Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

# Family-Centered Empowerment Model Influencing Quality of Life and Self-Efficacy of Patients with cancer undergoing chemotherapy Undergoing Chemotherapy

**Fatemeh Shakeri**
Fasa University of Medical Sciences
**Pezhman Bagheri**
Fasa University of Medical Sciences
**Azam Zare**
a.zare2002@gmail.com
Fasa University of Medical Sciences
**saeedeh Jafarzadeh**
Fasa University of Medical Sciences

**Research Article**

**Keywords:** Family-centered empowerment model, Self-efficacy, Quality of life, Cancer, Chemotherapy

**Posted Date:** November 10th, 2026

**DOI:** https://doi.org/10.21203/rs.3.rs-10845128/v1

**License:** This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

**Additional Declarations:** No competing interests reported.

## Abstract

# Background

Patients with cancer undergoing chemotherapy experience a range of physical and psychological complications that may adversely affect their self-efficacy and quality of life (QoL). The family-centered empowerment model (FCEM), which emphasizes the active participation of patients and their family caregivers in the care process, may help improve these outcomes. This study aimed to determine the effect of the FCEM on QoL and self-efficacy among patients with cancer undergoing chemotherapy at Shariati Hospital, Fasa, Iran, in 2024.

# Methods

In this randomized clinical trial, 80 patients with cancer undergoing chemotherapy at Shariati Hospital, Fasa, were randomly assigned to intervention (n = 40) and control (n = 40) groups. At baseline, participants completed validated QoL and self-efficacy questionnaires. Patients in the intervention group, together with their family caregivers, participated in an FCEM-based intervention consisting of four stages: perceived threat; promotion of self-efficacy and problem-solving; promotion of self-confidence and self-control through educational participation; and implementation and evaluation. The control group received routine care. QoL and self-efficacy were assessed at baseline, immediately after the intervention, and 2 months after the intervention. Data were analyzed using appropriate statistical tests and linear mixed-effects models to examine the effects of group, time, and the group-by-time interaction.

# Results

QoL and self-efficacy scores increased significantly across the three assessment points in the intervention group ($P < 0.001$). The intervention group also had significantly higher QoL and self-efficacy scores than the control group. Linear mixed-effects model analyses demonstrated significant effects of group, time, and the group-by-time interaction for both QoL and self-efficacy ($P < 0.001$). The group-by-time interaction was significant for QoL ($F = 18.983$, $P < 0.001$) and self-efficacy ($F = 29.863$, $P < 0.001$), indicating significantly different patterns of change between the intervention and control groups over time.

# Conclusions

The FCEM significantly improved QoL and self-efficacy among patients with cancer undergoing chemotherapy. Incorporating a family-centered empowerment intervention into supportive cancer care may enhance patients' self-efficacy and QoL and may provide a feasible approach to involving family caregivers in the care of patients receiving chemotherapy.

## Introduction

Cancer involves uncontrolled proliferation of malignant cells having the potential to metastasize to other parts of the body and is one of the most common growing diseases taking remarkable efforts by healthcare

systems(1) Despite recent advances in science and technology, cancer is the second leading cause of death in the United States. In Iran, cancer is the third leading cause of death, and it is estimated that over 40,000 individuals die from cancer annually and more than 70,000 new cases of cancer occur(2). There are various strategies for treating cancer, including surgery, hyperthermia, biological therapies, radiation therapy, chemotherapy, and hematopoietic stem cell transplantation, each of which has therapeutic and palliative approaches with side effects. Among these treatments, chemotherapy is the most common treatment method with high efficacy in promoting survival rates in cancer patients, which is often accompanied by side effects(3). Thus, it is required to be managed properly, and this needs the empowerment of patients with cancer undergoing chemotherapy living through chemotherapy and their self-efficacy in personal and therapeutic care(4).

Self-efficacy emphasizes an individual's perception of their skills and abilities to successfully perform a competent function(5). The concept of self-efficacy was first introduced by Albert Bandura, referring to it as "an individual’s capacity to successfully perform specific tasks and the expectation of being able to successfully execute a particular behavior." This concept overshadows the individual’s amount of effort and level of performance. Self-efficacy is also an important internal factor for the long-term control of chronic diseases. Self-efficacy is an essential factor for influencing self-care behaviors in patients. The patients equipped with better self-efficacy manage their own care better(6). Research on cancer patients reported that the interventions for increasing the sense of self-efficacy have boosted the efficiency of the treatment process and reduced the symptoms(7). Although chemotherapy is an important treatment method for cancer patients, it leads to numerous side effects affecting the patient's level of performance and even withdrawing to complete the treatment course. In this respect, it is particularly crucial to identify the level of self-efficacy of chemotherapy-subjected patients for self-care and its related factors. By identifying its pertinent factors, it is viable to expand the necessary interventions to strengthen self-efficacy and consequently, participate in self-care in such patients. This is because higher perceived self-efficacy raises cancer patients’ adaptation to their disease and enhances the QoL and reduces psychological distresses and enhances the emotional states of the patients(8).

Suffering from cancer is a very troublesome and unimaginable experience for every individual, affecting various aspects of patients’ QoL, including their mental, psychological, social, economic, and physical functioning. Therefore, dealing with the QoL in the studies on chronic diseases, especially cancer, is regarded of important medical and care indicators worldwide. Quality of life is the degree to which individuals feel about their potentials in terms of physical, emotional, and social functions (9). Today, the QoL has been proposed as part of the criteria for evaluating cancer treatment. What matters for the patient and their family, in addition to the conventional cancer treatments like chemotherapy, is not only boosting the QoL, but also guaranteeing that the patient has decent QoL regardless of their lifespan. Most studies done on cancer patients’ QoL indicate deficient QoL for these patients. Pursuant to the evidence, many factors can reduce the QoL of cancer patients, by identifying which, schemes can be developed to promote such patients’ QoL. The issues commonly affecting the patients with cancer undergoing chemotherapy’ QoL involve long-term treatments and high levels of stress, including the psychological, emotional, physical, social, and economic impacts of the disease and diagnostic and therapeutic procedures(10). Although medical interventions are effective in changing the QoL, some of these changes are related to demographic, social, psychological, and cultural characteristics. Consequently, perceiving the QoL relevant concerns for such patients and the factors associated with the QoL is a significant

priority for health practitioners and can work out as efficient in treatment-related decision-making. On the other hand, because chemotherapy has side effects, it can negatively affect the QoL. For this reason, the critical aspect of care provision for such patients is to pay attention, evaluate, and enhance the QoL, and patient empowerment results in the QoL enhancement, accountability, better interaction with health care workers, satisfaction, response to treatment, the prevention of complications, the reduction of medical costs, and a positive attitude towards the disease (11).

