

RESEARCH

Open Access



# Roy adaptation model-based nursing combined with transitional care for enhancing mental health and quality of life after cancer surgery: results from a randomized controlled study

Lijie Yuan<sup>1</sup> and Ying Fu<sup>2\*</sup>

## Abstract

**Objective** This paper aimed to assess the effectiveness of the Roy adaptation model (RAM)-based nursing with continuity of care in improving mental health and quality of life in patients undergoing tumor resection.

**Methods** A randomized controlled trial was conducted involving 114 patients diagnosed with malignant tumors, who were randomly assigned to either a control group receiving routine nursing care or an observation group receiving RAM-based nursing integrated with continuity of care. Both groups received sustained interventions over a 3-month period. Psychological resilience was assessed using the Connor-Davidson Resilience Scale (CD-RISC), and quality of life was evaluated with the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) at baseline and 3 months after the intervention. Following the intervention, satisfaction with nursing care was assessed through a hospital-designed satisfaction survey.

**Results** Following the nursing intervention, the CD-RISC score of the observation group was higher than that of the control group ( $P < 0.05$ ). The observation group showed higher EORTC QLQ-C30 scores in physical functioning, role functioning, emotional functioning, cognitive functioning, social functioning, and global health status compared with the control group, while scores for fatigue, pain, dyspnea, and insomnia were lower in the observation group than in the control group ( $P < 0.05$ ). Additionally, nursing satisfaction was significantly higher in the observation group compared to the control group ( $P < 0.05$ ).

**Conclusion** The integration of RAM-based nursing with continuity of care significantly enhances postoperative psychological resilience and overall quality of life in patients after tumor surgery. This approach also improves nursing satisfaction, supporting its utility as an effective model for comprehensive postoperative nursing.

**Keywords** Roy adaptation model, Continuity of care, Psychological resilience, Quality of life, Nursing satisfaction

\*Correspondence:

Ying Fu

fuyingmuer@163.com

Full list of author information is available at the end of the article



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

## Introduction

Tumor surgery serves as a critical modality for controlling tumor growth and preventing metastasis by removing malignant tissues, thereby slowing disease progression. However, patients in the postoperative phase often encounter significant psychological distress, including anxiety, depression, and fear. These emotional responses are commonly triggered by concerns about the illness itself, uncertainty regarding surgical outcomes, and apprehension about the future (Li et al. 2024). Without appropriate psychosocial interventions, such psychological burdens can adversely affect treatment adherence, delay recovery, impair functional and emotional status, and diminish overall quality of life (Li et al. 2023). For example, lung cancer patients undergoing surgery frequently experience a high symptom burden that substantially compromises their quality of life (Merlo et al. 2022). Similarly, elderly patients undergoing gastrointestinal cancer surgery face increased risks of postoperative pain and delirium, particularly on the first day after surgery (Liu et al. 2023).

Growing evidence underscores the role of high-quality nursing care in mitigating postoperative complications and improving outcomes. For instance, comprehensive nursing interventions have been shown to reduce inflammation and enhance prognosis in patients undergoing surgery for non-small cell lung cancer (Wang et al. 2022). Likewise, the implementation of a WeChat-based multimodal nursing program during early rehabilitation significantly improved health-related quality of life among women recovering from breast cancer surgery (Zhou et al. 2020). A thorough review of the literature highlights the Roy adaptation model (RAM) as one of the most widely applied theoretical frameworks in nursing. Developed by American nursing scholar Sister Callista Roy, RAM conceptualizes individuals as adaptive systems that respond to internal and external stimuli through four interrelated adaptive modes: physiological function, self-concept, role function, and interdependence (Tefera et al. 2022). RAM-guided nursing typically progresses through distinct stages: an initial assessment phase—including primary evaluation (stimulus identification) and secondary evaluation (adaptive response analysis)—followed by nursing diagnosis, goal setting, targeted intervention, and outcome evaluation (Zheng and Jin 2022). RAM has been effectively utilized across nursing research, clinical education, and practice, facilitating adaptive interactions between patients and their environments (Rezazadeh et al. 2023). For instance, RAM-based interventions have been shown to significantly improve self-efficacy and self-management behaviors in elderly patients with hypertension, leading to healthier lifestyle changes, increased

medication adherence, improved quality of life, and better blood pressure control (Zhang et al. 2021).

