Journal of Biosciences and Medicines, 2025, 13(12), 74-93
https://www.scirp.org/journal/jbm
ISSN Online: 2327-509X
ISSN Print: 2327-5081

Research on the Construction and Application of Communication Protocols for the Transfer of Critically Ill Cancer Patients in ICU under the Background of MEWS Early Warning Score

Yanyu Chen[1*], Qiongyao Guan[2], Wenting Zhang[3], Xiaohua Ren[4], Xiangping Ma[3], Shiyao Yang[5], Yan Yang[6#]

[1]School of Nursing, Kunming Medical University, Kunming, China
[2]Nursing Department, The Third Affiliated Hospital of Kunming Medical University, Yunnan Cancer Hospital, Peking University Cancer Hospital Yunnan, Kunming, China
[3]Intensive Care Unit, The Third Affiliated Hospital of Kunming Medical University, Yunnan Cancer Hospital, Peking University Cancer Hospital Yunnan, Kunming, China
[4]Second Department of Head and Neck Surgery, The Third Affiliated Hospital of Kunming Medical University, Yunnan Cancer Hospital, Peking University Cancer Hospital Yunnan, Kunming, China
[5]Dali Bai Autonomous Prefecture People's Hospital, Dali, China
[6]Phase I Clinical Trial Ward, The Third Affiliated Hospital of Kunming Medical University, Yunnan Cancer Hospital, Peking University Cancer Hospital Yunnan, Kunming, China
Email: #1767890922@qq.com

How to cite this paper: Chen, Y.Y., Guan, Q.Y., Zhang, W.T., Ren, X.H., Ma, X.P., Yang, S.Y. and Yang, Y. (2025) Research on the Construction and Application of Communication Protocols for the Transfer of Critically Ill Cancer Patients in ICU under the Background of MEWS Early Warning Score. *Journal of Biosciences and Medicines*, **13**, 74-93.
https://doi.org/10.4236/jbm.2025.1312007

Received: October 22, 2025
Accepted: December 1, 2025
Published: December 4, 2025

Abstract

Objective: To develop a communication protocol suitable for the transfer of critically ill cancer patients in ICU under the MEWS early warning scoring system and to evaluate its application effect. Methods: Through a literature review and combining the results of current situation survey, a preliminary draft of the communication protocol for the transfer of critically ill cancer patients in ICU under the MEWS early warning scoring system was formed through group discussions. 15 experts were invited to conduct two rounds of Delphi expert consultation, resulting in a revised draft. The protocol was further refined through pre-experiments to form the final version, which was validated in 94 cases of critically ill cancer patients and their families during transfer in ICU. The expert positive rate in both rounds of consultation was 100%. The expert judgment basis (Ca) was 0.88, familiarity (Cs) was 0.89, authority coefficient (Cr) was 0.89, and Kendall's W coefficients were 0.08 and 0.117 ($P < 0.05$). The communication protocol for the transfer of critically ill cancer patients in the ICU consists of 5 stages, including admission, visitation,

*The first author.
#Corresponding author.

pre-transfer, handover, and post-transfer follow-up. Before and after the intervention, the stress migration ability and caregiving ability of family members showed statistically significant differences ($P < 0.001$). The ICU transfer communication protocol for critically ill cancer patients within the context of the MEWS early warning score is scientifically sound and applicable, effectively reducing family relocation stress and enhancing care continuity.

Keywords

Mews Early Warning Score, ICU, Oncology, Critically Ill Patients, Transfer Communication, Protocol Development, Application Research

1. Introduction

With advancements in oncology diagnosis and treatment technologies alongside the rapid development of critical care medicine, the Intensive Care Unit (ICU) has become a crucial platform for treating critically ill cancer patients. Studies indicate that ICU patients often face severe conditions with compromised immune systems. Currently, malignancies account for 13.5% - 21.5% of all ICU admissions [1], yet their extremely low immunity makes them prone to infections, resulting in higher mortality rates compared to non-malignant ICU patients [2]. In this high-risk medical environment, family members, as key participants in healthcare decisions, frequently experience neglected information needs and emotional support demands. Research reveals that during ICU patient transfers, families endure more severe negative emotions and stress-related conditions like Post-Traumatic Stress Disorder (PTSD) [3], significantly higher than those in general ward patients. Current clinical practices focus primarily on medical risk assessments and transfer protocols [4] [5], lacking systematic communication frameworks tailored to cancer characteristics and family psychological needs. Existing studies predominantly examine interactions between healthcare providers and wards [6], but fragmented information transmission during transfers—where families act as key decision-makers—can lead to misaligned treatment expectations and undermine doctor-patient trust [7]. Additionally, the decision-making dilemmas faced by cancer patients' families demand enhanced professionalism and humanistic communication. The 2024 guidelines from the Society of Critical Care Medicine (SCCM) emphasize family involvement in home care, yet overlook specific needs for particular medical conditions. The Modified Early Warning Score (MEWS) dynamically monitors five physiological parameters—heart rate, systolic blood pressure, respiration, body temperature, and consciousness. Evaluating total scores to determine whether thresholds are met or exceeded enables real-time analysis while reducing reliance on subjective judgment [8]. However, existing research predominantly focuses on the ICU application of the scoring system itself, with limited exploration of its integration in multidisciplinary communication protocols during patient transfer under MEWS evaluation contexts. To address

this gap, our study proposes a mixed-methods approach for developing a family communication protocol for ICU oncology patients. Through Delphi expert consultation, we established standardized communication frameworks, validated their effectiveness via non-randomized controlled trials, and aim to provide evidence-based support for enhancing ICU patient transfer safety, optimizing family decision-making experiences, and improving the clinical applicability of communication strategies.

2. Subjects and Methods

2.1. Study Team Composition

The research team consists of seven members: one critical care physician, one head nurse in the critical care unit (ICU), four ICU nurses specializing in critical care, and two master's degree candidates in nursing. The critical care physician and head nurse are responsible for developing protocols, providing technical guidance, evaluating outcomes, and ensuring quality control. The graduate students handle literature review, research implementation, data collection and analysis, as well as intervention execution. Two specialized nurses manage communication and questionnaire distribution, while two others handle data collection and organization.