In the last two decades, the number of families providing care for chronic patients has shown a growing trend. Families are the most valuable and vulnerable source for chronic diseases suffering patients, and they play a fundamental role in supporting their patients(12). Without family participation, providing care, even a high level of specialized skill, can have its own positive impacts in some areas but negative effects in others. Thus, health educators stress empowerment measures as a key practical approach to enhancing the health of patients and their families. Empowerment is defined as involving clients and their families in decision-making for health and well-being(13). The concept of empowerment has been employed in providing care for chronic patients since 2003. Many experts assume that empowerment is a dynamic, positive, interactive, and social process, a process which is formed in connection with others and leads to improved QoL of those with chronic diseases, accountability, better interaction with health care providers, more satisfaction with treatment response, preventing the due complications, treatment cost reduction, and a positive attitude towards the disease (14). That is why, in recent years, the concept of patient empowerment has achieved a unique position in medical and nursing research. The family-centered empowerment model (FCEM) was designed by Alhani for chronic patients in Iran, Tarbiat Modarres University, and has been implemented on various diseases. The major goal the family-centered empowerment model(FCEM) pursues is to empower the patient's family system and other family members in order to promote health (15). The FCEM concentrates on the role of the individual and other family members in the motivational and psychological dimensions (self-confidence, self-control, and self-efficacy) and promotes conscious efforts of individuals to take care of themselves, their family, and society in order to take responsibility for promoting and maintaining their own and others' health(5). Empowerment involves the participation and organization of community members to pave the ground for environmental changes, so that they get effective in developing problem-solving strategies, and in such a community, individuals believe that they are capable of creating change. As an important concept, self-efficacy is required to outline the community-based care effect on family caregivers(16). Due to the increasing need for relative caregivers, the quality of life and self-efficacy should be taken as the variables in the studies on relative caregivers of chronically ill patients. Many factors such as personal knowledge, physical status, self-confidence, interpersonal environment, the available time, task complexity, and stress can affect self-efficacy and the resulted behavior(17). And the interventions to empower and build up the sense of self-efficacy have positive outcomes in boosting the self-efficacy of cancer patients(18). Various studies have revealed how important and effective family-centered care schemes are in providing optimal care for patients. Yousefi et al. (2022), in "Investigating the Effect of Family-Centered Empowerment Model on Fatigue in Patients Undergoing Chemotherapy," reported that empowering family members responsible for caring patients with cancer undergoing chemotherapy reduced their level of fatigue(1). The results of the study by Bashagh et al. (2022) showed that educating the family through the FCEM led to raising mothers' caregiving knowledge and prevented chemotherapy complications in children(19)

. Another research done by Nasri et al. (2020) found that FCEM can affect the self-care potential of patients with colorectal cancer (17).Moreover, Mulyana et al. (2023) indicated online interventions of family empowerment having a positive effect on increasing all areas of empowerment (20). The results of the study by Abdul Salam et al. (2023) displayed that mothers' knowledge and performance got boosted significantly after implementing the FCEM compared to executing the family empowerment plan before (21).

Previous research among patients with cancer has shown that interventions aimed at enhancing self-efficacy and quality of life may improve treatment-related outcomes and reduce symptoms (17). Therefore, identifying factors associated with self-efficacy among patients undergoing chemotherapy is important for developing interventions that promote self-care and quality of life. Given the substantial burden of cancer and its associated complications, empowering patients to actively participate in their care is an important component of supportive cancer care. Family-centered empowerment interventions may provide an appropriate approach because they involve both patients and family members in the process of education, problem-solving, and self-care. The FCEM, in particular, has been developed to promote health-related knowledge, attitudes, self-efficacy, and quality of life through active participation of patients and their families.

Despite growing evidence supporting family-centered empowerment interventions in cancer care, evidence regarding the effectiveness of the FCEM on both quality of life and self-efficacy among adults undergoing chemotherapy remains limited. Previous studies have primarily examined other outcomes among patients with cancer or chronic diseases, caregiver-related outcomes, or the association between empowerment and individual components of quality of life and self-efficacy. Moreover, limited evidence is available regarding the longitudinal effects of a structured FCEM intervention on both patient-reported quality of life and self-efficacy among adults undergoing chemotherapy. Differences in social, cultural, and healthcare contexts may also influence these outcomes and the effectiveness of empowerment interventions.

Therefore, this randomized clinical trial aimed to evaluate the effect of the family-centered empowerment model on quality of life and self-efficacy among patients with cancer undergoing chemotherapy at Shariati Hospital, Fasa, Iran, in 2024. Outcomes were assessed at baseline, immediately after the intervention, and two months after the intervention to examine both the immediate and sustained effects of the intervention.

## Materials and Methods

# Study Design and Setting

This randomized, two-arm, parallel-group clinical trial was conducted to evaluate the effect of the Family-Centered Empowerment Model (FCEM) on quality of life (QoL) and self-efficacy among patients with cancer undergoing chemotherapy. The study was conducted in the Oncology Department of Shariati Hospital, Fasa, Iran, in 2024. The study outcomes were assessed at three time points: before the intervention (baseline), immediately after the intervention, and two months after completion of the intervention.

## Participants

Patients were eligible for inclusion if they met the following criteria: aged 30–60 years; having a confirmed diagnosis of cancer for at least two months; currently receiving chemotherapy; having an active family member

or primary family caregiver who was able and willing to participate in the intervention; absence of debilitating malignant complications; ability to communicate verbally; ability to read and write; willingness to participate in the study; and absence of other chronic diseases.

Participants were excluded if they experienced clinical deterioration during the study, underwent a change in their treatment regimen, missed more than one intervention session, or expressed unwillingness to continue participation.

Following approval by the Deputy of Research and Technology and the Ethics Committee of Fasa University of Medical Sciences, the required ethical approval and official letter of introduction were obtained.

The researcher subsequently referred to the Oncology Department of Shariati Hospital, Fasa, and obtained permission from the hospital authorities to conduct the study. The study objectives and procedures were explained to eligible participants, and written informed consent was obtained before enrollment.

At baseline, participants in both the intervention and control groups completed the QoL and self-efficacy questionnaires. The control group received routine oncology care throughout the study period. The same outcome measures were administered to participants in both groups immediately after the intervention and again two months later.

## Sample Size Calculation

The required sample size was determined based on the findings of a previous study by Masoudi et al.(5). The calculation was performed using a two-sided significance level of 0.05, a statistical power of 80%, a standard deviation of 10.23, and a minimum detectable difference of 6.7 between the two groups. Considering the possibility of participant attrition and to maintain adequate statistical power, 40 participants were allocated to each group, resulting in a total sample size of 80 participants.

Participants who met the eligibility criteria were randomly allocated in a 1:1 ratio to either the intervention or control group. Randomization was performed using randomization method.

The sample size was calculated using the following formula

$$N = \frac{2(Z_{1-\alpha/2} + Z_{1-\beta})^2 \delta^2}{d^2}$$

Z 1-α/2 = 1.96, (1-β) = 0.80, =10.23, d = 6.7

The calculation yielded 36.56 participants per group. Therefore, the minimum required sample size was rounded up to 37 participants per group (74 participants in total). To allow for potential attrition and to increase the statistical power of the study, 40 participants were recruited for each group, resulting in a total sample of 80 participants.

