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Mixed-methods exploration of caregiver-patient dyad needs and home care delivery systems in limb amputee oncology cohorts

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Abstract: Objective: To find suitable nursing strategies for disabled oncology patients in China, ease family caregivers' burden, and boost patients' quality of life. **Methods:** Between June 2022 and June 2024, 116 patients with activities of daily living (ADL) scores ≤ 60 from five Guangdong tertiary hospitals were divided into an intervention and a control group of 58 each. Both got disease-specific education. The control group had monthly phone follow-ups, and the intervention group used a "family online hospital" model for health info sharing and video consultations. Assessments were done at baseline, 3-months, and 6-months post-discharge. **Results:** Baseline quality of life was poor, with the control group's caregiving burden heavier. Initially, groups had no significant differences ($P > 0.05$). After 3 and 6 months, the intervention group had better SF-36 and ADL scores. Their ADL and CBI scores improved ($P < 0.05$), while the control group's scores only briefly improved at 3 months and then returned to baseline ($P > 0.05$). **Conclusion:** Disabled oncology patients exhibit critically low quality of life, while their primary caregivers experience substantial burdens. Transitional care interventions can effectively improve patients' quality of life—particularly in psychological well-being—and partially alleviate caregiver strain, thereby enhancing family well-being.

Keywords: oncology; disabled patients; daily living; health care; nursing interventions

1. Introduction

Disability represents a state where individuals encounter substantial restrictions in independently carrying out daily self-care tasks. This can result from psychological traumas, such as severe emotional distress following a tragic event, or physical traumas like those sustained in accidents [1–3]. Accidents are indeed a leading cause of disability, with a high proportion of cases stemming from motor vehicle collisions, falls, or industrial mishaps. However, it is crucial not to overlook the role of intrinsic disease-related factors, especially in the context of oncology. Bone tumors or bone metastases, which are unfortunately common in the oncology field, often lead to complex and challenging situations. In many cases, these conditions necessitate surgical amputation as a means of treatment [4–6]. Such procedures not only bring about immediate physical changes but also impose a profound psychological toll on patients and their families. The loss of a limb can shatter a patient's sense of self-identity and independence, leading to feelings of depression, anxiety, and helplessness. Moreover, oncology patients typically endure a long-term and arduous journey of maintenance therapy. This extended treatment period, combined with the newly acquired disability, significantly deteriorates their post-disability quality

of life. The family caregivers, who are often the primary source of support, face overwhelming burdens. They must manage not only the physical care of the patient, such as assistance with daily activities like bathing, dressing, and eating, but also the emotional support required to help the patient cope with their new reality. The resulting situation is further exacerbated by escalating psychosocial conflicts. These may include financial strains due to the high cost of medical treatment and caregiving, as well as potential disruptions in family relationships. The patient's dependence on others for basic needs can create tension within the family unit, and the caregivers may experience burnout from the continuous demands placed on them. In light of these complex and multifaceted challenges, there is an urgent and critical need for systematic solutions. This paper delves into the significance of continuity of care and strongly advocates for the development and implementation of structured home care models specifically tailored to disabled oncology patients. By exploring these aspects, it aims to provide valuable insights that can enhance the quality of life for this vulnerable patient population and offer practical strategies to alleviate the burdens on both patients and their families.

2. Materials and methods

2.1. Subject of the study

Disability is clinically defined as a state of functional impairment wherein individuals face substantial limitations in performing basic daily living activities due to physical or psychological trauma, requiring sustained external assistance to maintain autonomy [1–3]. While traumatic injuries remain a predominant contributor to disability incidence, disease-mediated etiologies—particularly progressive conditions like osteosarcoma or metastatic bone lesions—warrant equal clinical emphasis. Such pathologies frequently necessitate radical interventions like surgical amputation [4–7], a procedure that not only inflicts existential crises and caregiver distress but also destabilizes socioeconomic functioning through loss of occupational capacity. Concurrently, oncology patients undergoing prolonged maintenance therapies experience compounding declines in health-related quality of life (HRQoL), exacerbated by unsustainable familial caregiving loads (e.g., 68% of caregivers report clinical burnout in longitudinal studies) and systemic gaps in psychosocial support infrastructure. These intersecting crises—spanning biological, psychological, and social domains—demand paradigm-shifting solutions. This study therefore interrogates the role of continuity-of-care frameworks in mitigating post-disability complications while proposing tiered homecare interventions specifically optimized for oncology-related disability cohorts.

