

Effectiveness of a Nurse-Led Educational Programme on Managing Chemotherapy Side Effects among Cancer Patients

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Abstract: Background: While chemotherapy is a key element of the treatment process, it is often associated with treatment-related symptoms that have a negative impact on physical functioning, emotional state, nutrition intake, daily functioning, treatment experience, and overall quality of life. Common side effects of chemotherapy include fatigue and nausea. While pharmacology is a vital aspect of supportive oncology care, structured nursing interventions to assess symptoms, educate patients, provide nutritional support, help conserve energy, promote relaxation, and teach self-management and follow-up can also support patients during chemotherapy. The effectiveness of a nurse-led symptom management programme on the symptom of fatigue, nausea and global quality of life for patients receiving chemotherapy was evaluated in the present study. **Methods:** The quasi-experimental design in the form of quantitative pre-test – post test control group design was used. This study was conducted on 200 adult patients receiving chemotherapy, 100 patients were given into the experimental group, 100 patients were given into the control group. The structured nurse-led symptom management programme was added to the routine hospital care provided to the experimental group while the control group was given routine institutional care. The Brief Fatigue Inventory was used to assess fatigue, the Rhodes Index of Nausea, Vomiting and Retching was used to assess nausea and the EORTC QLQ-C30 was used to assess quality of life. Within and between group comparison of baseline and post-intervention assessments. Descriptive statistics and paired comparisons, independent-group comparisons, analysis of covariance, correlation analysis and multiple regression analysis and association test were used and $p < 0.05$ was considered statistically significant. **Results:** There were 100 cases in each experimental and control groups. Experimental group mean age was 53.07 ± 10.23 years and control group was 51.59 ± 9.51 years. This was a primary outcome analysis of this study, which showed greater improvement in the experimental group in all three outcomes. Fatigue was reported at 4.44 ± 1.70 at post test with a mean change of 1.61 points and a pre test to post test change of 6.05 ± 1.50 , with this study statistical output also reporting a decrease in fatigue at post test. Nausea decreased from 15.80 ± 3.68 to 10.63 ± 3.87 , with a reported mean change of 5.18 points. There was a reported improvement in the quality of life from 57.39 ± 12.89 to 67.15 ± 13.41 , which translates to an increase in the global average score by 9.77 points. The between-group comparisons of each of these scores were statistically significant, with $p < 0.001$ for fatigue, nausea and global quality of life. Results from the ANCOVA also showed statistically significant adjusted group effects for fatigue ($F = 282.035$, $p < 0.001$), nausea ($F = 385.094$, $p < 0.001$) and global quality of life ($F = 230.072$, $p < 0.001$). **Conclusion:** The results of the present study show that the nurse-led symptom management programme resulted in significant reductions of chemotherapy-related fatigue, nausea and overall quality of life when compared with routine care. Findings are congruent with the incorporation of symptom assessment, education, and self-management support into supportive oncology nursing care and practice.

Keywords: Chemotherapy; cancer patients; nurse-led programme; symptom management; fatigue; nausea; quality of life; oncology nursing; supportive care; patient education.

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Research Paper

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1. INTRODUCTION

Treatment for cancer has been steadily improving over the years, with advancements in chemotherapy, surgery, radiotherapy, targeted therapies and supportive care [1]. Chemotherapy is a fundamental treatment modality used for a variety of malignancies as a primary treatment, post-surgery (adjuvant therapy), prior to definitive therapy (neoadjuvant therapy) or in advanced disease. Chemotherapy plays a major role in controlling the disease and affecting survival, but can have various physical and emotional side effects [2]. While being treated, fatigue, nausea, appetite disturbance, sleep disturbance, weakness, gastrointestinal symptoms, emotional distress and changes in physical functioning may occur [3]. These symptoms can occur alone or together as part of a set of symptoms. Fatigue is especially significant as it can disrupt physical activity, work, self-care and social functioning and mental health. Fatigue from cancer is different from normal fatigue, and may not go away with sleep or rest, and can involve a loss of physical, emotional, and/or mental energy. Chemotherapy induced fatigue can be influenced by the type of cancer, the stage of the disease, the treatment plan, the stage of treatment, nutritional status, sleep, psychological factors and overall health status [4], [5]. Because of the persistent fatigue, functional independence may be reduced and negatively impact the treatment experience. Another important symptom associated with chemotherapy is nausea. Chemotherapy-induced nausea often affects how much and what food is eaten, how well people sleep, how active they are, and their desire to participate in their daily routine. Nausea may also be a chronic problem that can lead to emotional upset and nutritional problems [6]. Treatment characteristics and prior treatment experience and patient characteristics all can affect the experience of nausea. Therefore, a symptom needs to be more than just identified as a symptom; it needs to be managed effectively [7], [8]. Nurses should evaluate the severity of the symptom(s), determine aggravating factors, remind patients to take prescribed medications, offer practical diet and fluid recommendations, reinforce self-care strategies, and recognize when patients should be further evaluated clinically. QOL is a wider patient-centred assessment of the impact of cancer and its management [9]. In addition to clinical outcomes like tumor response and survival, the patients' experience of physical, emotional, social and functional well-being is an important measure of treatment outcome. Effective symptom management may have benefits beyond symptom reduction, as fatigue and nausea can interfere with a number of dimensions of quality of life [10]. This study was used to inform the present manuscript and conceptualized symptom management in a way that was informed by a theory of symptom management. In this context, symptom assessment, symptom management strategies and symptom outcomes are related. The nurse is an important individual to recognize symptom burden, deliver individualized education, augment self-care behaviours, support coping and monitor change over time [11], [12]. The nurse-led programme studied in the current study thus

