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ORIGINAL RESEARCH

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Effect of case management based extended care model on mental state and quality of life of breast cancer patients

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Abstract

Background: Breast cancer is the most prevalent cancer among women. Anxiety, depression negatively impact their psychological well-being. Through extended care, and a holistic nursing approach, breast cancer patients may benefit more from this model in terms of psychological well-being and quality of life. This study assessed the impact of the extended care model, based on case management, on the self-management and psychological well-being of breast cancer patients. **Methods**: A retrospective analysis of 96 breast cancer patients' clinical records was conducted based on existing case records. Based on the different care methods recorded, 48 patients were included in the intervention group and 48 in the control group. All patients underwent a modified radical mastectomy. Standard treatment was administered to the control group, whereas the extended care mode intervention of case management was administered to the intervention group. Self-management effectiveness, self-management capacity, mental state, quality of life and patient satisfaction were assessed for both groups. **Results**: After intervention, the intervention group showed significant improvements in the Strategies Used by People to Promote Health (SUPPH) score ($p < 0.05$, −10.445, −6.805; −13.005, −8.286; −7.961, −5.914). The self-care agency scale (ESCA) score was significantly higher in the intervention group than in the control group ($p < 0.05$, −6.357, −2.685; −6.152, −2.307; −5.867, −1.841; −5.700, −3.050). The intervention group also showed significant improvements in Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) scores than the control group ($p < 0.05$, 1.372, 4.294; 0.715, 1.618). The intervention group scored significantly higher on quality of life scores ($p < 0.05$, −4.641, −1.484; −6.097, −2.695; −4.294, −1.831; −6.800, −4.408; −3.989, −1.386). Overall, the intervention group was more satisfied than the control group. **Conclusions**: A case management-based extended care model has shown positive results in improving self-care capabilities and reducing negative mental states in breast cancer patients.

Keywords

Breast cancer; Extended care model based on case management; Self-management; Mental state

1. Introduction

Female breast cancer incidences increase annually due to rising social pressures and unhealthy lifestyle habits [1]. Breast cancer surgery often involves modified radical mastectomy or breast-conserving surgery [2]. Many cancer patients, however, show little involvement in treatment and nursing decision-making, leading to an inadequate understanding of their disease and surgical options. Due to a lack of knowledge, patients have difficulty confronting physical and psychological challenges positively, resulting in depression and anxiety [3, 4]. Therefore, their quality of life deteriorates, health behaviors worsen and adherence to treatment regimens significantly declines [5, 6]. The absence of professional nursing guidance after discharge can also hinder patient recovery and negatively affect prognosis.

Case management mode extended care represents a novel approach that extends care into the home through evaluation, planning, implementation and cooperation [7, 8]. This model allows patients to receive nursing care after discharge, which improves care quality and reduces medical costs [9, 10]. Self-management efficacy describes an individual's ability to plan and act independently in response to health challenges [11]. It involves accurately recognizing and assessing one's health status, possessing the necessary skills and resources, and embracing challenges with an optimistic attitude. A proactive

attitude toward health, better control over chronic disease progression, improved quality of life and greater control over personal health are all associated with high self-management efficacy. Individuals with strong self-management efficacy were more confident in adopting healthier lifestyles, such as quitting smoking, limiting alcohol consumption and adhering to regular exercise, thus improving their overall health [12, 13]. Self-management efficacy is widely applied in chronic diseases clinical management, mental health care, elderly care and other fields. Enhancing self-management efficacy can significantly improve health behaviors, enhance quality of life and reduce healthcare burdens. Consequently, the purpose of this study is to examine the effect of an extended care case management model for patients undergoing chemotherapy after modified radical mastectomy.