2.2. Methodology

The control group and the intervention group were identical in terms of hospitalization and discharge guidance, namely, the implementation of targeted nursing measures before, during, and after each operation; good explanation; the establishment of a good nurse-patient relationship; the implementation of the responsibility system and the functional system of holistic nursing care; good health education; and reminding patients of regular follow-up. The intervention group implemented the following measures on this basis: 1) Explaining to patients and their families, developing WeChat applets, teaching patients and their families how to use the applets; creating WeChat groups; WeChat groups regularly push scientific

knowledge, educational videos, daily health care, etc., and setting up reminders, punching cards, and quick browsing functions for the applets to match the use of WeChat groups, and inviting oncology nursing groups, rehabilitation nursing groups, and nutrition nursing groups into the groups on a regular basis. The nursing team of oncology specialty, the rehabilitation nursing team, and the nutrition specialty nursing team are regularly invited to the group to guide and answer questions. Preparation of push content to facilitate the comprehensive interpretation of patients; 2) Online video visit nursing: intervention group patients were discharged for the first time, telephone follow-up, agreed to later online video visit time, taught online visit operation method and precautions, and regular monthly online face-to-face follow-up for six months. The content of the video follow-up visit mainly includes online guidance to monitor the patient's vital signs, assess the patient's skin, psychology, DVT risk, and limb function, ask the patient's adherence to medication and side effects of medication, understand the dietary habits, and guide the establishment of good living habits. For long-term bedridden patients with disabilities, we teach their families to exercise their limbs and give them rehabilitation exercise training programs and advise them to prevent complications such as pressure ulcers and blood clots; we listen to patients and caregivers and provide them with narrative communication and psychological support to alleviate and channel their bad moods. Each online follow-up visit lasts about 30 min.

2.3. Research tools

2.3.1 Patient's general information questionnaire

The patient's general information questionnaire was designed by the researcher, which was mainly used to assess the patient's basic condition and living background, including but not limited to the patient's age, gender, tumor stage, cultural level, and residence mode.

2.3.2 ADL assessment scale

The activities of daily living (ADL) assessment scale is the Barthel index questionnaire. The questionnaire is widely used, the content is comprehensive, it has good reliability and validity, and the Cronbach's alpha coefficient is 0.89 [8]. It is mainly used to evaluate the patient's ability to do daily life activities, from eating and living to level ground activities, climbing stairs, and so on, a total of 10 items, each item accounting for 10 points, according to the total points. Accumulation was classified as mild, moderate, or severe dependence, and the scale was compiled by Mshoney and Banhel.

2.3.3 Quality of life scale

The SF-36 Quality of Life Assessment Scale was developed by the U.S. Bureau of Medicine, which is rigorous and widely used, and not only assesses the health and psychological status of patients but also predicts the impact of disease and the effectiveness of treatment. The scale has eight domains, which are physical functioning (PF), physiological functioning (RP), somatic pain (BP), general health status (GH), vitality of life (VT), social functioning (SF), emotional functioning (RE), and mental health (MH). Four of these dimensions assessed the degree of organic health, and the other four analyzed psychological factors. The total score and quality of life were positively correlated. Cronbach's alpha coefficient was 0.812 [9,10].

2.3.4 Caregiver burden scale

The Caregiver Burden Inventory (CBI) was developed by Zarit in 1980 to assess the stress load of health caregiving [11]. The scale consists of 22 items, each item is rated from 0 to 4, and the score is negatively correlated with caregiver burden, with a maximum score of 88 indicating a severe burden and a minimum score of 0 indicating no burden, which is designed to analyze the psychological factors, emotional values, and family economic status of health caregivers. Its Cronbach's alpha coefficient was 0.81.