2.2. Development of Initial Intervention Protocol

- Literature Search Strategy A combined approach of subject terms and free keywords was employed for systematic searches across BMJ Best Practice, Up To Date, Society of Critical Care Medicine (SCCM), European Society of Intensive Care Medicine (ESICM), Critical Care, Journal of Intensive Care, Cochrane Library, Pub Med, Web of Science, China National Knowledge Infrastructure (CNKI), Wanfang Database, VIP Database, and Yimaitong Guidelines Network. The search period covered from database establishment to December 1, 2024. Chinese search terms included "Mews, warning score, intensive care unit (ICU), enhanced care unit, critical care medicine, oncology, malignant tumor, cancer, patient referral, doctor-patient communication, transport protocol, shift handover, communication plan, multidisciplinary collaboration, Delphi method, guideline development, clinical protocol, outcome evaluation". English search terms included "checklist, MEWS, transportntensive, Care Units, Critical Care, ICU, intensive therapy unit, critical care unit, Neoplasms Cancer, Oncology, Tumor, Malignancy, Patient Transfer, Transportation of Patients, Interdisciplinary Communication, patient handoff, care transition, transport protocol, communication strateg, handover process, Practice Guidelines as Topic, Clinical Protocols, Delphi Technique, protocol development, framework construction, model application".
- Current Status Survey Using convenience sampling, this study recruited 125 family members of cancer patients from the Intensive Care Unit (ICU) of a Grade III-A specialized oncology hospital in Kunming, Yunnan Province during May-June 2024. The survey questionnaire revealed that female family

members constituted the majority (84 cases, 67.20%), with age distribution primarily clustered between 18 and 60 years old. The average stress scale score for family members of ICU patients was 31.02 ± 4.60, with individual items averaging 1.79 - 2.58 points, indicating moderate to high levels of stress related to relocation.

- Development of Initial Intervention Protocol. The research team developed an initial intervention protocol for ICU oncology critically ill patients "transfer communication based on literature review findings, current situation surveys, and the characteristics of MEWS warning scores, considering the physiological status of ICU oncology critically ill patients and family members" stress levels.
- Expert Consultation and Protocol Revision. An expert consultation questionnaire was designed with three components: 1) Expert Engagement Letter; 2) Expert Consultation Form containing evaluations of content importance and relevance, with scoring for significance; 3) Expert Basic Information Form. Fifteen experts were consulted via email, meeting inclusion criteria: 1) Intermediate or higher professional titles; 2) 10+ years of critical care nursing experience; 3) Agreement to participate in this study; 4) Bachelor's degree or higher. After collecting first-round expert feedback, revisions were made to develop a second-round consultation questionnaire. Post-collaboration analysis showed items with mean scores > 4.0 and coefficient of variation < 0.2 as qualified for inclusion.

3. Application of the Solution

3.1. Target Population

The study enrolled families of critically ill ICU patients with cancer from a Grade III-A specialized oncology hospital in Yunnan Province. Inclusion criteria: Age ≥ 18 years; first-time ICU admission for cancer confirmed by pathological diagnosis with treatment duration > 72 hours; caregivers (including immediate family members and non-family members) providing care for >5 hours/day; voluntary participation with informed consent. Exclusion criteria: Individuals with communication impairments or who are receiving compensation. Based on two-sample mean calculation, each group initially included 40 cases. Considering potential sample attrition, each group was expanded by 20%, resulting in a final sample size of 48 cases per group. A non-scheduled controlled study was conducted: 48 eligible ICU cancer patient families from August to September 2024 served as the control group, while 48 families from October to November 2024 formed the intervention group. This study received approval from the Ethics Committee of Kunming Medical University Third Affiliated Hospital [KYLX2024-088].

3.2. Intervention Methods

- The control group received standard ICU transfer communication protocols, which only included basic admission instructions, item preparation, visitation policy briefings, routine condition updates during visits, and standard transfer

procedures without MEWS-integrated assessment, systematic psychological support, or post-transfer follow-up. During visits, responsible nurses briefed families on the patient's current condition and provided guidance on rehabilitation assistance methods. Transfers were conducted in accordance with hospital protocols, with no follow-up visits after transfer and routine psychological care.

- The intervention group implemented an ICU oncology critical care patient transfer protocol under MEWS warning scoring system. At admission, ICU family communication manuals were distributed, and families were directed to scan WeChat QR codes to access educational platforms for viewing rehabilitation exercise videos. During family visits, discussions followed the manual guidelines, while transfer preparation was documented using a transfer nursing checklist. Upon ward admission, handover procedures were conducted using an ICU transfer nursing checklist. Within 24 hours of transfer, responsible nurses conducted follow-up visits using an ICU post-transfer visitation form to reconfirm details with families and ward nurses.

3.3. Evaluation Indicators

1) Chinese Version of ICU Patient Family Relocation Stress Scale (FRSS), which was localized by Wang Yonghua *et al.* [9] and validated for reliability and validity. The Cronbach's α coefficient of the Chinese FRSS is 0.857, with four dimensions showing coefficients of 0.850, 0.849, 0.800, and 0.849 respectively. This scale evaluates ICU patients' family members' stress levels during relocation. The 14-item scale covers four dimensions: perception of general ward conditions, understanding of patient condition, separation anxiety, and transport awareness. 2) Chinese Version of Family Caregiver Task Inventory (FCTI), developed by Lee *et al.* [10]. The Cronbach's α coefficient is 0.867 (>0.8), with sub-scales ranging from 0.617 to 0.694. The total scale shows a half-reliability of 0.900. This 25-item scale includes five dimensions: adapting to caregiving roles, coping with challenges and providing assistance, managing personal emotions, assessing family and community resources, and adjusting lifestyle to meet caregiving needs. Scoring uses a 0 - 2 scale where 0 indicates no difficulty, 1 indicates moderate difficulty, and 2 indicates extreme difficulty. A full score of 50 points is awarded, with higher scores indicating poorer caregiving competence.

3.4. Data Collection

During the ICU admission period, both patient groups were communicated with by members of the research team through one-on-one interactions. The participating team members provided detailed explanations about the research objectives and significance to patients and their families, obtaining consent before completing informed consent forms. Within 24 hours after patient discharge, researchers distributed standardized questionnaires to family members for completion, collected data, and retrieved completed questionnaires. Researchers con-

ducted on-site verification of questionnaire completion, cross-checking with families when necessary, and performed double-entry verification with data re-examination.