Another essential concept in modern nursing is continuity of care, which was first introduced in the late 1940s to evaluate the need for consistent and coordinated healthcare services (Hu et al. 2020). Continuity of care is a multidimensional construct comprising longitudinal continuity (ongoing care within a healthcare setting), relational continuity (sustained provider-patient relationships), and informational continuity (effective information transfer and monitoring of patient progress). It also includes personalized care planning, communication efficiency, and structured discharge processes (Hu et al. 2020). Research indicates that ensuring continuity of care contributes to improved clinical outcomes, higher patient satisfaction (King et al. 2022), and reduced healthcare utilization—as evidenced in studies involving newly diagnosed diabetic patients (Li 2019).

RAM and continuity of care are conceptually complementary. While RAM emphasizes adaptive responses to health-related stimuli and the promotion of holistic adaptation, continuity of care ensures sustained, coordinated efforts to meet patients' long-term health needs. Both approaches advocate for personalized, systematic assessment and intervention strategies aimed at optimizing health outcomes. These findings suggest that this combined model holds promise for broader clinical implementation. Despite its theoretical and practical appeal, the application of RAM in combination with continuity of care within the context of postoperative oncology remains underexplored. There is a paucity of robust empirical evidence supporting its effectiveness in improving postoperative recovery and psychosocial outcomes among cancer patients. To address this gap, the present study aims to evaluate the impact of integrating RAM-based nursing with continuity of care on mental health and quality of life in patients following tumor surgery, thereby contributing novel insights to the nursing literature and informing clinical practice.

## Materials and methods

### Ethical approval and consent to participate

This study was approved by the ethical committee of Affiliated Tumor Hospital of Harbin Medical University, and all patients provided informed consent. This study was conducted in Heilongjiang Province, China.

### Design

This study was designed as a randomized controlled trial to assess the advantages of RAM-based nursing combined with continuity of care, compared with routine

nursing, in improving psychological health and quality of life among patients after tumor surgery.

### Participants

Participants enrolled in this study were patients with malignant tumors admitted to Affiliated Tumor Hospital of Harbin Medical University from December 2021 to November 2022.

Inclusion criteria were (1) patients diagnosed with a malignant tumor confirmed by pathological biopsy; (2) patients who underwent elective surgery; (3) patients without distant metastasis; (4) patients who were aware of their own condition, had clear consciousness, and could use social media apps; and (5) patients who had signed the informed consent form.

Exclusion criteria were (1) patients with an estimated survival time of less than 4 months; (2) patients who received chemoradiotherapy or targeted therapy before enrollment; (3) patients with other severe organic diseases; (4) patients who had recently undergone surgery; and (5) patients unable to cooperate with this study.

### Sample size estimation

A rigorous sample size calculation was integrated into the study design to ensure sufficient statistical power for detecting meaningful effects. Prior literature on quality of life improvements associated with the RAM in cancer patients (Zheng and Jin 2022) indicated a significant impact, with an estimated effect size of  $d=0.568$  as determined using G\*Power version 3.1.9.2. Based on a two-tailed test with  $\alpha=0.05$  and power  $(1 - \beta)=0.95$ , a minimum of 95 participants was recommended. Anticipating a 20% attrition rate, the final sample included 114 participants (57 per group), thus maintaining robust statistical power to support reliable inference.

### Randomization and blinding

Randomization was conducted by an independent researcher who was not involved in the trial. A set of 114 random numbers was generated using Microsoft Excel. Beginning from the second row and fourth column, numbers were sequentially assigned to ensure balanced distribution. If any duplicates appeared, they were replaced with newly generated numbers. Each random number was written on a separate card corresponding to one participant and then sealed in opaque envelopes to maintain allocation concealment. Ultimately, 57 participants were allocated to the observation group and 57 to the control group at a 1:1 ratio. Blinding was maintained for both the outcome assessor and the data analyst. The assessor, unaware of group assignments, entered all collected data into an Excel spreadsheet. Data were coded and stripped of identifying information before analysis.

Group allocation was only revealed after the statistical analyses were completed.

### Nursing methods

The control group ( $n=57$ ) received standard nursing care according to routine department protocols, which included monitoring vital signs, promptly informing medical staff of critical situations, administering prescribed medications, providing dietary and rehabilitation guidance, instructing patients on post-discharge precautions, and scheduling regular follow-ups.

