen the condition and cause or exacerbate symptoms such as anxiety, depression, panic, unease, and insomnia, seriously affecting the quality of life and bringing mental and psychological pressure and burden to patients. Tailored medication and non medication interventions for patients and their families can help provide effective surgical pain control and reduce anxiety.

The traditional pain management model mainly involves notifying doctors when patients experience pain, doctors issuing medical orders, and nurses executing them, but the patient's pain has not been effectively relieved. Usually targeting the clinical symptoms of cancer patients, the main goal is to prolong their survival cycle, which cannot alleviate their psychological distress. It is necessary to conduct routine pain screening, standardized evaluation, and effective pain control for cancer pain patients, emphasizing comprehensive and full process management. In the past, pain was largely overlooked and often left untreated, making the management of childhood cancer pain a difficult process. Insufficient pain assessment and inadequate pain management in children result in the physical and psychological torment caused by cancer pain for children with tumors. There is not much exploration and application of refined, specialized, and scientific whole process pain management plans regarding the factors influencing pain, the application of pain assessment tools, and the personalized use of analgesics. Over time, the perception of pain in children has changed, and now people believe that relieving pain is important. In April 2011, China launched the "Standardized Treatment Demonstration Ward for Cancer Pain" plan, which has also improved the treatment concept of cancer pain to varying degrees [14].

Qinghai is located in the high-altitude area of northwest China and is a settlement of multiple ethnic groups (Han, Tibetan, Hui, Mongolian) with different ethnic customs and cultural beliefs. In addition, due to the sparse population and limited transportation and information, the economic and medical conditions as well as the relatively poor cultural level, there is a lack of understanding of the pain issues of children with tumors. In order to better improve the pain management level and quality of life of children with tumors, our center has established a multidisciplinary tumor pain management team composed of doctors, nurses, pharmacists, volunteers, ethnic minority translators, and students. Through multidimensional pain management, doctors conduct cancer pain assessments based on the principles of "routine, quantitative, comprehensive, and dynamic" to make initial evaluations of the pain situation of children. Pharmacy conducts pain grading assessment and medication intervention guidance to implement individualized and standardized management for children with cancer pain. The nursing team and minority volunteers provide health education and psychological intervention. Medical and nursing staff accurately assess the physical and mental state of patients, and provide knowledge dissemination to patients and their families based on specific symptoms. Students enter the ward on weekends to play games, read books, and provide humanistic care for the sick children. By involving multidisciplinary and multidimensional teams in developing clinical treatment plans, preventive interventions, etc., we aim to provide reasonable medical services for children with tumors, increase their medical experience, and improve treatment comfort.

## 5. Summary

At present, there are no literature reports on pain management for children with cancer in Qinghai. This study is the first to establish a specific local ethnic minority volunteer participation model for pain management of cancer children, hoping to raise more attention from social workers, specialists, and family members to childhood cancer pain. Explore a soothing medical model that is suitable for high-altitude multi-ethnic areas. In order to provide more reference experience for clinical pain management in children, it has important clinical value. The research on using this model to intervene in pain management of children with tumors, through multiple scales such as pain management, anxiety, depression assessment, and quality of life, shows that the pain management model for children with malignant tumors in Qinghai region is effective.

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