The FCEM intervention was developed based on the four stages of the empowerment model and implemented according to a predefined training protocol. In the first stage (perceived threat), the educational sessions were conducted in groups of 10 participants, consisting of five patients and their respective primary family caregivers. These sessions were conducted by the researcher in a hospital meeting room using educational aids, including a whiteboard, projector, and PowerPoint presentations. The sessions included discussion, exchange of opinions, and question-and-answer activities to enhance patients' and caregivers' awareness and understanding of the disease and its potential complications. After completion of the first stage, the subsequent stages of the intervention were conducted individually for each patient–caregiver dyad (one patient and one primary family caregiver). This approach was repeated for successive groups until all 40 patients in the intervention group and their family caregivers had completed all stages of the FCEM intervention. The sessions were held at 5-day intervals, and each session lasted approximately 40–60 minutes. Throughout the intervention, both the patient and primary family caregiver participated in the sessions, while the researcher served as an educator, facilitator, and supporter.. The FCEM consisted of four core stages: (1) perceived threat, (2) promoting self-efficacy through problem-solving, (3) promoting self-confidence and self-esteem through educational participation, and (4) implementation and evaluation.

**1. First Stage: Perceived Threat**

The first stage of the FCEM aimed to increase patients' and family caregivers' perceived severity and susceptibility to the disease. Perceived severity refers to an individual's awareness and recognition of the seriousness of the disease and its potential risks and complications. To increase patients' and family caregivers' awareness and understanding, group-based educational sessions were conducted for groups of 10 participants, consisting of five patients and their respective primary family caregivers. Two sessions, each lasting 40–60 minutes, were conducted by the researcher in a hospital meeting room using educational aids, including a whiteboard, projector, and PowerPoint presentations. The educational content included the nature of the disease, symptoms, potential complications, prognosis, dietary recommendations, treatment regimen, physical activity, and relevant laboratory tests. The sessions were conducted through discussion, exchange of opinions, and question-and-answer activities. At the end of each session, questions and answers were used to assess participants' understanding of the educational content. Patients and family caregivers were encouraged to actively participate in the discussions, and their disease-related problems were identified, discussed, and prioritized.

**2. Second Stage: Promoting Self-Efficacy Through Problem-Solving**

Following completion of the first stage, the second stage was conducted individually for each patient–family caregiver dyad. Two individual sessions, each lasting 40–60 minutes, were conducted for each patient and their primary family caregiver. During these sessions, patients and caregivers were guided through the problem-solving process and were provided with opportunities to identify and address problems related to disease management. The skills required for effective disease control and self-care were explained, demonstrated, and practiced. Patients and family caregivers were then asked to perform the learned skills under the guidance and supervision of the researcher to enhance their confidence and ability to manage disease-related problems.

**3. Third Stage: Promoting Self-Confidence and Self-Esteem Through Educational Participation**

The third stage was also conducted individually for each patient–family caregiver dyad. During this stage, the patient was asked to teach the family caregiver the information and skills learned during the previous sessions. The researcher provided guidance and support whenever necessary. This educational participation was intended to strengthen the patient's sense of competence, self-confidence, and active involvement in self-care by allowing the patient to demonstrate their ability to understand and communicate the learned information to the family caregiver and to receive supportive feedback from the caregiver.

**4. Fourth Stage: Implementation and Evaluation**

The fourth stage consisted of process evaluation and final evaluation. Process evaluation was conducted throughout the intervention by reviewing the educational content and skills presented in previous sessions at the beginning of subsequent sessions through questions and answers and observation of participants' performance of the learned skills. Perceived threat was assessed through participants' responses to questions related to the educational content, while self-efficacy was assessed by observing their ability to perform the learned self-care and disease-management skills. Patients' participation, cooperation, and engagement in teaching their family caregivers were considered in evaluating the educational participation component of the intervention.

Final evaluation was performed immediately after completion of the intervention and again two months later. At these time points, the quality of life and self-efficacy questionnaires were completed by participants in both the intervention and control groups.

During the two-month follow-up period, the researcher maintained telephone contact with the patient and primary family caregiver every five days. Each telephone contact lasted approximately 5–10 minutes and was intended to answer participants' questions, provide guidance, and support the implementation of the learned self-care and disease-management skills.

To address ethical considerations, after completion of the study, all educational materials provided to the intervention group were also presented to patients in the control group and their primary family caregivers during a two-hour educational session.

## Stages and methods of implementing FCEM in patients undergoing chemotherapy

| Stage | Empowerment component | Goal | Intervention activities & content |
|---|---|---|---|
| 1st stage | perceived threat | Raising awareness, recognition of disease, and perceiving its severity & complications | **Group-based education** in groups of 10 participants (five patients and five primary family caregivers).Education on the disease nature, symptoms, complications, prognosis, diet and treatment, physical activities, and laboratory tests; identification, discussion, and prioritization of patient & family problems (two sessions) |
| 2nd stage | Promoting self-efficacy/problem solving | Strengthening the capability of patient and family to identify and solve disease-related problems & acquire practical skills | **Individual sessions for each patient–family caregiver dyad.** Identification of disease-related problems,, teaching problem-solving process, disease control skills & practical training, such as managing nausea and vomiting, getting to know the medication that controls the condition and how to take it, teaching & practicing how to use a wig for hair loss .Two sessions, 40–60 minutes each |
| 3rd stage | Promoting self-confidence and self-esteem through educational participation | Promoting self-confidence, a sense of empowerment, & the patient's active participation in self-care | Individual session for each patient–family caregiver dyad. The Patient teaches the material learned in previous sessions to family members; the researcher guides and supports if require**d. One session, 40–60 minutes** |
| 4th stage | Evaluation | Rating the effectiveness and sustainability of the intervention | **Process evaluation**: Review of the educational content and skills from previous sessions at the beginning of subsequent sessions through questions, answers, and observation of skill performance. **Final evaluation**: Assessment of changes in quality of life and self-efficacy immediately after the intervention and two months later using the relevant standardized scales |

The data collection tool included a questionnaire with three sections for patient's demographic information (age, gender, marital status, duration of illness, education, occupation, economic status, employment) and primary caregiver (age, gender, marital status, education, occupation, and relation to patient, economic status, employment) and quality of life and self-efficacy scale. The Quality of Life Scale in Cancer Patients, 3rd edition, is a specific instrument for measuring the QoL among cancer patients belonging to "the European Organization for Research and Treatment of Cancer(EORTC)", EORTC QoL-C30, which was developed by Aaronson in 1986. This 30-item scale measures cancer patients' QoL in 5 functional areas including physical functioning (items 1–5), role functioning (items 6 and 7), emotional functioning (items 24 – 21), cognitive (items 20 and 25), and social (questions 26 and 27), and 9 symptom subscales including fatigue (items 10, 12, and 18), pain (items 9 and 19), nausea and vomiting (items 14 and 15), dyspnea (item 8), diarrhea (item 17), constipation (item 16), sleep deprivation (item 11), loss of appetite (item 13), economic problems resulting from the received treatments (item 28), and general QoL (items 29 and 30). The responses are in the form of a 4-point Likert scale from 1 to 4, and the final score of the scale is assigned to 0 (worst health status) to 100 (best health status) for functioning indicators and 0 (absence of symptoms, best health status) to 100 (highest severity of symptoms, worst health status) for the symptoms and general health status indicators. This instrument was standardized by Safaei and Dehkordi Moghimi in Tehran, and the Cronbach's alpha 0.70 was achieved(22). The Self-Care Self-