The observation group ( $n=57$ ) received RAM-based nursing combined with continuity of care in addition to the standard care provided to the control group.

RAM nursing: (1) Establishment of the RAM nursing team: A dedicated nursing team composed of highly qualified nurses was assembled, with a team leader appointed to oversee the implementation and evaluation of nursing care. All personnel underwent structured training in the Roy adaptation model and were required to pass competency assessments prior to participating in the intervention phase. (2) Assessment phase: Before initiating the intervention, nurses conducted both primary and secondary assessments based on the RAM framework, evaluating patients across four adaptive modes: self-concept, physiological function, role function, and interdependence. Based on these assessments, individualized care plans were developed to address each patient's specific adaptation challenges. (3) In-hospital RAM-based nursing intervention: ① Physiological function adaptation: Postoperative pain is one of the most prominent physiological changes patients experience. While analgesic medication can alleviate discomfort, pain is often not fully suppressed. RAM nursing helps regulate patients' subjective emotions to reduce their perception of pain. Interventions include guiding patients in performing proper deep breathing exercises for relaxation, encouraging the use of phones to play videos or music of personal interest as a distraction, advising against behaviors that might exacerbate pain, and helping patients adopt appropriate positions to prevent drainage tubes from becoming dislodged, twisted, or compressed, thereby ensuring effective drainage. ② Psychological adaptation: The combination of intense postoperative pain and fear of the disease often triggers anxiety and other adverse emotional reactions. In these situations, nurses should provide psychological counseling to identify and address the factors contributing to negative emotions. Health education sessions and the sharing of successful treatment cases can enhance patients' cognitive understanding of their condition, bolster their self-confidence, and alleviate adverse emotional states. ③ Role function and self-concept adaptation: Postoperative recovery can disrupt patients'

daily routines and work, affecting their role function and self-concept. Nurses should offer targeted rehabilitation exercise guidance tailored to patients' living habits, starting with simple exercises and gradually increasing complexity. Setting small, achievable goals can boost patients' confidence in their rehabilitation process and improve compliance with medical advice. ④ Patient dependency adaptation: Feelings of loneliness and helplessness are common among postoperative patients. Nurses should provide enhanced emotional support and involve family members in the caregiving process to offer encouragement, support, and companionship. It is important to avoid excessive or overly stimulating language that could negatively impact the patient's emotional well-being or recovery. These interventions work collectively to address the multifaceted challenges patients face, promoting a smoother recovery process and better overall outcomes.

Continuity of care: (1) Needs assessment: 3 days prior to discharge, detailed case information was collected, including the patient's self-care ability, post-discharge treatment needs, family caregiver availability, and required capabilities. Based on this data, a discharge plan execution form was developed, and an electronic file management system was established to streamline care coordination. (2) Rehabilitation hotline support: A rehabilitation hotline was established via telephone and WeChat. Weekly follow-ups were conducted by phone to monitor patient conditions, address adverse reactions, provide medication and self-care guidance, and offer psychological counseling in a patient-focused and meticulous manner. Nursing staff answered patients' questions, building trust, alleviating concerns and fears, and maintaining a positive psychological state. Patients were encouraged to actively participate in activities that benefited their physical and mental health, bolstering their confidence in managing cancer. A WeChat group was created to facilitate interaction among patients, families, and medical staff, as well as other patients, via mobile networks. Through this platform, group lectures were conducted using text, images, and online videos to enhance patients' understanding of their condition and improve their mastery of disease-related knowledge. Patients were encouraged to share their feelings and questions within the group and seek support when needed. Nursing staff regularly shared rehabilitation knowledge, healthy lifestyle tips, and one successful recovery case per week. (3) Specialized knowledge support: Based on scientific assessments, a picture-text life diary manual was compiled to aid patients in self-learning. Monthly specialized knowledge lectures were conducted, covering topics such as postoperative treatment, self-management strategies, and recognizing signs of recurrence. These lectures guided patients in understanding disease-related

knowledge, identifying issues early, and seeking timely medical assistance from their doctors. (4) Information feedback support: Information from patient assessments was promptly integrated, allowing for the adjustment of individualized rehabilitation plans based on their physical and mental health status. One-on-one psychological counseling was provided to help patients self-adjust, address psychological challenges, and foster positive attitudes. These sessions encouraged patients to adopt correct values and actively cooperate with treatment, ensuring a smoother recovery process and better health outcomes.