2. Materials and methods

2.1 Patient and general information

The sample size was calculated using the formula:

$$n = \pi_t \times (1 - \pi_t) \times \pi_c \times (1 - \pi_c)/[(\pi_t - \pi_c - \Delta)] \times (\mu_{\alpha/2} + \mu_\beta)^2$$

In this retrospective cohort study, fixed variables were evaluated as primary efficacy outcome indicators. An equal (1:1) superiority design was applied, with parameters set to α = 0.025 (one-sided), β = 0.20 (one-sided) and Δ = 5%. Public disclosure calculations calculated a required sample size of 40 patients per group based on these parameters and the primary efficacy outcome indicators. Taking a 20% dropout rate into account, 48 patients were needed per group, resulting in 96 patients in total. A total of 48 patients were enrolled in the study, 48 in the intervention group and 48 in the control group, according to the recorded care methods.

A retrospective analysis was conducted on 96 patients with breast cancer diagnosed. Breast cancer diagnosis according to 2022 National Comprehensive Cancer Network (NCCN) guidelines [14]. All patients were diagnosed with breast cancer by imaging and pathological examination. All patients underwent modified radical mastectomy. They were grouped according to the different care methods recorded, with 48 patients in the intervention group and 48 patients in the control group.

Inclusion criteria: (1) Patients aged 18–70 years. (2) Patients with good cognitive abilities, who can understand the study content and participating in the questionnaire survey. (3) Patients in the postoperative recovery stage, usually within 1 to 6 months after surgery. (4) Patients without severe mental illnesses (such as major depressive disorder, schizophrenia, *etc.*). (5) Patients without severe cardiovascular diseases, liver or kidney insufficiency, or other comorbidities affecting quality of life and psychological state.

Exclusion criteria: (1) Patients with blurred consciousness and mental disorders. (2) Patients diagnosed with additional malignancies. (3) Patients with severe organ dysfunction such as liver and kidney. (4) Patients with poor treatment compliance and who did not actively cooperate.

2.2 Interventions

This retrospective study used existing case records to record the intervention methods. The control group received standard post-mastectomy nursing care, including:

(1) Information Collection: Upon admission, a standardized assessment form was used to collect essential patient information, medical history and treatment plans, ensuring data accuracy and completeness. Educational Materials: Each patient received an education manual regarding the disease, treatment options and postoperative care.

(2) Condition Monitoring and Guidance: A daily monitoring form was implemented to record vital signs, postoperative complications and patient-reported symptoms. To detect any abnormalities, nurses updated the form daily and compared it with previous data. Dietary and Exercise Guidance: To support postoperative recovery, a standardized diet and exercise plan was developed based on the patient's recovery progress.

(3) Humanistic Care: A standardized humanistic care protocol was established, which included regular psychological counseling, companionship services and palliative care Nursing staff were trained in integrating humanistic care principles into practice, ensuring patient-centered care.

(4) Standardized Discharge Guidance: Discharge Guidance Checklist: A discharge checklist was created to outline necessary precautions and follow-up visit schedules. Nursing staff reviewed this checklist with each patient to ensure comprehension and adherence. Distribution of Educational Pamphlets: Upon discharge, educational pamphlets provided follow-up care instructions, common questions and recommendations to maintain a healthy lifestyle. Patients were encouraged to adhere to follow-up visits by these materials, which reinforced key information.

(5) Regular Evaluation and Feedback: Patient satisfaction surveys and postoperative complications were used to assess nursing interventions. To facilitate continuous optimization of nursing practices, a feedback mechanism was developed to collect input from patients and their families.

The intervention group received the same routine care as the control group, with the addition of an extended care mode, including: (1) Build an extended care team based on case management: The team, consisting primarily of breast surgeons and nurses, developed continuous care plans tailored to each patient's needs. The team received ongoing training on patient communication and breast cancer home management. A digital platform was used to collect and manage patient data systematically. (2) Evaluation of data: Upon admission, comprehensive data on each patient's condition and disease progression were collected. Nursing plans for self-care were developed by the head nurse based on an evaluation of risks associated with self-care. (3) WeChat communication channel: A dedicated WeChat channel was set up to facilitate direct communication between nurses and patients, allowing for video consultations, follow-up care and timely intervention. (4) Extended care: Following discharged from hospital, weekly phone interviews were conducted via WeChat on weekends to assess medication adherence, lifestyle habits and

psychological well-being. Diet, medication and lifestyle recommendations were focused on ensuring compliance. Healthy behaviors were also encouraged. Appointments for follow-up hospital visits were arranged for those who needed them. Additionally, nursing staff periodically shared creative home care content with patients. (5) Breast cancer diary recording: Patients were introduced to diary recording before discharge, then guided to document their experiences via WeChat after discharge. The information was promptly integrated into patients' personal medical records. The intervention period for both groups was 3 months.