2.4. Statistical methods

SPSS 26.0 was used to analyze the data. In order to ensure the accuracy and reliability of the data, the data were entered by two people and sorted out and analyzed, and the difference was statistically significant at $P < 0.05$. Measured data were expressed as mean $\pm$ standard deviation, count data were expressed as frequency and percentage, and other data were expressed as independent samples *T*-test.

2.5. Ethical statement

1) This study has obtained approval from the Ethics Committee of Nanfang Hospital, Southern Medical University. Ethical approval number: (NFEC-2026-047). All disabled oncology patients (or their caregivers) have signed informed consent forms.

2) For this research, which involves issues of personal and family privacy, researchers and members of the guiding team strictly maintain confidentiality. The survey data are centrally collected and then entered into a computer. Except for researchers, other unauthorized personnel are not allowed to view the personal and family information of the research subjects.

3) During telemedicine interventions, especially video visits, researchers abide by all ethical regulations and do not discuss topics unrelated to this study. During video visits, patients and their families can end the visit at any time and determine the time for subsequent visits.

3. Results and discussion

3.1. General information of patients with incapacitating tumors

A total of 116 patients were included as the research subjects of this study according to the inclusion and exclusion criteria. Questionnaires were filled out through face-to-face interviews. In the baseline survey, 116 valid questionnaires were recovered, with a recovery rate of 100%. Among them, there were 68 males (58.62%) and 48 females (41.38%), and the average age was (60.35 ± 4.198) years old. 62.07% of the patients lived with their spouses, and 35.34% lived with their children. Among the 116 research subjects, 24 had one other chronic disease, accounting for 20.69%, and 12.07% of the disabled oncology patients had two or more comorbidities. In terms of educational level: 53 had primary school education or less, 28 had junior high school education, 23 had high school education, and 12 had a college education or above. The tumor staging showed that 48 patients were in stage T1, accounting for 41.38%, and 68 were in stage T2, accounting for 58.62%. In terms of treatment methods: 61.21% of the patients received radiotherapy and chemotherapy, 16 received immunotherapy, and 29 received targeted therapy. For details on family annual income, chemotherapy adverse reactions, and other aspects, please refer to **Table 1**.

Table 1. General information of disabled oncology patients [*n* (%)].

Project Grouping		Number of examples	Percentage (%)
Distinguishing between the sexes	Female	48	41.38
	Male	68	58.62
Age (years)	40–50	19	16.38
	50–60	36	31.03
	60–70	61	52.59
Educational attainment	Primary and below	53	45.69
	Junior high school	28	24.14
	High school	23	19.83
	College and above	12	10.34
Residency	Residence with spouse	72	62.07
	Residence with children	41	35.34
	Live alone	3	2.59
Tumor staging	TI period	48	41.38
	Phase T2	68	58.62
Treatment	Radiation and chemotherapy	71	61.21
	Immunotherapy	16	13.79
	Targeted therapies	29	25.00
Economic status (annual income, RMB)	Less than 20,000	27	23.28
	20,000~50,000	66	56.90
	Greater than 50,000	23	19.83
Types of complications	Hasn't	78	67.24
	Species I	24	20.69
	Species II	14	12.07
Venous thrombosis	Low risk	88	75.86
	Critical	17	14.66
	High risk	11	9.48
Nausea and vomiting	Neither	55	47.41
	Only disgusting	48	41.38
	Nausea and vomiting	13	11.21

3.2. ADL and CBI scores of the two groups of patients before intervention

Comparing the two groups of patients before intervention, the ADL and CBI P-values were greater than 0.05, indicating that there was no association between them and they were comparable, see **Table 2**.

Table 2. Comparison of ADL and CBI between the two groups of patients before intervention.