3.5. Statistical Methods

Data analysis was conducted using SPSS 29.0. Expert demographic data were analyzed using descriptive statistics; expert engagement levels were measured by questionnaire response rates and opinion submission rates; expert authority was assessed using the Cronbach's alpha coefficient (Cr = (Ca + Cs)/2); expert coordination was evaluated using the Kendall's harmony coefficient. Count and categorical data were presented as percentages or proportions. Normal distribution was confirmed using mean ± standard deviation (x ± S) for quantitative data, with comparisons between groups conducted via t-test or chi-square test. Significant differences in indicators between the two patient groups were defined as $P < 0.05$.

4. Results

4.1. Expert Consultation Results

The experts were aged (40.33 ± 7.22) years with an average work experience of (19.20 ± 8.19) years. Six experts held master's degrees (40%), while eleven had bachelor's degrees (60%). Eight experts held senior professional titles (53.33%) and seven intermediate-level titles (46.67%). Both rounds of expert consultations achieved a 100% positivity coefficient. The coefficients for Ca (0.88), Cs (0.89), and Cr (0.89) all exceeded 0.70, indicating high expert authority and reliable consultation outcomes [11]. The consensus degree of expert opinions was measured using mean (X), Standard Deviation (SD), Coefficient of Variation (CV), and K% ratio. A CV < 25% indicates greater consistency in expert opinions. The Kendall's W coefficients for both rounds were 0.08 and 0.117 respectively, with $P < 0.05$, suggesting converging expert views. Detailed consultation results and scores are presented in Table 1 and Table 2. The consensus degree of expert opinions is shown in Table 3.

Table 1. Results of expert inquiry on transport communication plan (second round).

Primary entry	Secondary entries	Level 3 entries
1) Introduction of ICU environment and visitation system	1) ICU Environment and Visitation Policy	1) Based on the MEWS scoring system and considering tumor patient characteristics (e.g., post-chemotherapy bone marrow suppression, risk of tumor-related complications), this article outlines the criteria for ICU transfer. Specifically: When a tumor patient's MEWS total score reaches or exceeds X points (or specific sub-items such as respiratory, circulatory, or consciousness scores reach Y points), it indicates a significantly increased risk of disease deterioration requiring ICU-level intensive monitoring and supportive care. The text emphasizes how tumor factors (such as leukopenia, pulmonary metastasis, pericardial effusion, etc.) influence each MEWS sub-item score and its threshold values.

Continued

	2) Main objects of ICU admission, requirements of family members after ICU admission, requirements of transfer to ICU and significance	2) Main objects of ICU admission, requirements of family members after ICU admission, requirements of transfer to ICU and significance. 3) What should patients do if they feel pain in the surgical wound and other areas after admission to ICU? 4) Family members who are transferred to ICU need to make preparations (psychological preparation and material preparation). 5) The visitation system includes the time of visitation, the number of visits and matters needing attention. 6) During the visit, instruct family members to listen to the patient's feelings, encourage the patient to establish confidence and actively cooperate, and communicate with the attending physician. 7) Establish a MEWS-driven early warning communication mechanism: Designated nurses continuously monitor the MEWS. When the MEWS total score increases by ≥Z points compared to baseline levels (or reaches warning thresholds such as W points in critical indicators like respiration and consciousness), they must immediately assess the patient's condition. They should proactively communicate with attending physicians about clinical changes and risks, while simultaneously providing preliminary explanations to family members. The communication should emphasize specific score variations, key abnormal indicators, and their potential implications for cancer patients. 8) During the visit, the responsible nurse will brief on the condition: Your family member's MEWS score today is [X] points, which is [stable/increased/decreased] compared with yesterday. The main change/attention needed is XX.
	2) Guide family members to assist and urge patients to carry out rehabilitation exercises	9) Key points of diet and excretion care for different patients. 10) The importance and exercise methods of ankle pump exercise. 11) The importance and methods of respiratory exercise. 12) The importance of early ambulation and exercise methods.
	3) Guide family members to adjust their psychology	13) Family members' self-psychological adjustment includes anxiety and insomnia adjustment. 14) Guide family members and coordinate relatives and friends to care for patients.
2) Guidance and communication to family members during the transfer process	4) Introduce family members to ICU transfer	15) Explain to family members the criteria for transferring a patient out of the ICU: The patient's MEWS score must remain consistently stable at or below [target score (e.g., 4)] for over [time period (e.g., 24 hours)], with all critical indicators (e.g., respiratory, circulatory, consciousness) within safe ranges. Additionally, assess whether acute tumor-related risks (e.g., infections, bleeding, metabolic disorders) have been controlled and whether short-term recurrence risks are low.
	5) Inform the family of their preparation for transfer out of ICU	16) The difference and connection between general ward and ICU. 17) Items and psychological preparation needed for transfer out of ICU.

Continued

	6) Preparation and verification of responsible nurses before transfer	18) The patient's condition before transfer. 19) The patient has a catheter pathway (venous, drainage). 20) The completion of basic care for the patient and the cleanliness of clothes. 21) Medications to be taken during the transfer. 22) Communication with the receiving department before transfer. 23) Communication with patients and their families before transfer. 24) Patients are required to bring their own belongings for transfer. 25) Preparation of transfer personnel (responsible nurses, family members, elevator team, stretcher team). 26) During handover, clearly report: The patient's current MEWS score is [X] points, with each component scored as follows: [itemized list]. This score has remained stable for [Y] hours, meeting our hospital ICU discharge criteria (MEWS ≤ Z points). Special attention should be paid during handover to whether the risk of tumor-related vital sign fluctuations has been resolved or is controllable.
3) Preparation of nursing staff and standardized handover during transfer	7) Handover of transfer to wards and general wards	27) Basic information of the patient (diet, excretion, sleep, history of allergy). 28) The type of venous access carried by the patient and whether it is currently unobstructed. 29) The type, amount and characteristics of drainage fluid carried by the patient. 30) The patient's skin condition (including wound, stoma, and pressure ulcer conditions, with description including specific location and extent). 31) Patient risk score handover (risk of catheter slippage, pressure sores, fall from bed). 32) The patient's current self-care ability, psychological status and nursing points. 33) The psychological status of the family and their questions and needs during the care process. 34) Explain the patient's transfer out of ICU based on MEWS score, and introduce the patient's current condition to the family.
4) Visiting and communicating with patients and their families after transfer	8) Communication with family members after transfer to the ward	35) Based on the MEWS monitoring records (especially abnormal fluctuation points) and tumor diagnosis of patients during ICU stay, the family members should be emphasized to pay special attention to risk points and observation points after the transfer. 36) Assess the family's knowledge of health guidance. 37) The patient's condition, diet and excretion, psychological status, self-care ability and rehabilitation exercise.