Specific Intervention Details:

(1) Personalized Health Assessment: At the start of the intervention, a comprehensive health assessment was performed for each patient. The evaluation includes patient's physical condition, psychological state, quality of life and social support. Standardized assessment tools, such as the comprehensive health assessment scale, were used to gather baseline data.

(2) Self-Management Education: A self-management education program was implemented, encompassing the following components: Disease Knowledge: Educating patients about breast cancer, treatment options and prognosis. Self-Monitoring: Instructing patients on how to monitor their symptoms, emotional changes and physical health Emotional Management: Implementing cognitive-behavioral therapy and relaxation techniques to manage anxiety and depression.

(3) Establishing Support Systems: Patient support groups were created to facilitate communication and mutual support among patients. Psychological counseling services were provided, with professional psychologists offering regular psychological guidance.

(4) Lifestyle Guidance: Nutritional guidance was provided to help patients develop a balanced dietary plan aimed at enhancing physical resilience. Physical exercise was also encouraged to improve both physical and mental health, with recommendations on suitable exercise types.

(5) Regular Follow-Up and Feedback: A regular follow-up plan was established (*e.g.*, once a month), with follow-ups conducted via phone calls, WeChat or in-person meetings to monitor patient conditions. Feedback from patients was collected to continuously adjust and optimize the nursing intervention plan.

Questionnaire Administration Methods:

(1) Administration Methods: Face-to-Face Interviews: Patients can respond to questions comfortably and relaxedly during in-person interviews conducted by nurses or researchers. Online Surveys: Patients can fill out online questionnaires using WeChat at their convenience. Participation rates were higher when patients have some technical skills.

(2) Questionnaire Language: The questionnaire was administered in Simplified Chinese to ensure patients can fully comprehend the questions and provide accurate answers.

(3) Validation and Applicability of the Questionnaire: Questionnaire Selection: Validated standardized questionnaires, such as the Self-Efficacy Scale, Self-Rating Depression Scale (SDS) and Functional Assessment of Cancer Therapy (FACT) were used. Validation Process: Before the study, a small-scale pilot survey was conducted to determine if the questionnaire was valid and suitable for assessing breast cancer patients' psychological states and quality of life.

2.3 Primary outcome

This retrospective study used existing case records to record outcome indicators results.

2.3.1 Self-management effectiveness

Strategies used by people to promote health (SUPPH) was used to assess the degree of self-efficacy in breast cancer patients [15]. The scale consists of three main aspects: stress reduction, positive attitude and decision-making. There were 28 items in the survey, ranging from no confidence to little confidence to confident to very confident to very confident. Each item was scored from 1 to 5, resulting in 140 points. Higher scores indicate greater self-efficacy.

Verification method: Reliability and Validity: The reliability of SUPPH was typically assessed through internal consistency (Cronbach's α coefficient) and test-retest reliability. Validity was verified through content validity (expert reviews), construct validity (factor analysis) and criterion validity (correlation with other related scales). SUPPH can be compared before and after a health promotion intervention using a before-and-after controlled experimental design. Relevance to Breast Cancer Patients: SUPPH was primarily used to assess an individual's use of health promotion strategies. During breast cancer treatment, patients must adopt a variety of health behaviors (such as diet, exercise and psychological support). Thus, this scale can be used to assess the self-management abilities of patients.

2.3.2 Self-care ability

A self-care agency scale (ESCA) [16] was used to assess the degree of self-care in patients with primary liver cancer. The scale exhibits high reliability and validity. The scale consists of four main aspects: health knowledge level, self-concept, self-responsibility and self-care skills. It consists of 43 items. Each item was scored from 1 to 4, resulting in 172 points. Higher scores indicate greater sense of self-care.