Efficacy Scale(SCSE) was first designed by Lev and Owen in 1996 for cancer patients(12) and was converted into a Persian version and used by Fini(11). This 29-item self-report instrument is scored on a 5-point Likert scale ranging from "Always " (score 5) to "Never" (score 1). This scale was designed to measure the individual's confidence(self-efficacy) in performing certain self-care behaviors, and the total score ranges from 29 to 145. The item numbers related to the scale dimensions are as it follows: stress reduction (items 1 to 10), decision-making (items 11 to 13), enjoying life (items 14 and 15), and coping (items 16 to 29). For this self-report scale, the internal consistency has been reported by calculating Cronbach's alpha (0.94). Moreover, it was 0.61 with the scores yielded by the health behavior inventory(HBI-20). To judge the content and face validity, the panel of experts was used, including the approval of 10 accredited members of the faculty of Hamedan University of Medical Sciences. In terms of reliability, the test-retest method was used in ten patients at a two-week interval, and the result of the Pearson test confirmed its reliability with correlation coefficient 0.75. In this study, Cronbach's alpha was 0.96, which indicates its satisfactory internal consistency (23)

## Data Analysis Method

After collecting, coding, and entering the data into the statistical software, they were analyzed. The mean and standard deviation were used to describe quantitative variables, and the frequency and percentage were used for qualitative variables. The Shapiro-Wilk test was used to check the quantitative variables' distribution normality. The Chi-squared test was used for the homogeneity of the two groups in terms of demographic and clinical variables, and the Fisher's exact test was employed for qualitative variables in case its assumptions were not met. The independent t-test or Mann-Whitney test was used to compare the quantitative variables between the two groups, depending on the data distribution.

To deal with the changes in quality of life and self-efficacy scores over time and to compare the trend of variation between the two groups, a linear mixed model(LMM) was applied considering group, time, and the interaction of group and time. Also, if there was a difference between the two groups in baseline values, the baseline score was entered into the model as a covariate in ANCOVA. In the mixed model analysis, the individual was considered as a random effect to account for the correlation of repeated measures in each individual.

To compare the intragroup and intergroup changes, befitting statistical tests were used based on the type and distribution of data. The significance of the tests was considered less than 0.05.

## Results

Most study subjects were female (60%). More than 60% of patients were married and most had a bachelor's degree (33.8%) and secondary school education (32.5%). In terms of employment, most subjects were self-employed (35%) and office holder (32.5%). Most subjects were of contractual and registered employment and most were of an average economic status (71.3%). Also, the demographics of the patient's accompanying population are depicted in Table 1 (Table 1).

Table 1
Frequency Distribution of the Demographic Characteristics of the Study Participants

| Variable | Group | Category | Control Frequency | Control Percentage | Test Frequency | Test Percentage |
|---|---|---|---|---|---|---|
| **Gender** | Patient | Female | 24 | 60% | 24 | 60% |
| | Patient | Male | 16 | 40% | 16 | 40% |
| | Patient Companion | Female | 32 | 80% | 29 | 72.5% |
| | Patient Companion | Male | 8 | 20% | 11 | 27.5% |
| **Marital Status** | Patient | Single | 9 | 22.5% | 8 | 20% |
| | Patient | Married | 24 | 60% | 29 | 72.5% |
| | Patient | Divorced/Widowed | 5 | 12.5% | 3 | — |
| | Patient Companion | Single | 4 | 10% | 5 | 12.5% |
| | Patient Companion | Married | 35 | 87.5% | 35 | 87.5% |
| | Patient Companion | Divorced/Widowed | 1 | 2.5% | 0 | 0% |
| **Education** | Patient | Middle School | 5 | 12.5% | 6 | 15% |
| | Patient | High School | 4 | 10% | 15 | 37.5% |
| | Patient | Associate Degree | 13 | 32.5% | 8 | 20% |
| | Patient | Bachelor's Degree | 16 | 40% | 11 | 27.5% |
| | Patient | Master's Degree/PhD | 2 | 5% | 0 | 0% |
| | Patient Companion | Middle School | 2 | 5% | 9 | 22.5% |
| | Patient Companion | High School | 13 | 32.5% | 15 | 37.5% |
| | Patient Companion | Associate Degree | 11 | 27.5% | 6 | 15% |
| | Patient Companion | Bachelor's Degree | 12 | 30% | 10 | 25% |
| | Patient Companion | Master's Degree/PhD | 2 | 5% | 0 | 0% |
| **Employment Status** | Patient | Employee | 15 | 37.5% | 11 | 27.5% |

| Variable | Group | Category | Control Frequency | Control Percentage | Test Frequency | Test Percentage |
|---|---|---|---|---|---|---|
| | Patient | Self-employed | 17 | 42.5% | 11 | 27.5% |
| | Patient | Homemaker | 8 | 20% | 18 | 45% |
| | Patient Companion | Employee | 11 | 27.5% | 13 | 32.5% |
| | Patient Companion | Self-employed | 11 | 27.5% | 9 | 22.5% |
| | Patient Companion | Homemaker | 18 | 45% | 18 | 45% |
| **Employment Type** | Patient | Company Employee | 6 | 15% | 5 | 12.5% |
| | Patient | Contractual | 14 | 35% | 6 | 15% |
| | Patient | Project-based | 6 | 15% | 6 | 15% |
| | Patient | Permanent | 6 | 15% | 8 | 20% |
| | Patient | Other | 8 | 20% | 15 | 37.5% |
| | Patient Companion | Company Employee | 10 | 25% | 13 | 32.5% |
| | Patient Companion | Contractual | 12 | 30% | 7 | 17.5% |
| | Patient Companion | Project-based | 14 | 35% | 10 | 25% |
| | Patient Companion | Permanent | 1 | 2.5% | 2 | 5% |
| | Patient Companion | Other | 3 | 7.5% | 8 | 20% |
| **Economic Status** | Patient | Poor | 3 | 7.5% | 9 | 22.5% |
| | Patient | Moderate | 26 | 65% | 31 | 77.5% |
| | Patient | Good | 11 | 27.5% | 0 | 0% |
| | Patient Companion | Poor | 4 | 10% | 5 | 12.5% |
| | Patient Companion | Moderate | 36 | 90% | 35 | 87.5% |
| | Patient Companion | Good | 0 | 0% | 0 | 0% |
| **Relationship Between Patient and** | | Mother | 6 | 15% | 2 | 5% |

| Variable | Group | Category | Control Frequency | Control Percentage | Test Frequency | Test Percentage |
|---|---|---|---|---|---|---|
| **Patient Companion** | | | | | | |
| | | Father | 0 | 0% | 1 | 2.5% |
| | | Spouse | 13 | 32.5% | 20 | 50% |
| | | Child | 7 | 17.5% | 10 | 25% |
| | | Sister | 11 | 27.5% | 7 | 17.5% |
| | | Brother | 3 | 7.5% | 0 | 0% |

The results showed self-efficacy scores with a significant difference in all three stages before, during, and after the intervention, and the mean self-efficacy scores of the study subjects increased significantly after the intervention compared to those of the pre- intervention ($P < 0.001$) (Table 2).