Continued

	38) The psychological status of the family members.
	39) The degree to which family members have mastered health guidance knowledge.
9) Visits to patients and their families	40) Questions and needs of family members in the process of caring for patients.
	41) Communicate with the patient's family together with the responsible nurse of the general ward, and inform the family of the current nursing points by the responsible nurse of the ward.

Table 2. Expert inquiry results of transfer communication plan item scores and coefficients (second round).

Article hierarchy	Importance score	Coefficient of variation
Primary entry	4.67 ± 0.62	0.13
	4.80 ± 0.56	0.12
	4.60 ± 0.737	0.16
	4.40 ± 0.82	0.18
Secondary entries	4.73 ± 0.59	0.13
	4.73 ± 0.59	0.13
	4.87 ± 0.35	0.07
	4.93 ± 0.26	0.05
	4.80 ± 0.41	0.09
	4,93 ± 0.26	0.05
	4.87 ± 0.35	0.07
	4.87 ± 0.35	0.07
	4.80 ± 0.41	0.09
Level 3 entries	4.93 ± 0.25	0.05
	4.87 ± 0.35	0.07
	4.67 ± 0.62	0.13
	4.80 ± 0.41	0.09
	4.80 ± 0.41	0.09
	4.67 ± 0.49	0.11
	4.93 ± 0.25	0.05
	4.60 ± 0.63	0.14
	4.87 ± 0.35	0.07
	4.87 ± 0.35	0.07
	4.67 ± 0.62	0.13
	4.73 ± 0.59	0.13
	4.73 ± 0.46	0.10
	4.87 ± 0.35	0.07
	4.87 ± 0.35	0.07
	4.67 ± 0.62	0.13
	4.93 ± 0.26	0.05
	4.73 ± 0.59	0.13

Continued

	5.00 ± 0.00	0.00
	4.87 ± 0.35	0.07
	4.53 ± 0.52	0.11
	4.87 ± 0.35	0.07
	4.87 ± 0.35	0.07
	4.87 ± 0.35	0.07
	4.93 ± 0.25	0.05
	4.87 ± 0.35	0.07
	4.93 ± 0.26	0.05
	4.80 ± 0.41	0.09
	4.73 ± 0.46	0.10
	4.87 ± 0.35	0.07
	4.93 ± 0.26	0.05
	4.87 ± 0.35	0.07
	5.00 ± 0.00	0.00
	5.00 ± 0.00	0.00
	5.00 ± 0.00	0.00
	5.00 ± 0.00	0.00
	5.00 ± 0.00	0.00
	5.00 ± 0.00	0.00
	4.73 ± 0.70	0.15
	4.67 ± 0.62	0.13
	4.67 ± 0.62	0.13

Table 3. Degree of coordination and concentration of expert opinions.

turn	Mean importance	coefficient of variation	Kendall coefficient		
			W price	*X price*	*P price*
Round 1	4.93 - 4.13	0.24 - 0.05	0.08	98.10	0.03
Round 2	5.00 - 4.40	0.18 - 0.00	0.117	129.50	0.00

4.2. Compilation of Expert Opinions and Revision Plan of Pre-Experiment

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates to and elaborates on this one topic. If there are two or more sub-topics, the next level head should be used and conversely, if there are not at least two sub-topics, then no subheads should be introduced. Styles named "Heading 1", "Heading 2", "Heading 3", and "Heading 4" are prescribed. Experts proposed that the intervention plan should focus on key aspects during visitation and transfer communication, with post-transfer visits emphasizing coordination with ward nurses. The plan should highlight communication priorities at each stage, incorporating oncology-specific features. It must align with Mews' warning scores to emphasize transfer requirements, while tailoring communications based on patients' and families' ac-

tual situations. Simultaneously, it should facilitate communication between attending physicians and patient families. After consolidating expert opinions through group discussions and revising the intervention plan, a pilot test was conducted with 10 families of ICU-transferred cancer patients. Based on feedback, the plan was refined into its final version as shown in Table 4.

Table 4. Finalized communication protocol for ICU transport of critical cancer patients in the MEWS alert scoring framework.

stage	Intervention Group
When the patient enters the room	Time: Admission to ICU, admission (within 24 hours). Location: ICU family talking room. Content: ICU Family Communication Guide, covering ICU environment introduction, visitation protocols, critical care objectives for cancer patients (anti-cancer therapy, emergency management of tumors, symptom control, end-of-life support), rehabilitation exercises for cancer patients, warning signs of common tumor emergencies (hypercalcemia crisis, superior vena cava syndrome, tumor lysis syndrome, spinal cord compression, severe bone marrow suppression with infection/blood disorders, with MEWS instructions), patient transfer procedures, and family psychological adjustment ("Common emotional responses to cancer diagnosis/recovery/progression and coping resources"). Communication: During the first communication, members of the research group will distribute manuals to the family members and conduct education. They should actively ask the family members about their understanding of the patient's tumor diagnosis, current stage (initial treatment/recurrence/advanced stage) and established treatment goals, and at the same time, the family members will scan the WeChat code to join the WeChat education platform. Objective: To ensure that family members understand and know the key points of communication.
During a visit by a patient's family member	Time: After daily visit time (16:00 - 16:30). Location: ICU family talking room. Responsibility nurses update the MEWS score trend chart daily, informing families about the patient's condition, current care priorities, and cost details. For example: "The MEWS score decreased from X to Y points in the past 24 hours. Considering the tumor patient's condition and the current low white blood cell/platelet levels along with the ongoing XX anti-tumor treatment, infection and bleeding risks still require close monitoring. We have enhanced XX monitoring/prevention measures." Communication: Responsible nurses engage in one-on-one conversations with patients families to understand their current concerns and anxieties. They provide guidance on self-psychological adjustment and coordinate family members' joint care responsibilities. Nurses instruct families on effective communication strategies, encouraging patients to build confidence and actively cooperate. They also assist families in communicating with attending physicians using the ICU Oncology Patient Family Communication Effectiveness Evaluation Form. This tool assesses families' mastery of communication guidelines, addresses unfamiliar content through explanations, and collects feedback on communication strategies from family members. Objective: Family members should accurately understand the patient's condition, guide family members to communicate effectively, and complete the questionnaire.