Verification method: Reliability and Validity: The reliability of ESCA was also evaluated through Cronbach's α coefficient and test-retest reliability. Validity was verified through expert reviews, factor analysis and correlation analysis. Clinical trials can classify patients with different self-care abilities and observe performance differences during treatment.

Relevance to Breast Cancer Patients: Breast cancer patients' self-care during treatment directly affects their disease management and quality of life. During treatment, breast cancer patients' ability to self-care directly affects their disease management and quality of life. An ESCA evaluates the patient's ability and initiative to manage their disease, indicating their health status overall.

2.3.3 Anxiety and depression

The self-rating anxiety scale (SAS) was utilized to assess anxiety levels [17]. SAS includes 20 items aimed at assessing anxiety symptoms over the past week. Scoring: A 4-level scoring system (usually 0–3 points) was used, corresponding to different degrees of anxiety (*e.g.*, from "none" to "severe").

Cutoff Value: SAS clinical cutoff value was 50 points. Significance of the Cutoff Value: Normal anxiety levels were differentiated from clinically significant anxiety levels using a cutoff value of 50. Individuals scoring above this threshold were generally considered to have significant anxiety issues and may require further evaluation or intervention. The patient may need professional mental health support if the score exceeds 50, while a score below this value indicates a normal anxiety level.

Derivation Process. Standardization and Validation: SAS cutoff value was derived from large-scale population studies and clinical trials. The optimal cutoff value was determined by comparing scores between different groups (*e.g.*, healthy individuals versus those with anxiety symptoms) using statistical methods (such as receiver operating characteristic (ROC) curve analysis). Clinical Experience: In setting the cutoff value, clinical observations and experience were combined with psychological theory to ensure clinically relevant anxiety levels were identified.

The self-rating depression scale (SDS), consisting of 20 questions, was utilized to assess depression levels [18]. SDS contains 20 questions designed to assess symptoms of depression. Scoring: A 4-point scoring method was used, with a scoring range similar to that of the SAS. Cut-off value: SDS critical value was 53 points. Significance of the cut-off value: The cut-off value of 53 points was used to differentiate the severity of depressive symptoms; individuals scoring above this value may face significant depressive issues. Inverse correlation: A higher score on the SDS indicates a lower level of depression, as the total score inversely correlates with depression. A score above 53 was considered normal, while a score below 53 may indicate depression. Derivation process. Standardization and validation: SDS cut-off value was derived from research and statistical analysis conducted on different populations. A large sample size analysis helped determine what scores were clinically significant depressive symptoms based on the distribution characteristics of the scores. Clinical research support: Studying clinically depressed patients has also established the critical value of identifying those requiring further assessment and treatment.

2.3.4 Quality of life

Functional Assessment of Cancer Therapy-Breast [19] (FACT-B) was used to evaluate the quality of life in both groups before and after care, including biological, family and social, emotional, functional and additional attention. The table includes a general generality scale and an additional specific module, which were divided into 7 physiological items, 7 family and social items, 6 emotional items, 7 functional items and 9 breast cancer additional items, with a total of 36 items, each item 0~4 points, total 0~144 points. Vital mass increases as the score increases. Verification method: Reliability and validity: FACT-B reliability was verified through internal consistency (Cronbach's α) and test-retest reliability. Validity was confirmed through expert reviews and factor analysis to assess its reasonable structure. Clinical application: FACT-B was used with breast cancer patients to obtain quality of life scores and compare them across different treatment stages (such as surgery, chemotherapy, radiation therapy, *etc.*) to evaluate its sensitivity.

Relevance to breast cancer patients: Comprehensive assessment of quality of life: FACT-B was specifically designed to assess the quality of life of breast cancer patients in terms of physical, psychological, social and functional aspects, providing a comprehensive reflection of the patient's health status.