Table 2
Analysis of the Three-Time Trend of the Self-Efficacy Variable by Intervention and Control Groups

| Group | Variable | Median | Mean Rank | P-value |
|---|---|---|---|---|
| **Intervention** | Self-efficacy 1 | 114.5 | 3.35 | P < 0.001 |
| | Self-efficacy 2 | 117.5 | 4.18 | |
| | Self-efficacy 3 | 125 | 5.48 | |
| **Control** | Self-efficacy 1 | 55 | 1.69 | P < 0.001 |
| | Self-efficacy 2 | 63 | 2.75 | |
| | Self-efficacy 3 | 89 | 5.31 | |

As demonstrated by the results, the QoL scores showed a significant difference in all three stages before, during, and after the intervention, and the mean scores of the study subjects' QoL meaningfully increased after the intervention compared to those of the pre-intervention ($P < 0.001$) (Table 3).

Table 3
Analysis of the Three-Time-Point Trend of the Quality of Life Variable by Intervention and Control Groups

| Group | Variable | Frequency | Median | Mean Rank | P-value |
|---|---|---|---|---|---|
| **Intervention** | Quality of Life 1 | 40 | 107.5 | 1.73 | **P < 0.001** |
| | Quality of Life 2 | 40 | 112 | 2.41 | |
| | Quality of Life 3 | 40 | 115 | 3.86 | |
| **Control** | Quality of Life 1 | 40 | 65 | 2.60 | **P < 0.001** |
| | Quality of Life 2 | 40 | 72 | 3.55 | |
| | Quality of Life 3 | 40 | 93 | 5.10 | |

The results exposed that the changes in the mean rank for self-efficacy scores in the intervention and control groups were significant for all three measurement stages (P < 0.001) (Table 4).

Table 4
Distribution of Differences in Self-Efficacy Scores Between the Intervention and Control Groups at Three Measurement Time Points

| Variable | Group | Mean Rank | P-value |
|---|---|---|---|
| **Self-Efficacy 1** | Intervention | 3.35 | **P < 0.001** |
| | Control | 1.69 | |
| **Self-Efficacy 2** | Intervention | 4.18 | **P < 0.001** |
| | Control | 2.75 | |
| **Self-Efficacy 3** | Intervention | 5.48 | **P < 0.001** |
| | Control | 5.31 | |

The results displayed the changes in the mean rank for the QoL scores in the intervention and control groups being meaningful for all three measurement stages (P < 0.001) (Table 5).

Table 5
Distribution of Differences in Quality of Life Scores Between the Intervention and Control Groups at Three Measurement Time Points

| Variable | Group | Mean Change | P-value |
|---|---|---|---|
| **Quality of Life 1** | Intervention | 1.73 | **P < 0.001** |
| | Control | 2.60 | |
| **Quality of Life 2** | Intervention | 2.41 | **P < 0.001** |
| | Control | 3.55 | |
| **Quality of Life 3** | Intervention | 3.86 | **P < 0.001** |
| | Control | 5.10 | |

Because statistically significant differences were observed between the intervention and control groups in baseline quality-of-life (QoL) and self-efficacy scores despite random allocation, baseline differences were taken into account in the subsequent analyses. Such imbalances may occur by chance, particularly in studies with relatively small sample sizes. Accordingly, ANCOVA was initially performed to compare post-intervention and two-month follow-up outcomes between the two groups while adjusting for the corresponding baseline scores.

Because QoL and self-efficacy were assessed repeatedly at three time points, linear mixed-effects models were used as the primary longitudinal analyses. These models account for the correlation among repeated observations within participants and allow the effects of time, group, and the Time × Group interaction to be examined simultaneously. The Time × Group interaction was used to determine whether the pattern of change in the outcomes over time differed between the intervention and control groups. The mixed-effects models were considered the primary analyses because the main objective of the study was to evaluate changes in QoL and self-efficacy across the three assessment time points rather than merely compare outcomes at a single post-intervention time point. ANCOVA results were therefore reported as complementary analyses to demonstrate between-group differences at specific follow-up points after adjustment for baseline values.

The ANCOVA analysis examined whether there was a significant difference in QoL scores between the intervention and control groups immediately after the intervention (QoL2), after adjusting for baseline QoL scores (QoL1). Levene's test indicated that the assumption of homogeneity of variances was satisfied ($F = 1.107$, $p = 0.296$). Baseline QoL was a significant predictor of post-intervention QoL ($F = 172.144$, $p < 0.001$, partial $\eta^2 = 0.691$), indicating a strong association between baseline and post-intervention QoL and supporting the importance of adjusting for baseline differences. After adjustment for baseline QoL, a statistically significant between-group difference was observed in post-intervention QoL scores ($F = 6.774$, $p = 0.011$, partial $\eta^2 = 0.081$), with higher QoL scores observed in the intervention group. The overall ANCOVA model explained 86.2% of the variance in post-intervention QoL scores ($R^2 = 0.862$).

At the two-month follow-up (QoL3), ANCOVA was performed to examine the between-group difference in QoL after adjustment for baseline QoL (QoL1). Levene's test indicated that the assumption of homogeneity of variances was not satisfied ($F = 9.635$, $p = 0.003$). Baseline QoL remained a significant predictor of QoL at the

two-month follow-up ($F = 45.530$, $p < 0.001$, partial $\eta^2 = 0.372$). After adjustment for baseline QoL, a statistically significant between-group difference was observed in QoL at the two-month follow-up ($F = 11.858$, $p = 0.001$, partial $\eta^2 = 0.133$). The overall model explained 71.3% of the variance in QoL at the two-month follow-up ($R^2 = 0.713$). Because the assumption of homogeneity of variances was violated, this finding should be interpreted with appropriate caution and in conjunction with the longitudinal mixed-effects analysis.

The linear mixed-effects model demonstrated a statistically significant main effect of time ($F(2, 156) = 91.728$, $p < 0.001$), indicating that QoL changed significantly across the three assessment time points. A significant main effect of group was also observed ($F(1, 78) = 110.488$, $p < 0.001$), indicating an overall difference in QoL between the intervention and control groups. Importantly, the Time × Group interaction was statistically significant ($F(2, 156) = 18.983$, $p < 0.001$), demonstrating that the pattern of QoL change over time differed significantly between the two groups. Overall, QoL improved more substantially in the intervention group than in the control group, with estimated mean QoL scores of 109.32 and 79.31, respectively. These findings indicate that the family-centered empowerment intervention was associated with a significantly different and more favorable trajectory of QoL over time compared with the control condition.