Continued

Before the patient is transferred	Time: After the responsible nurse and the doctor jointly assess the patient's condition, communicate and coordinate with the medical staff in the receiving ward; Medical record: Based on the patient's MEWS score and tumor-related risk stratification assessment (including bone marrow suppression status, immune status, and emergency management of active tumors), if ≤4 points: initiate routine transfer procedures using the "Transportation Nursing Preparation Checklist"; 5 - 6 points: require a secondary evaluation by oncology specialists and ICU physicians; ≥7 points: suspend transfer and initiate intra-hospital multidisciplinary consultation. Communication: Clearly inform patients that they may be discharged after passing the Mews Alert Scale assessment, and instruct family members to review the communication guide for discharge preparations. Use the Transfer Nursing Preparation Checklist to verify the patient's condition prior to discharge, including catheter readiness, completed basic care, medication preparation, pre-transfer communication arrangements, patient luggage coordination, staff preparation, and Mews Alert Level ratings. Objective: Family members are informed of the patient's condition and preparation for transfer.
The patient was transferred to the ward At the handover	Time: At the time of transfer. Place: bedside handover in the ward. Procedure: Complete the handover with the ward nurse using the hospital's transfer form. Utilize the ICU Transfer Nursing Handover Checklist and follow the ISBAR communication model to conduct the handover. Key oncology background information includes: recent anti-tumor treatment history, current tumor status, major tumor-related symptoms and management protocols, current bone marrow function, presence of tumor emergency risks, and subsequent critical oncology monitoring requirements. This should be followed by treatment coordination, symptom management plans, and family communication guidelines that require special attention from the ward. Communication: The content should include specific infection prevention measures, key points for monitoring bleeding, precautions for particular catheter/wound care, dietary and nutritional recommendations, as well as activity-rest guidance. Emergency contact information (oncology department/emergency department) and tumor-related warning symptoms requiring immediate medical attention. Current care priorities should be outlined, with reassessment of family members' understanding of relevant knowledge to provide explanations and guidance for unfamiliar areas. Objective: The responsible nurse in the ward should make clear the current situation of the patient, and the family members should be familiar with the key points of care for the patient at the present stage.
After the patient was transferred	Time: During the visit. Place: bedside of the ward. Record: The responsible nurse uses the ICU transfer visit form for the transferred patients (within 24 hours) to visit the transferred patients and their families. Patient assessment: Has the tumor-related symptom control remained stable? Have there been any new or worsening symptoms? How is the patient adapting to the current environment (general ward)? Family member evaluation: What are their understanding and implementation of key oncology care protocols in the ward? Are treatment plans clearly communicated? Are there any new concerns or decision-making difficulties? Do they recognize or need additional psychological/social support resources? For

Continued

	unfamiliar aspects, provide supplementary explanations. Based on the patient's current recovery status, collaborate with the ward nurse to develop nursing recommendations. Communication: Collaborate with nurses in the joint ward to provide early-stage support recommendations for cancer patients during recovery, including activity planning, nutritional optimization, fatigue management, and emotional support resource referrals. For families requiring decision-making assistance (such as treatment options or progression to palliative care), utilize multidisciplinary support resources (oncologists, palliative care teams, social workers) for intervention. Distribute questionnaires to family members and guide them through completing the surveys. Objective: Patients and their families should understand the contents of the manual and complete the follow-up care needs.

4.3. Results

In the control group, one patient experienced deterioration and was not transferred from the ICU. In the intervention group, one patient's family member withdrew from the trial due to personal reasons during implementation. Ultimately, both groups included 47 patients and their families. There were no statistically significant differences in demographic data between the groups (Table 5 and Table 6). Post-intervention, both the migration stress level scores and family caregiving competency scores showed statistically significant improvements compared to pre-intervention levels ($P < 0.05$) (Table 7 and Table 8).

Table 5. Comparison of patient demographics (Example (percentage, %)).

Project		Control group (n = 47)	Intervention Group (n = 47)	χ^2/t	P price
Sex	Man	29 (61.70)	24 (51.06)	1.08	0.29
	Woman	18 (38.30)	23 (48.93)		
Age		60.29 ± 15.16	60.32 ± 15.15	0.00	0.99
Marital status	Unmarried	0 (0)	2 (4.25)	2.05	0.35
	Married	37 (78.72)	35 (74.47)		
	bereft of one's spouse	10 (21.28)	10 (21.28)		
Record of formal schooling	Primary school	16 (34.04)	18 (38.30)	2.17	0.70
	Special school	12 (25.53)	11 (23.40)		
	Junior college	13 (27.66)	9 (19.15)		
	Undergraduate course	6 (12.77)	8 (17.02)		
	Master	0 (0)	1 (2.13)		
Monthly income	Under 2000	19 (40.43)	21 (44.68)	4.41	0.35
	2000 to 4000	15 (31.91)	15 (31.91)		
	4000 to 6000	12 (25.53)	7 (14.89)		
	6000 to 8000	0 (0)	3 (6.38)		

Continued

Occupation	More than 8000	1 (2.13)	1 (2.13)	11.35	0.07
	Cadre	14 (27.79)	12 (25.53)		
	Worker	7 (14.89)	9 (19.15)		
	Individuality	4 (8.51)	8 (17.02)		
	Unemployed	6 (12.77)	5 (10.64)		
	Peasant	16 (34.04)	7 (14.89)		
	Student	0 (0)	5 (10.64)		
Type of medical insurance	Employee medical insurance	21 (44.68)	25 (53.19)	2.16	0.33
	Resident medical insurance	25 (53.19)	19 (40.43)		
	At one's own expense	1 (2.13)	3 (6.38)		
Hours spent in ICU		88.66 ± 27.03	89.085 ± 27.70	0.07	0.94
APACHE II score		10.723 ± 3.24	10.83 ± 3.40	0.15	0.87

Table 6. Comparison of general data of family members of two groups of patients (name (percentage, %)).