Both groups underwent continuous intervention for a duration of 3 months. No participants withdrew during the study period.

#### Observation indicators

The primary outcomes included the Connor-Davidson Resilience Scale (CD-RISC) and the European Organization for Research and Treatment of Cancer Quality-of-Life Questionnaire-Core 30 (EORTC QLQ-C30). Secondary outcomes encompassed nursing satisfaction.

1. Psychological resilience: Psychological resilience was evaluated using the Connor-Davidson Resilience Scale (CD-RISC) (Cronbach's  $\alpha=0.89$ ) developed by Connor and Davidson, which includes 25 items divided into three dimensions: resilience (13 items), tenacity (8 items), and optimism (4 items). A 5-point Likert scale ranging from 0 to 4 was used, with total scores ranging from 0 to 100, where higher scores indicate greater psychological resilience.
2. Quality of life: Quality of life was assessed by using the European Organization for Research and Treatment of Cancer Quality-of-Life questionnaire-Core 30 (EORTC QLQ-C30). The EORTC QLQ-C30 includes functional dimensions (physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning); symptom dimensions (fatigue, nausea and vomiting, and pain); single symptom items (dyspnea, insomnia, loss of appetite, constipation, diarrhea, and financial difficulties); and a global health status/quality of life dimension. Higher scores on the functional dimensions and global health status indicate better physical condition and quality of life, whereas higher scores on the symptom items reflect more severe symptoms or problems and poorer quality of life.
3. Nursing satisfaction: Nursing satisfaction was measured post-intervention using a hospital-specific nursing satisfaction survey scale with a maximum score of 60. Satisfaction was categorized as very satisfied (>51 points), satisfied (31–50 points), or not satisfied

(<30 points). The overall satisfaction rate was calculated by combining the percentages of “very satisfied” and “satisfied” responses.

### Statistical analysis

The data analysis was conducted using SPSS 26.0 statistical software. Enumeration data were presented as cases (%) and analyzed using the  $\chi^2$  test or Fisher’s exact test. The normality of measurement data was tested using the Shapiro–Wilk test. Data conforming to a normal distribution were expressed as mean  $\pm$  standard deviation (SD); comparisons between the two groups were conducted using the *t*-test.  $P < 0.05$  indicated that the difference was statistically significant.

## Results

### Baseline data

The control group consisted of 34 males and 23 females, with ages ranging from 39 to 65 years old and a mean age of  $50.67 \pm 5.72$  years old. The observation group consisted of 31 males and 26 females, with ages ranging from 41 to 70 years and a mean age of  $51.35 \pm 5.26$  years. There were no marked differences between the two groups in terms of age, gender, BMI, pathological stage, history of hypertension, or history of diabetes ( $P > 0.05$ ) (Table 1).

**Table 1** Comparison of baseline data between the two groups

| Indicators                               | Control group<br>( <i>n</i> = 57) | Observation<br>group<br>( <i>n</i> = 57) | <i>P</i> value |
|------------------------------------------|-----------------------------------|------------------------------------------|----------------|
| Age (years)                              | $50.67 \pm 5.72$                  | $51.35 \pm 5.26$                         | 0.508          |
| Gender                                   |                                   |                                          | 0.570          |
| Male                                     | 34 (59.65)                        | 31 (54.39)                               |                |
| Female                                   | 23 (40.35)                        | 26 (45.61)                               |                |
| Body mass index (kg/<br>m <sup>2</sup> ) | $23.59 \pm 2.50$                  | $22.91 \pm 2.79$                         | 0.173          |
| Pathological stage                       |                                   |                                          | 0.698          |
| I                                        | 20 (35.09)                        | 22 (38.60)                               |                |
| II                                       | 37 (64.91)                        | 35 (61.40)                               |                |
| History of hyperten-<br>sion             | 12 (21.05)                        | 10 (17.54)                               | 0.635          |
| History of diabetes                      | 6 (10.53)                         | 7 (12.28)                                | 0.768          |

Data are presented as mean  $\pm$  SD or *n* (%)

### Psychological resilience

Before the intervention, there were no significant differences in CD-RISC scores between the two groups ( $P > 0.05$ ). Following the intervention, the observation group demonstrated significantly higher scores than the control group ( $P < 0.05$ ) (Table 2).