The ANCOVA analysis examined the difference in self-efficacy scores between the intervention and control groups immediately after the intervention, after adjusting for baseline self-efficacy scores. Levene's test indicated that the assumption of homogeneity of variances was satisfied ($F = 0.077$, $p = 0.782$). Baseline self-efficacy was a significant predictor of post-intervention self-efficacy ($F = 119.548$, $p < 0.001$, partial $\eta^2 = 0.608$), indicating a strong association between baseline and post-intervention self-efficacy and supporting the importance of adjusting for baseline differences. After controlling for baseline self-efficacy, a statistically significant between-group difference was observed in post-intervention self-efficacy scores ($F = 11.425$, $p = 0.011$, partial $\eta^2 = 0.129$), with higher self-efficacy scores observed in the intervention group. The overall ANCOVA model explained 86.7% of the variance in post-intervention self-efficacy scores ($R^2 = 0.867$).

At the two-month follow-up, the ANCOVA results indicated that the assumption of homogeneity of variances was not satisfied ($p < 0.001$). After adjustment for baseline self-efficacy, no statistically significant between-group difference was observed in self-efficacy scores at the two-month follow-up ($F = 0.734$, $p = 0.394$, partial $\eta^2 = 0.009$). This finding indicates that the between-group difference in self-efficacy was not statistically significant at the two-month follow-up after controlling for baseline scores. Baseline self-efficacy remained a significant predictor of follow-up self-efficacy ($p < 0.001$). Given the violation of the homogeneity assumption, the ANCOVA finding at this time point should be interpreted cautiously and considered alongside the longitudinal mixed-effects model.

The linear mixed-effects model demonstrated a statistically significant main effect of time ($F = 98.724$, $p < 0.001$), indicating that self-efficacy changed significantly across the three assessment time points. A significant main effect of group was also observed ($F = 134.521$, $p < 0.001$), indicating an overall difference in self-efficacy between the intervention and control groups, with higher scores observed in the intervention group. Importantly, the Time × Group interaction was statistically significant ($F = 29.863$, $p < 0.001$), demonstrating that the pattern of change in self-efficacy over time differed significantly between the two groups.

Mean self-efficacy scores in the intervention group increased progressively across the three assessment time points, from 109.60 at Time 1 to 118.70 at Time 2 and 123.80 at Time 3. In the control group, mean scores

increased from 61.35 at Time 1 to 69.40 at Time 2 and 94.53 at Time 3. Although both groups showed an overall increase in self-efficacy over time, the intervention group maintained substantially higher scores at all three assessment points. The significant Time × Group interaction indicates that the magnitude and pattern of change differed between the two groups. Overall, these findings suggest that the family-centered empowerment intervention was associated with higher self-efficacy and a more favorable trajectory of change over time compared with the control condition.

## Discussion

Patients suffering from cancer face numerous post-chemotherapy problems. The family-centered empowerment model (FCEM) underscores the role of the individual and other family members in the motivational and psychological dimensions (self-confidence, self-control, and self-efficacy) and spurs conscious efforts of individuals in order to take care of themselves, their families, and society in order to take responsibility for promoting and maintaining their own and others' health. The present study targeted to investigate the effect of family-centered empowerment model (FCEM) on the quality of life (QoL) and self-efficacy of cancer patients undergoing chemotherapy at Fasa-based Shariati Hospital in 2024.

As reported by the study drawn results, a significant difference was spotted in pre-and post-intervention self-efficacy scores in all three stages simultaneously, so that the mean scores of the post-intervention self-efficacy of the subjects meaningfully increased compared to the pre-intervention. The results of the research exposed that the mean variation in self-efficacy scores in the intervention and control groups were significant for all three measurement stages.

The results of the study done by Salehitali et al. reported that caregivers of chronic patients suffer from a heavy care burden, but implementing the FCEM raised the self-efficacy of patients with prosthetic valves (24). The research done by Sayadi et al. concluded that the family-centered supportive program can be viewed as a method for reducing the frequency, severity, and level of discomfort of chemotherapy-induced symptoms (25). In another study performed by Shirvani et al., they found that executing the FCEM was effective in improving the quality of life of women with breast cancer subjected to chemotherapy(6). The study by El-Melegy et al. (2016) indicated that empowering hemodialysis patients and their caregivers in the hemodialysis ward can help patients and their caregivers manage health-related problems, improve their self-efficacy, and reduce the responsibility of their caregivers (26). The results of the above studies are consistent with those of the current research. Moattari et al. carried out a study titled “Investigating Effect of Empowerment on Self-Efficacy and Quality of Life in Chronic Kidney Failure Patients” and stated that the empowerment program had an effect on increasing awareness, knowledge, motivation, self-confidence, and self-efficacy in preventive behaviors and led to increasing self-efficacy in two dimensions: stress reduction and decision-making(27).

In contrast to the results of the above studies, the research by Kuo et al. regarding the study on the effect of family-centered interventions on improving long-term care of children with asthma did not reveal any difference in family functioning. This difference could be attributed to various factors such as cultural issues and the background of the participants (28).

One of the concepts of the FCEM is self-efficacy. As a factor affecting the QoL, it emphasizes the individual's perception of their skills and capabilities to successfully perform a competent function. This concept

overshadows the amount of effort and level of performance of the individual(29). Self-efficacy is also an important internal factor for the long-term control of chronic diseases, and its high score is associated with and can predict the improvement of the patients' adaptation ability. This promoted adaptation then results in reducing psychological disorders. Research cases have reported that the individuals who are confident in their abilities actively participate in health programs that promote health, and this participation leads to improving the QoL(30).

In addition, the results demonstrated the QoL scores in all three stages before the intervention, simultaneously and after the intervention having a significant difference and the mean QoL scores of the study subjects meaningfully increased during the pre-intervention compared to the post-intervention. The study extracted results suggested that the mean variation of the QoL scores in the intervention and control groups were significant for all three measurement stages. Pursuant to the findings of the present study, implementing the FCEM enhanced the QoL in the intervention group. The study by Shirvani et al. (2017) as Effect of Implementing Family-Centered Empowerment Model on the Functional Scales of Quality of Life of Women with Breast Cancer Undergoing Chemotherapy indicated that the FCEM boosted the general functional scales (physical, role, mental, emotional and social) in the intervention group, congruent with the results of the present study (6).

The results of the study by Karimi et al. found that the implementation of the FCEM on the quality of life of patients with multiple sclerosis enhanced the QoL of such patients(31). The study done by Kahrazei showed functional dimensions in various areas of the QoL in women with breast cancer undergoing chemotherapy getting improved by involving families in care(32). Chen et al. also assumed in case of the quality of life and efficiency of family caregivers getting enhanced, the effectiveness of family caregivers in care provision for the client would also get improved(33). The effect of the FCEM on the QoL of diabetics (6) and hemodialysis patients has also been recognized (34). The results of the study by Jafari etal also indicated that executing the FCEM was effective in the QoL of kidney transplant patients and the post-intervention QoL showed a significant increase, which was in accord with the results of the present study (35). Since family members are the key elements in home care, if they are under tough tensions and problems, the care and the pressure of family support will seriously run into problems (36). Empowering the families of patients while strengthening their capability to care the patients also boosts the patients' quality of life (QoL). Moreover, empowering the family, especially in chronic diseases, is inevitable in the process of treatment and care. Considering the increasing trend of chronic diseases and lack of physical space in the treatment area, paying attention to the family-centered empowerment model(FCEM) is the fundamental factor in medical and nursing education (37).