Project		Control group (n = 47)	Intervention Group (n = 47)	χ^2/t	P
Sex	Man	15 (31.91)	20 (42.55)	1.13	0.28
	Woman	32 (68.09)	27 (57.45)		
Age		43.04 ± 10.88	43.06 ± 11.04	0.00	0.99
Marital status	Unmarried	3 (6.38)	6 (12.77)	2.30	0.31
	Married	43 (91.49)	38 (80.45)		
	Bereft of one's spouse	1 (2.13)	3 (6.38)		
Record of formal schooling	Primary school	6 (12.77)	4 (8.51)	4.99	0.41
	Special school	10 (21.28)	14 (27.79)		
	Junior college	13 (27.66)	11 (31.91)		
	Undergraduate course	15 (31.91)	11 (31.91)		
	Master	3 (6.38)	4 (8.51)		
	doctor	0 (0)	3 (6.38)		
Relationship with patients	Man and wife	16 (34.04)	22 (46.81)	3.17	0.20
	Sons and daughters	30 (63.83)	22 (46.81)		
	Other	1 (2.13)	3 (6.38)		
Religion faith	Have	4 (8.51)	8 (17.02)	1.52	0.21
	Not have	43 (91.49)	39 (82.98)		
Occupation	Cadre	18 (38.30)	20 (42.55)	8.35	0.13
	Worker	12 (25.53)	12 (25.53)		

Continued

	Individuality	4 (8.51)	5 (10.64)		
	Unemployed	1 (2.13)	6 (12.77)		
	Peasant	11 (31.91)	3 (6.38)		
	Student	1 (2.13)	1 (2.13)		
	Full-time	21 (44.68)	19 (40.43)	4.26	0.23
Operative mode	Temporarily out of office	16 (34.04)	20 (42.55)		
	Resign	1 (2.13)	4 (8.51)		
	Retire	9 (19.15)	4 (8.51)		
Whether they live together	Yes	22 (46.81)	26 (55.32)	0.68	0.40
	Deny	25 (53.19)	21(44.68)		

Table 7. Comparison of migration stress levels between families of two groups of patients (score, (x ±S)).

Prediction dimension	Group	Control group (n = 47)	Intervention group (n = 47)	*t*	p
Knowledge of the environment and care in a general ward	Before the intervention	12.21 ± 2.12	13.10 ± 2.46	−1.880	0.063
	After the intervention	12.04 ± 1.89	10.66 ± 2.44	3.06	0.000
Critical condition awareness	Before the intervention	7.61 ± 1.55	7.40 ± 2.31	0.523	0.603
	After the intervention	6.59 ± 1.59	5.78 ± 1.50	2.521	0.010
The perception of separation anxiety	Before the intervention	8.68 ± 1.97	8.04 ± 1.87	1.605	0.112
	After the intervention	7.02 ± 2.66	5.93 ± 2.25	2.132	0.030
Cognitive transition	Before the intervention	5.24 ± 1.67	5.55 ± 1.48	0.418	0.677
	After the intervention	5.12 ± 1.52	5.00 ± 1.42	3.616	0.016
Total stress migration score	Before the intervention	33.53 ± 3.99	33.68.4.40	0.172	0.864
	After the intervention	31.10 ± 4.23	27.93 ± 4.39	3.567	0.000

Table 8. Comparison of family care ability between the two groups (score, (x ± S)).

Group	Family care ability total score	
	Before the intervention	After the intervention
Control group (n = 47)	25.42 ± 0.49	39.48 ± 8.64
Intervention group (n = 47)	25.00 ± 1.53	43.12 ± 5.84
t	1.810	2.394
P	0.074	0.010

5. Discussion

This study adopted evidence-based medicine as its core methodology, developing an initial transport communication protocol through literature review, current situation surveys, and group discussions. Guided by expert consultations, the protocol focused on specialized needs of cancer patients during transport and family psychological characteristics, incorporating MEWS (Medical Emergency Warning System) scoring as a foundational communication framework to formulate a revised ICU protocol for critically ill cancer patients. Through pilot testing, communication items and content were refined to cover the entire transport process (intubation, visitation, transfer, and post-transfer) via ICU procedures. The protocol utilized tools like the "ICU Family Communication Manual" and ISBAR handover [12] to standardize operations, while enhancing information efficiency through manuals and digital platforms aligned with modern healthcare trends. Literature review provided scientific foundation for protocol development, with current surveys revealing moderate-to-high levels of family stress during patient transfer (average score 31.02 ± 4.60), highlighting both high-level communication needs and deficiencies in family psychological support [13]. The Delphi expert consultation served as the critical phase, involving 53.33% senior ICU nursing professionals with rich experience and expertise. Both rounds of expert consultations achieved 100% questionnaire response rates. Statistical parameters (Ca = 0.88, Cs = 0.89, Cr = 0.89 > 0.70) demonstrate high expert authority and reliable consultation outcomes. The Kendall's W coefficients for the two rounds were 0.08 and 0.117 respectively, with $P < 0.05$, indicating a trend toward consensus among experts. In the pilot study, based on the field experiences and feedback from both researchers and subjects, the research team integrated clinical expertise with scientific evidence to optimize the questionnaire items, ensuring the protocol aligned with practical needs.