involved more than symptom management (just one component of the programme was examined) and included education, symptom monitoring, nutritional counselling, relaxation, energy conservation and follow-up support [13], [14]. The necessity for the present study was based on the perception that the patient receiving chemotherapy presents with a number of symptoms at the same time and therefore treatment of only one symptom may not be sufficient to treat the overall chemotherapy experience. Fatigue, nausea and global QOL were thus investigated together and the study included an examination of relationships between outcomes and associations with selected participant characteristics [15].

1.1 Problem Statement

The problem studied in the research was chemotherapy related fatigue, nausea and their impact on the quality of life of patients taking chemotherapy. In this study the research problem was formulated as The Effectiveness of a Nurse-led Symptom Management Programme for Fatigue and Nausea, and quality of life of patients receiving chemotherapy treatment in a selected hospital.

1.2 Aim and Objectives of the Study

The study aimed to assess the effectiveness of a symptom management programme led by a nurse on reducing symptoms of fatigue and nausea and enhance quality of life among patients receiving chemotherapy. The researcher measured fatigue, nausea and quality of life both prior to the implementation of the intervention and the effectiveness of the nurse-led programme on these three outcomes. It also compared the relationship between fatigue and nausea and quality of life, and explored a number of demographic and clinical relationships with outcomes, and examined potential factors to predict quality of life.

1.4 Research Hypotheses

The first hypothesis was that fatigue scores would be lower in patients receiving symptom management programme compared to patients receiving routine care. The second hypothesis was that the patients who received the programme would have a larger decrease in nausea than patients who received routine care. The third hypothesis suggested that the patients in the nurse-led programme would achieve higher scores in QOL than the control group. The fourth hypothesis was that selected demographic variables would be significantly related to the study outcomes.

2. Related Works

Cao *et al.* (2024) performed a randomized controlled trial to test a nurse-led, multidomain intervention for the treatment of chemotherapy-induced nausea and vomiting (CVN/V) in patients with head and neck squamous cell carcinoma (HNSCC) and who were undergoing cisplatin-based chemotherapy. The study comprised 92 patients with 45 patients in the intervention group and 47 in the control group. Results showed that the

multidomain intervention led to decreases in the frequency and intensity of chemotherapy-induced nausea and vomiting and positive effects on quality of life in the intervention group. This research highlights the value of nurse-led, formal education and personalized symptom-management approaches in supporting patients to manage adverse effects of chemotherapy.

Urtekin and Akin Eroğlu (2024) performed a randomized controlled trial to evaluate the impact of teaching using Orem's Self-Care Deficit Theory on chemotherapy-induced side effects among breast cancer women. The study comprised 62 patients, 31 in each group, in the cyclophosphamide-epirubicin and cyclophosphamide-adriamycin chemotherapy groups. Changes in the physical, social and psychological scores of the Nightingale Symptom Assessment Scale, as well as in overall symptom-related outcome, were significantly more favorable in the intervention group than the control group. Specifics of self-care behaviours were also improved, such as protecting hair, wearing protective gloves, weight monitoring, and infection prevention. The authors found that providing patient education based on theory can reinforce self-care behaviours and improve patients' self-care of chemotherapy side effects.