### Quality of life

Before the intervention, no notable differences were observed between the two groups in the EORTC QLQ-C30 scores, including functional dimensions (physical, role, emotional, cognitive, and social functioning), symptom dimensions (fatigue, nausea and vomiting, and pain), single-item symptoms (dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial difficulties), and the global health status/quality of life dimension ( $P > 0.05$ ). Following the intervention, the observation group demonstrated significantly higher scores in physical functioning, role functioning, emotional functioning, cognitive functioning, social functioning, and global health status in comparison to the control group, while the scores for fatigue, pain, dyspnea, and insomnia were lower in the observation group than in the control group ( $P < 0.05$ ). No statistically significant differences were found between the observation and control groups in nausea and vomiting, appetite loss, constipation, diarrhea, or financial difficulties ( $P > 0.05$ ) (Table 3).

### Nursing satisfaction

Nursing satisfaction in the observation group was markedly higher than that in the control group, with statistically significant differences ( $P < 0.05$ , Table 4).

## Discussion

The significance of postoperative care in cancer patients lies in its capacity to improve outcomes, prevent complications, and facilitate the timely initiation of adjuvant therapies (Seibaek et al. 2018). This study aimed to assess the effectiveness of RAM-based nursing combined with continuity of care in patients undergoing tumor surgery, with a particular focus on psychological resilience, quality of life, and nursing satisfaction. The findings of this trial provide robust evidence supporting the clinical efficacy of this integrated nursing approach.

**Table 2** Comparison of mental resilience scores between the two groups

| CD-RISC |                             | Control group ( <i>n</i> = 57) | Observation group ( <i>n</i> = 57) | <i>P</i> value |
|---------|-----------------------------|--------------------------------|------------------------------------|----------------|
| CD-RISC | Before nursing intervention | $44.18 \pm 4.48$               | $45.53 \pm 4.01$                   | 0.093          |
|         | After nursing intervention  | $59.95 \pm 6.25$               | $63.14 \pm 6.83$                   | 0.011          |

Data are presented as mean  $\pm$  SD

CD-RISC Connor-Davidson Resilience Scale

**Table 3** Comparison of QLQ-C30 scores between the two groups

| QLQ-C30 scores         |                             | Control group (n = 57) | Observation group (n = 57) | P value |
|------------------------|-----------------------------|------------------------|----------------------------|---------|
| Physical function      | Before nursing intervention | 42.70 ± 1.74           | 42.46 ± 1.56               | 0.429   |
|                        | After nursing intervention  | 53.16 ± 3.84           | 65.89 ± 4.35               | < 0.001 |
| Role function          | Before nursing intervention | 56.46 ± 2.56           | 55.68 ± 2.44               | 0.102   |
|                        | After nursing intervention  | 62.65 ± 3.38           | 74.91 ± 4.59               | < 0.001 |
| Emotional function     | Before nursing intervention | 54.56 ± 2.76           | 53.74 ± 2.13               | 0.077   |
|                        | After nursing intervention  | 64.25 ± 4.33           | 72.12 ± 3.70               | < 0.001 |
| Cognitive function     | Before nursing intervention | 41.30 ± 2.60           | 41.37 ± 2.41               | 0.882   |
|                        | After nursing intervention  | 51.37 ± 3.62           | 69.05 ± 3.96               | < 0.001 |
| Social function        | Before nursing intervention | 64.26 ± 2.57           | 64.91 ± 2.54               | 0.178   |
|                        | After nursing intervention  | 70.81 ± 6.70           | 83.47 ± 3.45               | < 0.001 |
| General health status  | Before nursing intervention | 44.37 ± 3.10           | 45.23 ± 3.09               | 0.141   |
|                        | After nursing intervention  | 65.40 ± 3.20           | 81.79 ± 3.22               | < 0.001 |
| Fatigue                | Before nursing intervention | 36.64 ± 9.29           | 36.53 ± 8.45               | 0.947   |
|                        | After nursing intervention  | 22.53 ± 6.99           | 17.18 ± 7.29               | < 0.001 |
| Nausea and vomiting    | Before nursing intervention | 17.36 ± 7.98           | 17.63 ± 7.51               | 0.853   |
|                        | After nursing intervention  | 12.09 ± 4.75           | 10.94 ± 4.58               | 0.191   |
| Pain                   | Before nursing intervention | 31.07 ± 9.96           | 31.72 ± 11.04              | 0.742   |
|                        | After nursing intervention  | 18.24 ± 4.57           | 15.06 ± 3.65               | < 0.001 |
| Dyspnea                | Before nursing intervention | 18.67 ± 7.03           | 19.02 ± 7.53               | 0.798   |
|                        | After nursing intervention  | 12.02 ± 3.68           | 10.01 ± 3.07               | 0.002   |
| Insomnia               | Before nursing intervention | 36.86 ± 9.58           | 36.61 ± 8.54               | 0.883   |
|                        | After nursing intervention  | 19.01 ± 5.25           | 16.19 ± 3.91               | 0.002   |
| Loss of appetite       | Before nursing intervention | 39.53 ± 11.34          | 39.88 ± 11.05              | 0.868   |
|                        | After nursing intervention  | 22.26 ± 7.11           | 19.93 ± 6.45               | 0.070   |
| Constipation           | Before nursing intervention | 22.35 ± 8.17           | 21.21 ± 7.97               | 0.452   |
|                        | After nursing intervention  | 11.87 ± 4.62           | 10.85 ± 4.29               | 0.224   |
| Diarrhea               | Before nursing intervention | 23.75 ± 7.79           | 23.47 ± 7.60               | 0.846   |
|                        | After nursing intervention  | 12.53 ± 4.59           | 10.88 ± 4.61               | 0.058   |
| Financial difficulties | Before nursing intervention | 45.39 ± 12.37          | 45.44 ± 13.76              | 0.984   |
|                        | After nursing intervention  | 42.89 ± 3.98           | 42.04 ± 3.87               | 0.250   |