The communication plan has applicability to specialized departments. Cancer patients may require intensive drug therapy for multiple indications. In most cases, intensive care treatment is needed either due to the malignancy itself or as a result of cancer treatment complications [14]. Acute respiratory failure is the most common medical reason for cancer patients to be referred to the ICU [15]. The MEWS scoring system can promptly monitor first changes in vital signs and comprehensively assess whether patients meet referral criteria. Therefore, this protocol optimizes patient transport tailored to the ICU environment and the needs of cancer patients and their families. During patient evaluation, quantified benefit and risk assessment indicators are established according to MEWS warning score requirements, applying corresponding weighting and scoring based on specific symptoms, physical sign changes, and critical physiological parameters observed in patients' conditions [16]. It also clarifies tumor-specific indicators and risks to enable quantitative assessment of patients' clinical manifestations and characteristic indicators, allowing rapid and accurate determination of disease severity. This ensures safety for critically ill patients at all stages while fully prepar-

ing for transport procedures and monitoring during transit [17]. Given that relatives' ICU admission experiences, cancer diagnosis burdens, and participation in decision-making may lead to anxiety, depression, and post-traumatic stress disorder symptoms [14], incorporating family psychological guidance modules during visits—including strategies for emotional regulation and coordinated caregiving among relatives—effectively reduces migration stress and lowers family members' psychological burden [18]. Meanwhile, we will strengthen oncology-specific training programs to guide family members in mastering caregiving skills, assist in rehabilitation, and enhance their caregiving capabilities. This approach aims to provide dual-path psychological and physiological support for cancer patients' families. Building on this foundation, we will implement enhanced communication before and after patient transfers, along with joint ward nurse visits within 24 hours post-transfer. By establishing an ICU-to-hospital corridor coordination mechanism, we reduce nursing gaps, improve family understanding of patients, minimize transfer stress, and boost care satisfaction. The "Post-Transfer Visitation Checklist" will dynamically assess family knowledge acquisition, creating a closed-loop management system of "intervention-feedback-improvement". These findings align with the conclusions of Jonasdottir [19] and Wang Shuang [20]'s research.

Communication plan for ICU cancer patients can reduce family migration stress and improve the continuity of care. Family members' stress migration is a common psychological phenomenon among patients' families, particularly when critically ill patients are transferred from ICU to general wards. This stress may lead to negative emotions due to concerns about the new environment's suitability for the patient. Research indicates that stress migration not only affects family members' physical and mental health but also triggers similar emotional responses in patients, potentially leading to ineffective disease management, uncertainty, and poor treatment outcomes, ultimately prolonging hospital stays [7]. Standardized handover procedures can reduce information gaps by ensuring seamless communication of critical details like medical conditions, IV lines, and medications, while standardizing transfer protocols and improving coordination with receiving departments [21]. According to the Ottawa Decision Support Framework, social support influences decision-makers' confidence in healthcare decisions [22]. Therefore, the study incorporated a WeChat platform to provide families with continuous professional guidance covering ICU and general ward introductions, key rehabilitation points for cancer patients, early mobilization, dietary advice, as well as psychological adjustment techniques and communication strategies. This approach fully meets the needs of cancer patients' families while promoting homogeneity between home care and hospital treatment. Additionally, follow-up visits with patients and their families within 24 hours after ICU discharge enable timely monitoring of basic conditions, early mobilization guidance, educational interventions, and participation in rehabilitation plan formulation, thereby ensuring patient safety and maintaining nursing continuity. The intervention group

demonstrated significantly lower total stress scores in family migration compared to the control group, confirming the communication program's effectiveness in alleviating anxiety and enhancing cognitive function. This finding aligns with the conclusions of Zhu Dongping [23]'s research. The MEWS assessment system helps predict vital sign prognoses during initial evaluations, enabling clinicians to streamline patient management. After family education programs, caregivers become primary monitors, effectively identifying warning signs of deterioration while improving overall care capabilities and patient safety, thereby enabling comprehensive health monitoring [24].

This study has several potential limitations that should be acknowledged. First, it adopted a single-center design, which may limit the generalizability of the results to other healthcare settings with different patient populations and resource allocations. Second, the non-randomized controlled study design may introduce selection bias, as the control and intervention groups were recruited sequentially rather than randomly assigned. Third, the sample size was relatively modest (94 cases in total), which may affect the statistical power to detect subtle differences in outcomes. Fourth, the follow-up period was limited to 24 hours post-transfer, and long-term outcomes such as sustained caregiving ability and psychological well-being of family members were not evaluated. Future studies should adopt a multi-center, randomized controlled design with a larger sample size and longer follow-up to validate the protocol's long-term effectiveness and generalizability.

This study successfully constructed a scientifically sound and practically applicable ICU transfer communication protocol for critically ill cancer patients based on the MEWS early warning score. The protocol covers five key stages (admission, visitation, pre-transfer, handover, and post-transfer follow-up) and integrates standardized tools, digital educational resources, and humanistic communication strategies. The application of this protocol effectively reduces family migration stress and improves the caregiving ability of family members, contributing to better care continuity and patient safety during transfer. The protocol also has the potential to mitigate long-term psychological risks such as PTSD in family caregivers. For hospital management, the broader implementation of this protocol requires targeted resource allocation and specialized training for healthcare providers. Despite its limitations, this study provides valuable evidence-based support for optimizing the transfer communication of critically ill cancer patients and enhancing the overall quality of care for this high-risk population.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request. Some data may be restricted due to ethical, legal, or privacy considerations and thus are not publicly depositable. Raw data, processed datasets, and analytical code generated during the current study are available from the authors without undue reservation, provided that the requester complies with relevant data usage agreements.

Funding

This research was supported by Yunnan Provincial Department of Education Scientific Research Fund Project, China (Project number: 2024J0359). The recipient of the funding is YangYan.

Acknowledgements

Thank you to every patient and family member who contributed to this study. We would like to thank the funding support from the Department of Education of Yunnan Province.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Bos, M.M.E.M., Verburg, I.W.M., Dumaij, I., Stouthard, J., Nortier, J.W.R., Richel, D., *et al.* (2015) Intensive Care Admission of Cancer Patients: A Comparative Analysis. *Cancer Medicine*, **4**, 966-976. https://doi.org/10.1002/cam4.430

[2] Zhou, H., Song, M. and Gao, H. (2024) The Nursing Effect of Stepwise Nutritional Intervention on Critically Ill Patients with Tumors in Intensive Care Units. *Journal of Shanxi Medicine*, **53**, 1821-1825.

[3] Li, W., Zhao, J., Chi, Y., *et al.* (2018) Qualitative Study on Migration Stress of Families of Critically Ill Cancer Patients. *Journal of Nursing Education*, **33**, 1700-1703.