Sports event	Intervention group (<i>n</i> = 58)	Control group (<i>n</i> = 58)	<i>t/z</i> value	<i>P</i>
ADL M (P25,P75)	55 (40, 60)	55 (40, 60)	−0.813	0.502
CBI ($\bar{x} \pm s$)	37.67 ± 2.742	39.47 ± 2.417	−1.028	0.306

3.3. Comparison of SF-36 scores on each dimension between the two groups of patients before intervention

Comparison of SF-36 scores between the two groups of patients before intervention, $P > 0.05$, comparable, see **Table 3**.

Table 3. Comparison of sf-36 scores on each dimension between the two groups of patients before intervention (Mean ± SD).

Dimension (math.)	Intervention group (<i>n</i> = 31)	Control group (<i>n</i> = 31)	<i>t</i> -value	<i>p</i>
Physical Function (PF)	38.460 ± 12.543	37.690 ± 12.375	0.333	0.740
Physiological functions (PF)	4.450 ± 7.329	5.140 ± 8.122	−0.480	0.632
Body Pain (BP)	81.698 ± 21.878	87.697 ± 19.158	−1.571	0.119
General health status (GH)	35.790 ± 4.943	37.163 ± 4.883	−1.505	0.135
Vitality (VT)	46.780 ± 8.897	44.989 ± 7.942	1.144	0.255
Social Function (SF)	35.240 ± 8.995	37.980 ± 9.976	−1.554	0.123
Emotional function (EF)	54.980 ± 15.789	45.879 ± 19.985	0.004	0.997
Mental Health (MH)	58.870 ± 8.437	57.479 ± 8.034	0.909	0.365
Health changes	15.870 ± 10.985	17.980 ± 10.876	1.040	0.301

3.4. Comparison of ADL and CBI scores between the two groups of patients before and after the intervention

After the 3-month and 6-month nursing interventions, the ADL scores and CBI scores of the two groups of patients were higher than those before the interventions ($P < 0.05$), and the difference was statistically significant, and the CBI scores of the intervention group were lower than those at the time of the 3-month intervention after the implementation of the 6-month nursing interventions ($P < 0.05$); in the control group after the After 3 and 6 months of intervention, only the ADL score was statistically different after 3 months of intervention ($P < 0.05$). See **Table 4**.

Table 4. ADLs, sleep quality, and caregiving burden scores after 3 and 6 months of intervention in the two groups of patients.

Sports event	Intervention group		Control subjects	
	3 months of intervention (<i>n</i> = 31)	6 months of intervention (<i>n</i> = 28)	3 months of intervention (<i>n</i> = 31)	6 months of intervention (<i>n</i> = 28)
ADL M (P25, P75)	70 (55, 75) ^{1,2}	75 (62, 80) ^{1,2}	60 (50, 70) ¹	60 (53, 75) ^{2,3}
Burden of Care ($\bar{x} \pm s$)	30.12 ± 3,789 ^{1,2}	25.4 ± 3.546 ^{1,2,3}	35.78 ± 4.167 ²	33.46 ± 4.982 ²

¹ indicates $P < 0.05$ for each of the same time points in the intervention and control groups;

² indicates $p < 0.05$ for 3 and 6 months of intervention compared to pre-intervention;

³ indicates $p < 0.05$ for 3 months of intervention compared with 6 months of intervention.

3.5. Comparison of SF-36 scores between the two groups of patients after intervention

After 3 months of intervention, the scores of all dimensions in the intervention group were higher than those in the control group, in which there was a statistically significant difference between PF, RP, VT, SF and RE compared with the control group ($P < 0.05$), and there was no statistically significant difference between BP, GH and MH compared with the control group ($P > 0.05$). After 6 months of intervention, the scores of the dimensions in the intervention group were significantly higher than those in the control group, and there was a statistically significant difference between PF, RP, BP, GH, VT, SF, RE, and MH compared to the control group ($P < 0.05$), and there was no statistically significant difference between BP and the control group ($P > 0.05$). See **Table 5**.

Table 5. Comparison of scores of quality-of-life dimensions after 3 and 6 months of intervention in both groups (Mean $\pm$ SD).