Data are presented as mean ± SD

QLQ-C30 European Organization for Research and Treatment of Cancer Quality-of-Life questionnaire-Core 30

**Table 4** Comparison of nursing satisfaction between the two groups

| Satisfaction   | Control group (n = 57) | Observation group (n = 57) | P value |
|----------------|------------------------|----------------------------|---------|
| Very satisfied | 18 (31.58)             | 38 (66.67)                 | 0.016   |
| Satisfied      | 28 (49.12)             | 17 (29.82)                 |         |
| Not satisfied  | 11 (19.30)             | 2 (3.51)                   |         |
| Satisfaction   | 46 (80.70)             | 55 (96.49)                 |         |

Data are presented as n (%)

In this study, the psychological outcome assessed was psychological resilience, which refers to the capacity to maintain or even enhance mental well-being in the face of stress and adversity (Troy et al. 2023). Psychological

resilience is a dynamic framework influenced by biological, psychological, spiritual, and social factors, characterized by adaptability, persistence, and the potential for improvement (Tay and Lim 2020). In this study, psychological resilience was measured using the CD-RISC. The results revealed that RAM-based nursing significantly improved psychological resilience in patients undergoing tumor surgery, as reflected in increased CD-RISC scores (Ding et al. 2022).

Moreover, patients in the observation group exhibited greater improvements across functional dimensions (physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning); symptom dimensions (fatigue, nausea and vomiting, and pain); single symptom items (dyspnea,

insomnia, loss of appetite, constipation, diarrhea, and financial difficulties); and a global health status/quality of life dimension, which showed that structured nursing or rehabilitation interventions significantly improve health-related quality of life in cancer patients. For example, Granger et al. found that home-based exercise after lung cancer surgery enhanced multiple quality of life domains (Granger et al. 2024), and Adams-Campbell et al. reported similar improvements in breast cancer patients undergoing active treatment (Adams-Campbell et al. 2023). Additionally, nursing satisfaction levels were markedly higher, indicating that patients perceived the care received as more personalized, effective, and trustworthy, which likely contributed to improved patient-provider relationships. This is consistent with Fu et al., who showed that continuity of care enhances satisfaction and outcomes among cervical cancer patients (Fu et al. 2024). Together, these findings indicate that combining RAM-based nursing with continuity of care not only improves quality of life but also strengthens patient trust and satisfaction.