[4] Jin, J., Wang, X. and Hu, Z. (2024) Application Effect of In-Hospital Safe Transport Under Extracorporeal Membrane Oxygenation Support Led by ICU Emergency Treatment Team. *China Medical News*, **21**, 52-55.

[5] Cai, Z., Zou, C., Huang, L., *et al.* (2023) Application of A Standardized Communication Model for Error Management in The Intra-Hospital Transfer of Critically Ill Patients in Nephrology. *Journal of Critical Care Nursing, China*, **4**, 293-298.

[6] Liang, T. and Deng, X. (2021) Application of SBAR Communication Mo Del in Emergency-ICU Patient Transfer and Handover. *Contemporary Chinese Medicine*, **28**, 260-263.

[7] Chang, Q., Xiao, Y., Duan, Z., *et al.* (2025) Relationship Between Stress Levels, Social Support, Coping Strategies, Self-Efficacy and Clinical Value of Family Migration in Orthopedic ICU Patients. *Heilongjiang Medical Science*, **48**, 129-132.

[8] Wang, M., Liu, L., Yang, X., *et al.* (2024) Value of National Early Warning Score System Combined with Albumin in Predicting Adverse Pro Gnosis of Acute Heart Failure Patients. *Journal of Cardiovascular and Pulmonary Diseases*, **43**, 695-699.

[9] Wang, Y. (2017) Chinese Adaptation and Preliminary Application of the ICU Patient Family Migration Stress Scale. Huzhou Normal University.

[10] Lee, R.L. and Mok, E.S. (2011) Evaluation of the Psychometric Properties of a Modified Chinese Version of the Caregiver Task Inventory-Refinement and Psychometric Testing of the Chinese Caregiver Task Inventory: A Confirmatory Factor Analysis. *Journal of Clinical Nursing*, **20**, 3452-3462. https://doi.org/10.1111/j.1365-2702.2011.03729.x

[11] Brooke, J., Hasan, N., Slark, J. and Sharma, P. (2012) Efficacy of Information Inter-

ventions in Reducing Transfer Anxiety from a Critical Care Setting to a General Ward: A Systematic Review and Meta-Analysis. *Journal of Critical Care*, **27**, 425.e9-425.e15. https://doi.org/10.1016/j.jcrc.2012.01.009

[12] Li, Q., Chen, H., Tao, S., *et al.* (2025) Research Progress on the Application of ISBAR Communication Model in Nursing Practice. *Evidence-Based Nursing*, **11**, 477-481.

[13] Watland, S., Solberg Nes, L., Ekeberg, Ø., Rostrup, M., Hanson, E., Ekstedt, M., *et al.* (2025) Effects of the Caregiver Pathway Intervention on Symptoms of Post-Intensive Care Syndrome among Family Caregivers to Critically Ill Patients: Long-Term Results from a Randomized Controlled Trial. *Intensive Care Medicine*, **51**, 2042-2053. https://doi.org/10.1007/s00134-025-08139-x

[14] Shimabukuro-Vornhagen, A., Böll, B., Kochanek, M., Azoulay, É. and von Bergwelt-Baildon, M.S. (2016) Critical Care of Patients with Cancer. *CA*: *A Cancer Journal for Clinicians*, **66**, 496-517. https://doi.org/10.3322/caac.21351

[15] Bird, G.T., Farquhar-Smith, P., Wigmore, T., Potter, M. and Gruber, P.C. (2012) Outcomes and Prognostic Factors in Patients with Haematological Malignancy Admitted to a Specialist Cancer Intensive Care Unit: A 5 Yr Study. *British Journal of Anaesthesia*, **108**, 452-459. https://doi.org/10.1093/bja/aer449

[16] Zong, J., Liu, X., Geng, Q., *et al.* (2025) Research on Standardized Nursing Assessment Indicators for Critical Multiple Injuries Based on Corrected and Improved Early Warning Scoring. *Journal of Nursing Management*, **25**, 98-103, 110.

[17] Zhang, W. (2024) Clinical Study on the Predictive Effect of Advanced Modified Early Warning Scoring Model on In-Hospital Cardiac Arrest in Critically Ill Patients. Hebei Medical University.

[18] Huang, Y., Liang, D., Shang, J., *et al.* (2025) Construction and Application of ICU Patient Family Communication Checklist Based on Narrative Nursing. *Journal of Nursing*, **40**, 69-73.

[19] Jónasdóttir, R.J., Jónsdóttir, H., Gudmundsdottir, B. and Sigurdsson, G.H. (2018) Psychological Recovery after Intensive Care: Outcomes of a Long-Term Quasi-Experimental Study of Structured Nurse-Led Follow-Up. *Intensive and Critical Care Nursing*, **44**, 59-66. https://doi.org/10.1016/j.iccn.2017.06.001

[20] Wang, S., Wu, Y., Liu, Y., *et al.* (2025) Impact of Intensive Care Unit Follow-Up Methods Led by Critical Care Nurses on Patients Read Mitted Without Prior Planning. *Military Nursing*, **42**, 14-17.

[21] Liu, L. (2022) Application of Multimedia Visualization Standardized Manage Ment Process Combined with SBAR Shift Handover Guide in Surgical Handover. *Journal of Clinical Nursing*, **21**, 44-47.

[22] Li, X., Zhao, J., Zhang, X., *et al.* (2022) A Review on the Connotation and Clinical Application Scope of Decision Support Framework in Ottawa. *Chinese Journal of Nursing*, **57**, 756-762.

[23] Zhu, D., Shao, P., Qiao, Y., *et al.* (2025) Construction and Application Effect Evaluation of Stress Nursing Program for Family Members of Patients Transferred from ICU with Severe Craniocerebral Trauma. *Chinese Journal of Critical Care Nursing*, **6**, 261-267.

[24] Ko, R., Kim, Z., Jeon, B., Ji, M., Chung, C.R., Suh, G.Y., *et al.* (2023) Deep Learning-Based Early Warning Score for Predicting Clinical Deterioration in General Ward Cancer Patients. *Cancers*, **15**, Article 5145. https://doi.org/10.3390/cancers15215145