Sports event	Intervention group		Control subjects	
	3 months of intervention ($n = 31$)	6 months of intervention ($n = 28$)	3 months of intervention ($n = 31$)	Intervention 6 months ($n = 28$)
Bodily function	42.980 $\pm$ 07.962 ¹	43.550 $\pm$ 08.962 ^{1,2,3}	37.960 $\pm$ 07.867	43.550 $\pm$ 08.962
Physiological function	43.780 $\pm$ 18.954 ^{1,2}	49.980 $\pm$ 18.715 ^{1,2}	31.650 $\pm$ 17.962 ²	35.910 $\pm$ 19.43 ²
Pain in the body	88.653 $\pm$ 13.795 ²	92.898 $\pm$ 17.166 ²	84.762 $\pm$ 12.877 ²	88.989 $\pm$ 11.054 ²
General health status	39.230 $\pm$ 05.140 ²	43.780 $\pm$ 05.954 ^{1,2,3}	36.450 $\pm$ 07.712	38.340 $\pm$ 08.132
Energies	52.120 $\pm$ 07.003 ^{1,2}	57.130 $\pm$ 05.140 ^{1,2,3}	46.980 $\pm$ 08.658	48.470 $\pm$ 07.234 ²
Social function	44.989 $\pm$ 10.253 ^{1,2}	45.178 $\pm$ 10.446 ^{1,2}	36.768 $\pm$ 09.345	35.610 $\pm$ 08.732
Emotional function	58.430 $\pm$ 18.754 ¹	68.970 $\pm$ 18.134 ^{1,2,3}	47.675 $\pm$ 27.675 ²	51.343 $\pm$ 20.142 ^{2,3}
Mental health	59.986 $\pm$ 07.132	67.681 $\pm$ 08.241 ^{1,2,3}	57.250 $\pm$ 09.103	62.198 $\pm$ 11.432
Health changes	27.780 $\pm$ 17.139 ^{1,2}	32.980 $\pm$ 14.980 ^{1,2,3}	18.890 $\pm$ 24.769	27.980 $\pm$ 14.786 ^{2,3}

¹ indicates $P < 0.05$ for each of the same time points in the intervention and control groups;

² indicates $p < 0.05$ for 3 and 6 months of intervention compared to pre-intervention;

³ indicates $p < 0.05$ for 3 months of intervention compared with 6 months of intervention.

4. Discussion

4.1. Quality of life and care needs of disabled oncology patients

In this study, the quality of life (QoL) scores of disabled oncology patients were generally low. Research by Yuan et al. [12] demonstrated that disabled oncology patients scored significantly lower across all QoL dimensions compared to non-disabled patients, with statistically meaningful differences ($P < 0.05$). Medhi et al. [13] further confirmed that QoL scores declined proportionally to the severity of dependence on ADL. Observations from this study indicated that disability adversely impacted both physical domains of the SF-36 scale (e.g., physiological function, general health, and social functioning) and psychological well-being, including mental health. Additionally, disabled oncology patients exhibited lower emotional role functioning scores than physically healthy individuals, potentially

due to multifaceted factors such as negative emotions, low self-esteem, body image concerns, and reduced life satisfaction. While disease-specific characteristics contribute to functional decline, some patients maintained stable functional health despite cancer-related fears. Notably, ADL dependence showed strong ties to chronic diseases, particularly cardiovascular and cerebrovascular conditions [14,15], which dominate disability etiology in this population. The long-term, complex care demands for disabled oncology patients impose significantly heavier burdens on caregivers compared to those caring for non-disabled patients. Primary caregivers face heightened risks of psychological distress and physical pain, while chronically ill caregivers endure compounded health deterioration from dual caregiving and self-management pressures, exacerbating anxiety and depression [16]. Conversely, compromised caregiver well-being often reduces patient happiness, intensifies stress, and amplifies guilt among patients. These findings underscore alarming QoL deficits in disabled oncology patients and unsustainable caregiver burdens, necessitating urgent implementation of structured transitional nursing interventions post-discharge to mitigate these challenges.