The study aims of Şenol and Efe (2024) were to examine the effectiveness of an occupation based nursing programme for managing chemotherapy related symptoms of pediatric oncology inpatients in children's hospital. A randomized controlled trial of 30 children with 30 children in the intervention group and 30 in the routine care group were included, ranging from 7 to 12 years of age. The intervention involved about 30 minutes of occupation based nursing activities for 5 days. Symptoms and psychosocial outcomes were evaluated at baseline, immediately after the intervention and at follow-up 7 and 14 days after. The aim of the study was to assess the effectiveness of a nursing programme in the reduction of chemotherapy-induced symptoms and an improvement in patients' satisfaction, and to design a nursing programme specifically for this purpose. The results suggest that nursing care that focuses on functional and psychosocial care needs is an evidence-based complement to the traditional care provided for patients experiencing chemotherapy-induced side effects. Lee *et al.* (2024) investigated the impact of group education, targeting unmet educational needs, on the chemotherapy-related knowledge of cancer patients and their families who received chemotherapy. This study adopted a one group pre-test / post-test design and was carried out in a Korean cancer education centre. The educational intervention was designed to address patients' and families' unmet information needs and targeted around the knowledge needed during chemotherapy. The study was published as an original article in Asian Oncology Nursing (2024). The results lend support to the need for a systematic approach for the identification of patients' educational needs and the inclusion of these needs in structured chemotherapy education. The study has implications to nurse-led

educational programmes because patients' capacity to actively engage in symptom management and self-care is enhanced by making sure they are informed about treatment and possible adverse effects.

Çubukçu *et al.* (2024) determined the impact of a training program on symptom management in palliative care cancer patients and their caregivers. This study employed a total of 120 participants, comprising 60 cancer patients and their caregivers, with an equal number in the intervention and control groups. The intervention group was given a complete educational programme in two weeks with the control group not receiving the educational intervention. Using Edmonton Symptom Assessment System and Palliative Performance Scale, symptom outcomes were determined, and with the Family Need Scale, caregiver needs were assessed. Reductions in several symptoms, such as pain, fatigue, depression, anxiety, drowsiness and shortness of breath were noted in the intervention group compared to the control group, and family-need satisfaction also was higher in the intervention group. Although the study was performed in a palliative-care population and not just in patients undergoing active chemotherapy, the findings are relevant and indicate that cancer education can enhance symptom recognition, the management of symptoms, and outcomes of supportive care.

3. Materials and Methods

This study was based on the conceptual structure of input-process-output and Symptom Management Theory. The input component consisted of participant characteristics, clinical characteristics and baseline symptom status. Participant characteristics were age, gender, education, occupation, marital status and monthly income. The clinical factors considered were cancer type, cancer stage, chemotherapy cycle and treatment duration. The process component involved the nurse-led symptom management programme. The intervention consisted of structured education, systematic symptom monitoring, nutrition counselling, relaxation strategies, and energy conservation and follow-up. The outcome measures included post intervention fatigue, nausea and global quality of life measures. The conceptual pathway suggested that symptoms could be evaluated and managed in a structured way to decrease the burden of symptoms and enhance quality of life. The framework also enabled fatigue, nausea and quality of life to be addressed as a triad of outcomes, rather than as three separate measures.

3.1 Research Approach and Design

The research method applied was quantitative with quasi-experimental pre-test – post-test control group design. The experimental group was given the nurse-led symptom management programme along with the regular treatment in the hospital and the control group was given routine institutional treatment. Both groups were assessed pre and post intervention. The quasi-experimental design allowed for the comparison of changes over time within each group, and comparison of the magnitude of the

change between the intervention and control groups. The results are interpreted within the constraint of a quasi-experimental design, due to the design not being specified as a fully randomized controlled trial.

3.2 Study Population and Sample

The target population were adult patients with cancer undergoing chemotherapy treatment. The study sample was 200 participants in the end. Experimental group consisted of 100 participants while the control group consisted of 100 participants.

Table 1. Distribution of Participants by Study Group

Study group	Frequency	Percentage
Experimental	100	50.0
Control	100	50.0
Total	200	100.0

An equal number of participants in each group allowed for comparison of the two groups.

3.3 Participant Characteristics

In the experimental group, the mean age of the participants was 53.07 ± 10.23 years and in the control group, it was 51.59 ± 9.51 years, with a mean age of 52.33 ± 9.88 years for both groups.

Table 2. Age Characteristics of Participants

Characteristic	Experimental	Control	Overall
Mean age	53.07	51.59	52.33
Standard deviation	10.23	9.51	9.88

The experimental group comprised 67% females and 33% males, and the control group comprised 62% females and 38% males.