2.3.5 Satisfaction

Newcastle nursing service satisfaction scale (NSNS) was used to assess nursing satisfaction among both groups [20]. Nursing experience, nursing satisfaction and patients' basic information, as well as overall satisfaction with nursing during hospitalization, constitute the three components of NSNS. This study focused on the second part, which evaluates patients' satisfaction with nursing. Nursing satisfaction includes 19 statements, with response options on a 5-point Likert scale ranging from "completely satisfied" to "completely dissatisfied". Analyzing the responses helps determine a total satisfaction score within a range of 0–100. 100 reflects complete satisfaction with all aspects of nursing, and 0 indicates dissatisfaction with any aspect of nursing. Below 60 indicates dissatisfaction, 60–69 indicates general satisfaction, 70–89 indicates satisfaction, and 90 or above indicates complete satisfaction. Overall satisfaction = (general satisfaction + satisfaction + complete satisfaction) cases/total cases $\times$ 100%.

2.4 Statistical analysis and results interpretation

Data analysis was performed using SPSS 22.0 (IBM, Armonk, NY, USA) and GraphPad Prism 8.0.2 (GraphPad Software Inc., San Diego, CA, USA). Normal distribution continuous data were presented as $\bar{x} \pm s$, with between-group comparisons performed using independent *t*-tests. Paired-sample *t*-tests were used for the within-group comparisons. Data with skewed distributions or unequal variances were analyzed using the Mann-Whitney U test and expressed as the median (M) with an interquartile range (P25, P75). Categorical data were presented as counts and percentages (%), with chi-square test or Fisher's exact test used to determine group differences. $p < 0.05$ indicates statistically significant differences.

3. Results

3.1 Clinical data

General information of both groups were shown in Table 1.

3.2 Self-management efficacy

Both groups scored similarly prior to nursing in terms of all dimensions ($p > 0.05$). Significant difference in SUPPH score after intervention ($p < 0.05$, Table 2).

3.3 Self-care ability

Both groups scored similarly before intervention in terms of all dimensions ($p > 0.05$). ESCA scores increased significantly after intervention ($p < 0.05$, Table 3).

TABLE 1. Comparison of clinical data between both groups.

Project	Control group (n = 48)	Intervention group (n = 48)	t/χ^2	p
Age (yr)	49.56 ± 6.26	48.19 ± 8.00	0.938	0.351
Marital status				
Married	44 (91.67%)	41 (85.42%)	0.924	0.336
Unmarried	4 (8.33%)	7 (14.58%)		
BMI (kg/m^2)	22.86 ± 2.70	22.02 ± 1.73	1.823	0.071
CA153 at diagnosis (U/mL)	56.96 ± 6.04	54.56 ± 6.05	1.939	0.056
Staging of carcinoma				
Stage Ia	6 (12.50%)	5 (10.42%)	0.706	0.872
Stage Ib	21 (43.75%)	24 (50.00%)		
Stage IIa	18 (37.50%)	15 (31.25%)		
Stage IIb	3 (6.25%)	4 (8.33%)		

BMI: Body Mass Index; CA: Cancer Antigen.

TABLE 2. Comparison of self-management efficacy between both groups (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Intervention group (n = 48)	t	p
Stress relief					
	Before intervention	22.31 ± 2.83	22.81 ± 3.32	0.794	0.429
	After intervention	26.10 ± 3.38*	34.73 ± 5.36*	9.433	<0.001
Positive attitude					
	Before intervention	31.65 ± 5.72	31.42 ± 4.30	0.222	0.825
	After intervention	37.50 ± 5.38*	48.15 ± 6.23*	8.958	<0.001
Decision-making					
	Before intervention	7.10 ± 1.73	7.63 ± 1.45	1.598	0.113
	After intervention	8.04 ± 1.54*	14.98 ± 3.20*	13.533	<0.001

*Note: *Compared to before intervention, the same group showed a $p < 0.05$ after intervention.*