Quality of life is one of the major parameters determining the success of cancer treatment. The issues typically affecting the QoL of cancer patients include the psychological, emotional, physical, social and economic effects incurred by the disease and diagnostic and therapeutic measures(38). Although medical interventions are effective in changing the QoL, some of these changes are related to demographic, social, psychological and cultural characteristics. As a result, to grasp the QoL concerns for such patients and QoL relevant factors is a major priority for health professionals and can be useful in treatment-related decision-making (39).

As reported by the studies, higher levels of self-efficacy lead to better emotional health, increased coping and stress reduction, improved health care outcomes, success in achieving the desired behavioral changes, and promoted performance in performing mental and motor skills. Research in cancer patients reported that the interventions to promote self-efficacy increased treatment efficiency and reduced symptoms (40). In this

respect, identifying the self-efficacy of chemotherapy-subjected patients for self-care and its associated factors is particularly critical. By identifying self-efficacy-associated factors, it is feasible to increase the interventions for promoting self-efficacy and, subsequently, participating in self-care in such patients. Because higher self-efficacy perception increases cancer patients' adaptation to their disease, improves their quality of life, reduces psychological problems, and improves their emotional states, it is vital to study the level of self-efficacy among these patients. Rogers et al. (2008) pinpointed that if cancer patients reach a belief in self-efficacy, it gets easier for them to tolerate the disease, and as a result

, they will have better empowerment and are less likely to relapse or feel frustrated(41). Jafari et al. (2020), in their study titled Effect of Implementing Family-Centered Empowerment Model on Self-Efficacy of Kidney Transplant Patients, reported self-efficacy and quality of life scores significantly increasing after the intervention compared to the pre-intervention, which is in agreement with the results of the existing study (35).

Various studies have stated that empowerment, whether as a concept at the individual level or in relationship with the disease, leads to personal satisfaction, self-efficacy, positive self-concept, health redefinition, confidence, active participation, desire for life, excitement, purposefulness, being capable to help others, a sense of control, hope, improved quality of life, and growth, and is influenced by support, participatory decision-making, training, and counseling (46). The goal the family-centered empowerment model(FCEM) pursued is to consciously involve the patient and their family in decision-making to promote their health, so that they can help themselves by making empowered and informed decisions to control their own health status and create positive changes in it. This conscious participation of the family and patient in the care treatment process is one of the main elements of the effectiveness and sustainability of the family-centered empowerment model (42).

The FCEM has four dimensions: learning, improving self-efficacy, boosting self-confidence, and evaluating, and by improving the aforementioned dimensions in a purposeful manner, it leads the patient towards the desired physical and psychological status(6).

One of the limitations of the current research is the small sample size, which limits the potential to generalize the findings. Therefore, performing further studies including a larger sample size could be useful in overcoming this limitation. In addition, there are conditions and problems in patients. The living environment can affect their performance, which was partially managed by continuous phone follow-up and communication with the patients' family members.

## Conclusion

Chemotherapy is a systemic treatment often accompanied by various side effects. The main goal behind the family-centered empowerment model(FCEM) is to empower the patient's family system and other family members in order to improve their health. According to the findings of the present study, self-efficacy and quality of life scores revealed significant differences in all three stages before, during, and after the intervention, and the mean post-intervention scores of the self-efficacy and quality of life in the study subjects got significantly higher compared to the pre-intervention. The study results suggested that the mean variation in self-efficacy and quality of life scores in the intervention and control groups were significant for all three measurement stages. Since the family-centered empowerment model (FCEM) affects the self-efficacy and

quality of life of cancer patients undergoing chemotherapy, it is recommended to include non-pharmacological interventions in treatment planning alongside medical interventions, and that increasing knowledge, awareness, self-efficacy, and quality of life of both the patient and family be considered critical. It is also proposed that medical staff, relying on the required training and interventions, strive to empower patients and their families, and that necessary support be provided by health managers and policymakers.

## Declarations

# Ethical Considerations:

This study was conducted following approval from the Ethics Committee (IR.FUMS.REC.1403.075). Written informed consent was obtained from all participants prior to their enrollment in the study. The confidentiality of participants' data was strictly maintained, and participation was entirely voluntary. Participants were informed of their right to withdraw from the study at any stage without any consequences. All study procedures were performed in accordance with the principles of the Declaration of Helsinki and the guidelines of the Committee on Publication Ethics (COPE).

# Author Contribution

F.S. and A.Z.have participated in the conception and design of the study. FS acontributed the data collection. AZ and s.j. critically revised and checked closely the proposal, P.B. the analysis and interpretation of the data AZ and FS design the article. All authors prepared the first draft of the manuscript.

# Acknowledgement

Acknowledgment: The authors appreciate Fasa University of Medical Sciences for financially supporting this research also, the authors thank the patients for their cooperation in implementing the project.

## References

1. Yousefi F, Kalhor M, Asghari R, Nouri B, Valiee S.The effect of family-centered empowerment model on the level of fatigue of patients undergoing chemotherapy. 2022.
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2021;71(3):209–49.
3. Mendoza M, Capafons A, Gralow J, Syrjala K, Suárez-Rodríguez J, Fann J, et al. Randomized controlled trial of the Valencia model of waking hypnosis plus CBT for pain, fatigue, and sleep management in patients with cancer and cancer survivors. Psycho-oncology. 2017;26(11):1832–8.
4. Aapro M. CINV: still troubling patients after all these years. Supportive Care in Cancer. 2018;26(Suppl 1):5–9.