In addition to the findings of this trial, existing literature supports the efficacy of RAM-based nursing in cancer patients. For instance, RAM-based nursing has been shown to reduce feelings of shame and negative emotions, improve psychological resilience, enhance rehabilitation quality, boost overall quality of life, and reduce the occurrence of complications (Zheng and Jin 2022). Furthermore, RAM-based interventions have been reported to positively impact the physiological, self-concept, role function, and interdependence modes for women undergoing breast cancer treatment (Erol Ursavas and Karayurt 2021). Another study found that RAM nursing significantly improved postoperative psychological well-being, sleep quality, and nursing satisfaction in patients with early-stage lung carcinoma (Yu et al. 2023). Similarly, continuity of care has demonstrated positive effects on disease monitoring and control in various patient populations. For instance, nurse-led continuity of care plans have been associated with improved quality of life, mental health, self-efficacy, and self-care abilities in patients with coronary artery disease (Posadas-Collado et al. 2022). Additionally, information-based health education combined with continuity of care has enhanced medication adherence and nursing satisfaction in peptic ulcer patients, improving their disease-related knowledge, self-care abilities, quality of life, and psychological well-being (Liu et al. 2021).

Taken together, these findings highlight the complementary nature of RAM-based nursing and continuity of care. While RAM emphasizes the adaptive process of individuals in response to internal and external stimuli,

continuity of care addresses long-term needs through structured follow-up and communication. Their integration enables targeted, holistic care that fosters physical and psychological recovery, improves nursing satisfaction, and promotes more efficient use of medical resources. Future studies may further explore whether RAM-based interventions also contribute to physiological recovery and the alleviation of negative emotions such as anxiety and depression, which could create a positive feedback loop between physical health and psychological well-being.

In conclusion, this study demonstrates that RAM-based nursing integrated with continuity of care significantly improves psychological resilience, enhances quality of life, and increases nursing satisfaction in patients following tumor surgery. Nonetheless, several limitations should be acknowledged. First, the sample size was relatively small, which may introduce bias and limit the generalizability of the results. Second, while short-term outcomes were favorable, the long-term effects of this nursing model remain to be evaluated. Future studies should expand the sample size and include multicenter trials to enhance the reliability and applicability of the findings. Longitudinal follow-up is also warranted to assess the sustainability of intervention effects.

#### Authors' contributions

L.J.Y. finished the study design and the experimental studies, Y.F. finished the data analysis and the manuscript editing. All authors read and approved the final manuscript.

#### Funding

No funds, grants, or other support was received.

#### Data availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

#### Declarations

##### Ethics approval and consent to participate

This study was approved by the ethical committee of Affiliated Tumor Hospital of Harbin Medical University, and all patients provided informed consent. This study was conducted in Heilongjiang Province, China.

##### Consent for publication

The participant has consented to the submission of the manuscript to the journal.

##### Competing interests

The authors declare no competing interests.

##### Author details

<sup>1</sup>Orthopedic surgery, Affiliated Tumor Hospital of Harbin Medical University, Harbin, Heilongjiang Province 150081, China. <sup>2</sup>Disinfection Supply Center, Affiliated Tumor Hospital of Harbin Medical University, No. 150 Haping Road, Harbin, Heilongjiang Province 150081, China.