TABLE 3. Comparison of self-care ability between the two groups (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Intervention group (n = 48)	t	p
Self-cognition					
	Before intervention	18.21 ± 5.50	19.10 ± 3.83	0.927	0.356
	After intervention	21.77 ± 4.20*	26.29 ± 4.84*	4.890	<0.001
Self-responsibility					
	Before intervention	18.27 ± 3.86	17.56 ± 2.66	1.048	0.297
	After intervention	20.63 ± 4.92*	24.85 ± 4.56*	4.368	<0.001
Health knowledge					
	Before intervention	22.04 ± 6.83	23.21 ± 3.57	1.048	0.297
	After intervention	24.83 ± 4.34*	28.69 ± 5.52*	3.801	<0.001
Self-care skill					
	Before intervention	17.38 ± 2.99	16.67 ± 2.55	1.247	0.215
	After intervention	20.56 ± 3.13*	24.94 ± 3.40*	6.556	<0.001

*Note: *Compared to before intervention, the same group showed a $p < 0.05$ after intervention.*

3.4 Anxiety and depression

SAS and SDS scores did not differ statistically between both groups before nursing ($p > 0.05$). SAS and SDS scores were significantly lower in the intervention group after nursing ($p < 0.05$, Table 4).

3.5 Quality of life

A significant improvement in quality of life was observed in the intervention group when comparing physiological function, somatic pain, social functioning and mental health ($p < 0.05$, Table 5).

3.6 Satisfaction

In general, the intervention group was significantly more satisfied than the control group ($p < 0.05$, Table 6).

4. Discussion

Breast cancer is the leading cause of malignant tumors among Chinese women, and its prevention and treatment remain critical [21]. Surgery is the primary treatment for breast cancer, with modified radical mastectomy being the most effective procedure for extending survival [22]. Secondary sexual characteristics are altered by this procedure, resulting in physical and psychological distress for patients [23]. The lack of understanding of a patient's disease and surgical treatment, as well as self-management skills, reduce the chances of recovery and lower quality of life [24]. Therefore, extended nursing care outside the hospital is necessary for disease control and long-term prognosis management [25].

Routine nursing typically includes postoperative guidance, health education and instructions on postoperative care to promote healthy behaviors and recovery. Conventional nursing approaches, however, tend to overlook patients' mental health, which leads to poor outcomes. Negative emotions, such as anxiety and depression, are not adequately addressed, resulting in low moods and unhealthy behaviors [26].

Cancer patients are often stressed and emotionally upset, which negatively impacts their adherence to medication [27]. Prolonged treatment cycles, high recurrence rates and long-term chemotherapy contribute to anxiety, depression and other emotional challenges that adversely affect prognosis [28]. The lack of systematic psychological assessment tools and methods makes traditional care models inadequate at addressing patients' psychological needs. The nursing profession prioritizes physical symptoms and treatment protocols over emotional concerns, resulting in insufficient mental health interventions. Further, conventional nursing practices typically follow standardized procedures and do not tailor care to each patient's individual needs. This lack of personalized care, combined with the absence of a multidisciplinary approach that includes psychologists, social workers and other specialists, further limits comprehensive psychological support.

Routine care is typically limited to in-hospital services, with support discontinuing after patients are discharged, preventing continuous care. A case management-based extended care model is a targeted nursing approach tailored to patients' individual needs, which may include family-based care. This model aims to improve patients' self-care abilities and quality of life. A case-management-based rehabilitation model, on the other hand, improves clinical outcomes, improves patients' quality of life and enhances self-management capabilities [29]. Using the case management model, individualized care plans are created that meet each patient's physical and psychological needs, improving quality of life overall. This model emphasizes collaboration within a multidisciplinary team, including doctors, nurses, psychologists, dietitians and physical therapists. By addressing the patient's physical, psychological and social needs in a comprehensive way, the model enhances well-being. It also encourages patients to take an active role in their care, fostering a better understanding of their condition and treatment plan, which improves self-management. Patients are assisted in setting personal self-management goals by the care team, who provide feedback and support. Patients' confidence and accomplishment in managing their health are enhanced by achieving these goals. Family, friends and therapists are also included in the case management model, which contributes to a more positive attitude and more effective self-management. We found a significant increase in SUPPH and ESCA scores in breast cancer patients with an extended care model compared to the control group, indicating substantial improvements in self-management efficacy and capacity to self-care. Patients' quality of life, anxiety and depression improved significantly compared to the control group. Quality of life is currently a key metric for assessing tumor treatment efficacy in European and American cancer research institutions [30]. Case management-based extended care mode offers continuous, individualized