5. Masoodi R, Alhani F, Rabiei L, Majdinasab N, Moghaddasi J, Esmaeili S, et al. The effect of family-centered empowerment model on quality of life and self efficacy of multiple sclerosis patients family care givers. 2013.
6. Shirvani H, Alhani F, Montazeri A. The effect of family-centered empowerment model on the functional scales quality of life in women with breast cancer undergoing chemotherapy. 2017.
7. Fazekas C, Semlitsch B, Pieringer W. Empowerment bei diabetes mellitus: theorie und praxis. Wiener Medizinische Wochenschrift. 2003;153(21):459–63.
8. Hydary L. Common breast cancer family care giving problems. 2015.
9. Alhani F, Asghari-Jafarabadi M, Norouzadeh R, Rahimi-Bashar F, Vahedian-Azimi A, Jamialahmadi T, et al. The effect of family-centered empowerment model on the quality of life of adults with chronic diseases: An updated systematic review and meta-analysis. Journal of affective disorders. 2022;316:140–7.
10. Ammentorp J, Sabroe S, Kofoed P-E, Mainz J. The effect of training in communication skills on medical doctors' and nurses' self-efficacy: A randomized controlled trial. Patient education and counseling. 2007;66(3):270–7.
11. Fini IA, Adib-Hajbaghery M, Khachian A. The effect of health-promotion strategies education on self-care self-efficacy in patients with bone marrow transplantation. Iranian Journal of Critical Care Nursing. 2011;4(3):109–16.
12. Lev EL, Paul D, Owen SV. Age, self-efficacy, and change in patients' adjustment to cancer. Cancer practice. 1999;7(4):170–6.
13. Vahedian-azimi A, Rahimi A. Concept of spirituality: A conventional content analysis. Journal of Qualitative Research in Health Sciences. 2013;2(1):11–20.
14. Varvani FP, Hekmatpoue D, Alhani F, Ashouri M, AZADNIA M. Investigating the effect of family-centered empowerment model on the lifestyle of children suffering from leukemia. 2018.
15. Hedayati B. Effect of family-based empowerment model on the self-efficacy of hypertensive elderly people. Iranian Journal of Ageing. 2018;13(1):86–97.
16. Mirzakhani M, Gharraee B, Zahedi Tajrishi K, Khanjani S, Noorbala AA, Safaei Nodehi SR. Effect of Compassion-focused Therapy on Depression, anxiety, Stress, and Quality of Life in Patients with Cancer: a clinical trial. Iranian Journal of Psychiatry and Clinical Psychology. 2023;29(2):142–55.
17. Nasri HA, Nasiri A, Hosseini SV, Hajhosseini F, Fereidooni S, Mahmoudirad G. Investigation of the effect of the family-centered empowerment model on the self-care ability of patients with colorectal cancer. Journal of Translational Medical Research. 2020;27(4):355–65.
18. Betiar A, Saraj KN, Makvandi B. Effectiveness of cognitive-behavioral therapy and mental imagery on hope and self-efficacy of patients with Leukemia and Lymphoma. 2023.
19. Boshagh F, Hakim A, Alghasi A, Haghighizadeh MH. Effect of family-centered empowerment model on knowledge and caring performance of mothers of children with leukemia: A randomized clinical trial. Jundishapur J Chronic Dis Care. 2022;11(3):1–6.
20. Mulyana AM, Rakhmawati W, Wartakusumah R, Fitri SYR, Juniarti N. The efficacy of internet-based interventions in family-centered empowerment among children with chronic diseases: A mixed-methods systematic review. Journal of multidisciplinary healthcare. 2023:3415–33.

21. Abdel-Salam AA, Aziz A-E, Mohammed S, Arabie E, El Sayed M, Sharshour SM. Effect of implementing Family Empowerment Model on the Quality of Life and Self Efficacy of Mothers of Children with Systematic Lupus Erythema. Tanta Scientific Nursing Journal. 2023;29(2):216–44.
22. SAFAEI A, MOGHIMI DB, Tabatabaei S. Reliability and validity of the QLQ-C30 questionnaire in cancer patients. 2007.
23. Sargazi ST, Kermansaravi F, Navidian A. Effect of the family-centered empowerment model on quality of life and self-efficacy in adolescents with type 1 diabetes referring to the Ali Asghar's clinic in Zahedan, 2016. 2018.
24. Salehitali S, Ahmadi F, Dehkordi AH, Noorian K, Fereidooni-Moghadam M, Zarea K. Progressive exhaustion: A qualitative study on the experiences of Iranian family caregivers regarding patients undergoing hemodialysis. International journal of nursing sciences. 2018;5(2):193–200.
25. Sayadi L, Varaei S, Zanjani MB. The effect of family-centered supportive program on chemotherapy-induced symptoms in patients with acute lymphoblastic leukemia (ALL). International journal of hematology-oncology and stem cell research. 2021;15(1):35.
26. El-Melegy OA, Al-Zeftawy AM, Khaton SE. Effect of family centered empowerment model on hemodialysis patients and their caregivers. J Nurs Educ Pract. 2016;6(11):119.
27. Moattari M, Ebrahimi M, Sharifı N, Rouzbeh J. The effect of empowerment on the self-efficacy, quality of life and clinical and laboratory indicators of patients treated with hemodialysis: a randomized controlled trial. Health and quality of life outcomes. 2012;10(1):115.
28. Kuo DZ, Bird TM, Tilford JM. Associations of family-centered care with health care outcomes for children with special health care needs. Maternal and child health journal. 2011;15(6):794–805.
29. Salimian S, Esmaieli R, Dabirian A, Mansoorin S, Anboohi SZ. The survey of factors related to self-efficacy based on Orem's theory in patients with coronary artery bypass surgery in Tehran in 2014. Advances in Nursing & Midwifery. 2016;25(90):9–16.
30. Rasooli S, Rahmani A, Ashrafı A, AR N, Zadeh H. Relationship self-efficacy with perception of prognosis among cancer patients. Iranian Journal of Psychiatric Nursing. 2014;2(2):33–45.
31. Karimi Monaghi H, Haresabadi M, Foroghipor M, Zarifnejad G, Mazloum S, Alhani F. The effect of family-centered empowerment model on the quality of life of patient with multiple sclerosis. Journal of Mashhad School of Nursing & Midwifery. 2009;9(3):8–14.
32. Kahrazei F, Danesh E, Azadfallah P. Effectiveness of Cognitive-Behavioral Therapy on improving quality of life of cancer patients. 2011.
33. Chen PY, Chang H-C. The coping process of patients with cancer. European Journal of Oncology Nursing. 2012;16(1):10–6.
34. Salehi S, Javanbakhtyan R, Hasheminia M, Habibzadeh H. Effect of family centered empowerment model on quality of life of patients on dialysis center. Journal of Nursing anm Midwifery Urmia University of Medical Science. 2012;10(1):62–7.
35. Jafari-Diziche S, Izadi-Avanji F-S, Yadollahi S, Azizi-Fini I. The effect of family-centered empowerment model on daily living activities of the elderly with heart failure: A quasi-experimental study. Feyz Medical Sciences Journal. 2022;26(2):184–92.

36. Bradley CJ, Dahman B. Time away from work: employed husbands of women treated for breast cancer. Journal of Cancer Survivorship. 2013;7(2):227–36.
37. Noori R, Alami A, Noghabi AD. Effect of family-centered empowerment model on quality of life in patients with hypertension. 2015.
38. Fazel A, Tirgary B. mokhber N, Koshyar M, Esmaieli H. Impact mastectomy on mode and quality of life in patients with breast cancer. Journal of Yazd Shahid Sadoghi University of Medical Sciences. 2008;16(3):28–36.
39. Tsay S-L, Chang J-Y, Yates P, Lin K-C, Liang S-Y. Factors influencing quality of life in patients with benign primary brain tumors: prior to and following surgery. Supportive Care in Cancer. 2012;20(1):57–64.
40. Tabrizi FM, Alizadeh S, Barjasteh S. The study of symptom-management's self-efficacy in breast cancer survivors undergoing chemotherapy. Scientific Journal of Hamadan Nursing & Midwifery Faculty-ISSN. 2018;2008:2819.
41. Rogers LQ, McAuley E, Courneya KS, Verhulst SJ. Correlates of physical activity self-efficacy among breast cancer survivors. American journal of health behavior. 2008;32(6):594–603.
42. Khan A, Ramsey K, Ballard C, Armstrong E, Burchill LJ, Menashe V, et al. Limited accuracy of administrative data for the identification and classification of adult congenital heart disease. Journal of the American Heart Association. 2018;7(2):e007378.