4.2. The effect of nursing intervention on ADL of disabling tumor patients

As clearly depicted in **Table 2**, prior to the initiation of the intervention, a comprehensive statistical analysis revealed no significant difference in the ADL (Activities of Daily Living) scores between the two groups of patients. This baseline similarity serves as a crucial foundation for a reliable comparison of the intervention's effects. Following 3 and 6 months of intervention, as shown in **Table 4**, a remarkable change occurred. The ADL scores of both groups of patients demonstrated improvement. However, what is particularly striking is that the scores in the intervention group were consistently higher than those in the control group, and these differences were statistically significant. This compelling evidence strongly indicates that the continuity nursing intervention model has a positive and substantial impact on enhancing the daily life capabilities of patients. Previous research studies [17–19] have extensively reported that continuity of care intervention not only reduces patients' mortality rates but also significantly improves their ADL scores. This aligns perfectly with the findings of our current study. Additionally, Hager et al. [20–22], conducted in-depth investigations and pointed out the immense nursing value of video follow-up and face-to-face communication. In the context of our research, these elements were integrated into the continuity nursing intervention. In this study, the significant improvement in the ADL score of the intervention group is a testament to the practicality and feasibility of the implemented intervention. Patients readily accepted this novel approach, which is a key factor contributing to its success. The video follow-up component, in particular, played a pivotal role. It allowed healthcare providers to comprehensively assess the patients' physical, mental, and functional status in a timely manner. This comprehensive assessment was not only beneficial for understanding the patients' immediate needs but also provided invaluable guidance for tailoring home nursing care plans. By closely monitoring patients through video follow-up, nurses could make informed decisions about adjusting care strategies, providing targeted advice, and ensuring that patients received the most appropriate support in the comfort of their own homes. This, in turn, contributed to better patient outcomes and an enhanced quality of life for the patients under our care.

4.3. The effect of nursing intervention on relieving the stress load of the primary caregiver

Table 2 clearly indicates that prior to the intervention, there was no statistically

significant disparity in the CBI scores between the two groups of patients. This initial similarity in scores is an important baseline, suggesting that both groups started on an equal footing in terms of the burden experienced, likely related to caregiving or patient-related stressors. After 3 and 6 months of the intervention, a notable change occurred. The CBI scores of both patient groups decreased to varying extents, and the difference between the groups became statistically significant ($P < 0.05$). This change can be primarily attributed to two key factors. Firstly, without professional intervention guidance, patients often face challenges in managing their conditions effectively, which can exacerbate the caregiving burden. Secondly, the primary caregivers were shouldering a heavy load due to the complexity and long-term nature of the patients' needs. The Internet-based online visiting mode, as documented in references [23–25], offers multiple advantages. It serves as a powerful tool to enhance the medication adherence of both patients and their families. By providing regular reminders and educational resources, it ensures that patients take their medications as prescribed. Moreover, this mode allows for the dynamic monitoring of patients' general conditions. Healthcare providers can remotely assess vital signs, symptoms, and overall well-being, enabling timely interventions when necessary. In addition, remote video consultations play a crucial role in providing psychological support. They bring a sense of comfort to patients and their families, as they can directly interact with healthcare professionals. This face-to-face communication, even if virtual, increases their confidence in overcoming the disease. It also enhances their sense of self-existence and empowerment, as they feel actively involved in their care process. Yang [26] conducted research that revealed the benefits of combining online and offline care models. This integrated approach can significantly improve the overall quality of care. The online component provides continuous support and access to information, while the offline aspect allows for in-person examinations and hands-on care. As a result, the burden on caregivers is reduced, as they receive more comprehensive and coordinated assistance. Ding et al. [27–29] emphasized the importance of the Internet telecare pathway. It offers all-around nursing guidance to family members, enabling them to understand the patient's home condition comprehensively. This pathway is irreplaceable in ensuring the continuity of care measures. Family members can receive professional care guidance and health education during the nursing process. This education helps them avoid common errors and inadequacies in care, such as improper medication administration or ineffective symptom management. Consequently, to a large extent, the burden on caregivers is alleviated, as they are better equipped to handle the challenges of caring for the patients. In conclusion, the intervention, particularly the utilization of Internet-based care models, has shown promising results in reducing the burden associated with patient care, as evidenced by the significant changes in the CBI scores over time.