TABLE 4. Comparison of SAS and SDS scores between both groups (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Intervention group (n = 48)	t	p
SAS scores					
	Before intervention	21.20 ± 4.56	20.54 ± 3.88	0.772	0.442
	After intervention	17.27 ± 3.55*	14.44 ± 3.66*	3.851	<0.001
SDS scores					
	Before intervention	6.31 ± 1.32	6.58 ± 1.22	1.043	0.299
	After intervention	4.67 ± 1.28*	3.50 ± 0.92*	5.130	<0.001

*Note: *Compared to before intervention, the same group showed a $p < 0.05$ after intervention.*
SAS: Self-Rating Anxiety Scale; SDS: Self-Rating Depression Scale.

TABLE 5. Comparison of quality of life between both groups (points, $\bar{x} \pm s$).

Groups	Time	Control group (n = 48)	Intervention group (n = 48)	t	p
Biological					
	Before intervention	18.48 ± 3.39	18.98 ± 2.89	0.778	0.439
	After intervention	20.10 ± 3.27*	23.17 ± 4.43*	3.856	<0.001
Family and social					
	Before intervention	13.21 ± 3.05	13.85 ± 2.88	1.067	0.289
	After intervention	14.73 ± 3.40*	19.13 ± 4.85*	5.139	<0.001
Emotional					
	Before intervention	15.10 ± 2.97	15.40 ± 2.54	0.517	0.606
	After intervention	16.48 ± 2.59*	19.54 ± 3.43*	4.938	<0.001
Functional					
	Before intervention	8.88 ± 1.61	9.40 ± 1.33	1.729	0.087
	After intervention	11.94 ± 3.26*	17.54 ± 2.61*	9.303	<0.001
Additional attention					
	Before intervention	21.17 ± 3.40	21.79 ± 3.06	0.946	0.347
	After intervention	24.60 ± 3.17*	27.29 ± 3.25*	4.100	<0.001

*Note: *Compared to before intervention, the same group showed a $p < 0.05$ after intervention.*

TABLE 6. Comparison of satisfaction between both groups.

Groups	n	Complete satisfaction	Satisfaction	General satisfaction	Dissatisfaction	Overall satisfaction
Control group	48	11 (22.92%)	18 (37.50%)	6 (12.50%)	13 (27.08%)	35 (72.92%)
Intervention group	48	27 (56.25%)	10 (20.83%)	8 (16.67%)	3 (6.25%)	45 (93.75%)
χ^2						6.075
p						0.014

care that integrates education, planning, evaluation, communication and monitoring. Providing whole-process care, from hospital to home, extended care ensures comprehensive treatment and support [31]. Consultations with medical staff enable patients to actively cooperate and communicate, rationally allocate resources, reduce medical costs and improve quality of care, all while meeting individual patient needs.

The introduction of an out-of-hospital communication channel via WeChat, particularly through one-on-one communication between nurses and patients, represents an innovative approach to patient care. However, its implementation faces a number of challenges and limitations: (1) Technical Access Issues: (A) Network Stability: Poor network coverage may affect the quality of video calls and create communication difficulties for some patients. (B) Device Compatibility: Some patients do not own smartphones or are familiar with WeChat, especially elderly patients. (2) Patient Preferences: (A) Communication Method Preferences: Especially when dealing with complex issues or emotional support, some patients prefer face-to-face communication. (B) Patients' comfort level and acceptance of technology can be greatly influenced by their age and cultural background. In general, younger patients are more adaptable, while older patients rely more on traditional communication methods.

While WeChat as an out-of-hospital communication channel can enhance nursing efficiency and patient satisfaction, hospitals and nurses must carefully evaluate this approach. To optimize patient satisfaction, technical solutions must be implemented to ensure seamless communication.