Received: 23 May 2025 Accepted: 24 September 2025

Published online: 21 October 2025

## References

- Adams-Campbell LL, Hicks J, Makambi K, Randolph-Jackson P, Mills M, Isaacs C, et al. An 8-week exercise study to improve cancer treatment related fatigue and QOL among African American breast cancer patients undergoing radiation treatment: a pilot randomized clinical trial. *J Natl Med Assoc.* 2023;115(2):199–206.
- Ding X, Fang H, Liu Y, Zheng L, Zhu X, Duan H, et al. Neurocognitive correlates of psychological resilience: event-related potential studies. *J Affect Disord.* 2022;312:100–6.
- Erol Ursavas F, Karayurt O. Effects of a Roy's adaptation model-guided support group intervention on sexual adjustment, body image, and perceived social support in women with breast cancer. *Cancer Nurs.* 2021;44(6):E382–94.
- Fu W, Xu Q, Lu H, Yang Y, Zheng Y. Effectiveness of continuity of care in postoperative patients with cervical cancer: a systematic evaluation and meta-analysis of a randomized controlled trial. *Front Oncol.* 2024;14:1461296.
- Granger CL, Edbrooke L, Antippa P, Wright G, McDonald CF, Zannino D, et al. Home-based exercise and self-management after lung cancer resection: a randomized clinical trial. *JAMA Netw Open.* 2024;7(12):e2447325.
- Hu J, Wang Y, Li X. Continuity of care in chronic diseases: a concept analysis by literature review. *J Korean Acad Nurs.* 2020;50(4):513–22.
- King M, Steele Gray C, Kobewka D, Grudniewicz A. Continuity of care for older adults in a Canadian long-term care setting: a qualitative study. *BMC Health Serv Res.* 2022;22(1):1204.
- Li YC. Continuity of care for newly diagnosed diabetic patients: a population-based study. *PLoS ONE.* 2019;14(8):e0221327.
- Li S, Zhu X, Zhang L, Huang C, Li D. The effect of pain-education nursing based on a mind map on postoperative pain score and quality of life in patients with colorectal cancer. *Medicine (Baltimore).* 2023;102(19):e33562.
- Li C, Tao M, Chen D, Wei Q, Xiong X, Zhao W, et al. Transcranial direct current stimulation for anxiety during laparoscopic colorectal cancer surgery: a randomized clinical trial. *JAMA Netw Open.* 2024;7(4):e246589.
- Liu A, Kuang Y, Huang R, Ge Q. Application value of information-based health education and continuity of care in patients with peptic ulcer. *Front Public Health.* 2021;9:694128.
- Liu Q, Li L, Wei J, Xie Y. Correlation and influencing factors of preoperative anxiety, postoperative pain, and delirium in elderly patients undergoing gastrointestinal cancer surgery. *BMC Anesthesiol.* 2023;23(1):78.
- Merlo A, Carlson R, Espey J 3rd, Williams BM, Balakrishnan P, Chen S, et al. Postoperative symptom burden in patients undergoing lung cancer surgery. *J Pain Symptom Manage.* 2022;64(3):254–67.
- Posadas-Collado G, Membrive-Jimenez MJ, Romero-Bejar JL, Gomez-Urquiza JL, Albendin-Garcia L, Suleiman-Martos N, et al. Continuity of nursing care in patients with coronary artery disease: a systematic review. *Int J Environ Res Public Health.* 2022;19(5):3000.
- Rezazadeh M, Hosseini SA, Musarezaie A. Effects of Roy's adaptation model on quality of life in people with opioid abuse under methadone maintenance treatment: a randomized trial. *Ethiop J Health Sci.* 2023;33(2):355–62.
- Seibaek L, Jakobsen DH, Hogdall C. The Danish Gynecological Cancer Nursing Database: creating evidence for quality improvements in preoperative and postoperative cancer care. *Int J Gynecol Cancer.* 2018;28(4):802–7.
- Tay PKC, Lim KK. Psychological resilience as an emergent characteristic for well-being: a pragmatic view. *Gerontology.* 2020;66(5):476–83.
- Tefera M, Assefa N, Roba KT, Gedefa L, Brewis A, Schuster RC. Women's hospital birth experiences in Harar, eastern Ethiopia: a qualitative study using Roy's adaptation model. *BMJ Open.* 2022;12(7):e055250.
- Troy AS, Willroth EC, Shallcross AJ, Giuliani NR, Gross JJ, Mauss IB. Psychological resilience: an affect-regulation framework. *Annu Rev Psychol.* 2023;74:547–76.
- Wang M, Sun Y, Zhang M, Yu R, Fu J. Effects of high-quality nursing care on quality of life, survival, and recurrence in patients with advanced nonsmall cell lung cancer. *Medicine (Baltimore).* 2022;101(37):e30569.
- Yu Z, Jia W, Sun X, Zhang S, Tan J, Feng L. Effect of Roy's adaptation, model-based, perioperative nursing service on patients: a clinical observational study. *Altern Ther Health Med.* 2023;29(1):118–23.
- Zhang J, Guo L, Mao J, Qi X, Chen L, Huang H, et al. The effects of nursing of Roy adaptation model on the elderly hypertensive: a randomised control study. *Ann Palliat Med.* 2021;10(12):12149–58.
- Zheng L, Jin Q. Roy adaptation model-based nursing diagnosis and implementation reduces the sense of shame and enhances nursing outcomes in female patients with breast cancer. *Am J Transl Res.* 2022;14(8):5520–8.
- Zhou K, Wang W, Zhao W, Li L, Zhang M, Guo P, et al. Benefits of a WeChat-based multimodal nursing program on early rehabilitation in postoperative women with breast cancer: a clinical randomized controlled trial. *Int J Nurs Stud.* 2020;106:103565.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.