4.4. Effect of nursing intervention on patients' quality of life

Table 5 in this study reveals that after three months of intervention, there were statistically significant differences in the intervention group regarding physical functioning, somatic pain, general health status, mental health, social functioning, and health change when compared to the pre-intervention period ($P < 0.05$). In the control group, the scores for physical functioning, general health status, somatic pain, emotional functioning, and mental health dimensions were higher than those before the intervention, while the scores for other dimensions declined. After six months of intervention, all dimension scores in the intervention group showed statistically significant differences compared to the pre-intervention state ($P < 0.05$).

In contrast, the differences in the control group were not statistically significant ($P > 0.05$). This indicates that the Internet-based visit intervention model employed in this study can enhance the physical and mental health of disabled oncology patients and improve their overall quality of life to a certain degree. The research by Peng et al. [29–32], arrived at a similar conclusion. Specifically, the combination of home care and Internet hospitals can contribute to improving the quality of life of disabled patients and enhance the feasibility and sustainability of continuous care. Moreover, previous literature [33–36] has reported that video visits and educational initiatives can mitigate the psychological trauma experienced by patients and their families and strengthen their belief in the treatment process. By regularly disseminating disease-related knowledge and conducting science education popularization, this model can boost patients' treatment adherence. It also enriches the knowledge base of caregivers, thereby alleviating the caregiving burden and facilitating patients' recovery.

5. Strengths and weaknesses of the study

5.1. Research advantage

This study adopted an integrated health care and family guidance model. By leveraging the Internet platform, it implemented both online and offline interventions. This model provided professional guidance on family care for patients and their families. It continuously monitored the out-of-hospital care situation of oncology patients with disabilities. The research team made efforts to understand the spiritual needs of patients and the caregiving burdens of their families. Additionally, through the face-to-face communication mode of return visits enabled by artificial intelligence and by using methods such as WeChat mini-programs and group messages, the study met the knowledge needs of patients and their families, alleviating their ideological burdens and psychological pressures. Understanding the implementation effect of these intervention measures paves the way for further research. This comprehensive approach not only improved the quality of care for patients but also enhanced the support system for their families, which is of great significance for promoting the overall well-being of oncology patients with hearing impairments.

5.2. Research deficiencies

However, this study has certain limitations. Firstly, the sample size was relatively small, and the convenience sampling method had some uncontrollable factors. This may limit the generalizability of the research findings. Due to limited human resources and time, the tracking and evaluation of home-based patients were not carried out over a long enough period. It is recommended that follow-up research focus on long-term, whole-process interventions. For patients with suitable conditions, family nursing services could be carried out to provide higher-quality care. In areas with convenient transportation, irregular centralized mobile nursing measures could be implemented. These measures would promote in-depth communication with patients and their families, thereby enhancing their self-efficacy. This would help to address the current shortcomings and contribute to more comprehensive and effective research in the future.

Author contributions: Conceptualization, ZY and FZ; methodology, JZ; software, QL; validation, TY, ZY and ZL; formal analysis, JM; investigation, QZ; resources, ML; data curation, FZ; writing—original draft preparation, ZY; writing—review and editing, FZ, JM and ZL; visualization, JX; supervision, ML; project administration, ZL; funding acquisition, JM. All authors have read and agreed to the published

version of the manuscript.

Ethical approval: This study was reviewed and approved by Nanfang Hospital of Southern Medical University (approval number: NFEC-2026-047).

Ethics Statement: Ethical approval information for this study was provided by the authors. The study is reported to have been conducted in accordance with relevant institutional and ethical guidelines. Ethical approval details are presented as provided by the authors, and have not been independently verified by the journal.

Informed consent statement: All disabled oncology patients (or their caregivers) have signed informed consent forms.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest: The authors declare that there are no conflicts of interests.

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