Lili L's study, which involved 176 patients divided into an intervention group and a control group, demonstrated the effectiveness of an integrated medical-nursing extended care model. The control group received conventional care, while the intervention group received extended care. The intervention group had significantly higher quality of life scores and better medication adherence than the control group [32]. These findings suggest that the extended care model, providing comprehensive and individualized care after discharge may improve treatment outcomes and enhance patients' quality of life. It is consistent with the results of the present study. Case management-based extended care mode significantly improved patient satisfaction as compared to the control group. The model promotes long-term communication between patients and trusted nurses, improving nursing efficiency and nurse-patient cooperation [33]. Nurses and patients trust plays a pivotal role in enhancing patient satisfaction and improving treatment outcomes. We have implemented the following strategies to achieve this: (1) Building Trust Rela-

tionships: Nurses can cultivate trust by engaging in effective communication and actively listening to patients' needs and concerns, ensuring patients feel valued and understood. Trust is naturally developed when patients perceive that the nurse is attentive and professional. Nurses' expertise and skill further enhance patient confidence. As patients receive care, they observe the nurse's professional performance, which strengthens their trust in nursing. Beyond medical support, nurses also offer emotional care throughout the caregiving process. (2) Trust Impact on Patient Satisfaction: (A) Enhancing Patient Engagement: When patients trust their nurses, they are more likely to engage actively in their care, expressing their opinions and needs. Participation enhances patient satisfaction and contributes to the development of more personal and effective care plans. (B) Improving Compliance: Trust encourages patients to follow nurses' recommendations. Patients comply better with treatment when they are trusted, leading to better treatment outcomes and quality of life. (C) Reducing Anxiety and Discomfort: A trusting relationship alleviates patients' fears about their illness and treatment, reducing psychological burdens. Psychological relief increases patient satisfaction overall. (3) Trust Impact on Treatment Outcomes: (A) Improving Psychological Well-being: Mental health improves significantly in a trusting environment, including reductions in anxiety and depression. This not only enhances their quality of life but also provides a strong psychological foundation for treatment. (B) Facilitating Recovery: Patient motivation and confidence in recovery are boosted with a trusting nursing relationship. Positive mental states often lead to faster physical recovery. (C) Enhancing Quality of Life: Trust enhances patient satisfaction and safety during their care, ultimately improving their quality of life. For breast cancer patients, enhancing mental well-being and overall quality of life are crucial objectives throughout the treatment journey.

Several factors can significantly influence outcomes for breast cancer patients: (1) Social Support: Patients' psychological well-being and quality of life are influenced by the support of family, friends and healthcare providers. (2) Education Level: Higher-educated patients are often more receptive to self-management education, which enhances their ability to manage their health. (3) Timely Psychological Intervention: Psychological support immediately after surgery can significantly reduce negative emotions and improve psychological well-being.

This study has several limitations: There was insufficient examination of patients' basic medical history, including any underlying conditions, due to the small sample size. The small sample size and single-center design may limit the generalizability of the findings. In addition, research on the factors influencing patient recurrence rates is lacking. A supplementary data analysis in this area would provide valuable insight into how these two approaches impact recurrence in such patients. To improve surgical and clinical management, further investigation is needed into the risk factors for postoperative complications. The sample size for future studies should be increased, demographic data should be incorporated and multicenter designs should be used. For the purpose of improving the accuracy and comprehensiveness of the findings, further research should be conducted regarding risk factors for postoperative complications and recurrences.

The extended case management model has been shown to positively impact medication adherence in patients with chronic heart failure, leading to improved heart function, reduced readmission rates and enhanced daily living capabilities [34]. Patient outcomes are improved through this holistic approach as well as long-term benefits. Further, the findings suggest that the extended case management model may be useful for a broader range of patients.

5. Conclusions

In conclusion, extended care models based on case management benefit breast cancer patients. By improving self-efficacy and health management ability, it ultimately improves quality of life.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

WZL, LLZ—designed the study and carried them out; prepared the manuscript for publication and reviewed the draft of the manuscript. WZL, TL, YP, CYH, QYZ—supervised the data collection; analyzed the data; interpreted the data. All authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of Taizhou Central Hospital of Zhejiang Province (Taizhou University Hospital) (Approval no. 2022-SC-073). Written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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