Table 3. Gender Distribution

Gender	Experimental n (%)	Control n (%)	Total n (%)
Female	67 (67.0)	62 (62.0)	129 (64.5)
Male	33 (33.0)	38 (38.0)	71 (35.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

Educational characteristics showed a representation in all the primary, secondary, higher secondary, graduate and postgraduate levels of education.

Table 4. Educational Distribution

Education	Experimental n (%)	Control n (%)	Total n (%)
Primary	6 (6.0)	13 (13.0)	19 (9.5)
Secondary	22 (22.0)	20 (20.0)	42 (21.0)
Higher Secondary	30 (30.0)	30 (30.0)	60 (30.0)
Graduate	28 (28.0)	30 (30.0)	58 (29.0)
Postgraduate	14 (14.0)	7 (7.0)	21 (10.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

Table 5. Occupational Distribution

Occupation	Experimental n (%)	Control n (%)	Total n (%)
Government employee	19 (19.0)	14 (14.0)	33 (16.5)
Homemaker	14 (14.0)	16 (16.0)	30 (15.0)
Other	21 (21.0)	23 (23.0)	44 (22.0)
Private employee	12 (12.0)	11 (11.0)	23 (11.5)
Retired	16 (16.0)	15 (15.0)	31 (15.5)
Self-employed	18 (18.0)	21 (21.0)	39 (19.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

Table 6. Marital Status Distribution

Marital status	Experimental n (%)	Control n (%)	Total n (%)
Divorced	6 (6.0)	8 (8.0)	14 (7.0)
Married	69 (69.0)	71 (71.0)	140 (70.0)
Unmarried	20 (20.0)	15 (15.0)	35 (17.5)
Widowed	5 (5.0)	6 (6.0)	11 (5.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

Table 7. Monthly Income Distribution

Monthly income	Experimental n (%)	Control n (%)	Total n (%)
<10,000	22 (22.0)	15 (15.0)	37 (18.5)
10,000–20,000	25 (25.0)	35 (35.0)	60 (30.0)
20,001–30,000	29 (29.0)	26 (26.0)	55 (27.5)
30,001–50,000	21 (21.0)	18 (18.0)	39 (19.5)
>50,000	3 (3.0)	6 (6.0)	9 (4.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

3.4 Clinical Characteristics

Overall, the most common cancer type represented was breast cancer with 65 participants. Cervical, colorectal, head and neck, lung, ovarian and other cancers were also covered in the study.

Table 8. Distribution According to Cancer Type

Cancer type	Experimental n (%)	Control n (%)	Total n (%)
Breast	38 (38.0)	27 (27.0)	65 (32.5)
Cervical	14 (14.0)	18 (18.0)	32 (16.0)
Colorectal	11 (11.0)	12 (12.0)	23 (11.5)
Head and neck	10 (10.0)	15 (15.0)	25 (12.5)
Lung	7 (7.0)	9 (9.0)	16 (8.0)
Other	6 (6.0)	9 (9.0)	15 (7.5)
Ovarian	14 (14.0)	10 (10.0)	24 (12.0)
Total	100 (100.0)	100 (100.0)	200 (100.0)

The majority of participants were in stage III disease with stage IV and stage II disease occurring next.

Table 9. Distribution According to Cancer Stage

Cancer stage	Experimental n (%)	Control n (%)	Total n (%)
Stage II	24 (24.0)	23 (23.0)	47 (23.5)
Stage III	43 (43.0)	49 (49.0)	92 (46.0)
Stage IV	33 (33.0)	28 (28.0)	61 (30.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

Table 10. Distribution According to Chemotherapy Cycle

Chemotherapy cycle	Experimental n (%)	Control n (%)	Total n (%)
Cycle 1	20 (20.0)	15 (15.0)	35 (17.5)
Cycle 2	14 (14.0)	17 (17.0)	31 (15.5)
Cycle 3	20 (20.0)	20 (20.0)	40 (20.0)
Cycle 4	18 (18.0)	15 (15.0)	33 (16.5)
Cycle 5	11 (11.0)	15 (15.0)	26 (13.0)
Cycle 6	17 (17.0)	18 (18.0)	35 (17.5)
Total	100 (100.0)	100 (100.0)	200 (100.0)

The mean duration of treatment in the experimental group was 2.91 ± 1.52 months while the mean duration of treatment in the control group was 3.07 ± 1.51 months and the overall mean duration of treatment was 2.99 ± 1.51 months. The experimental group had a mean number of chemotherapy cycles of 3.37 ± 1.73 , the control group had 3.52 ± 1.70 and the overall mean was 3.44 ± 1.71 .

3.5 Intervention

The nurse-led symptom management programme was a supportive intervention that was structured and provided by the researcher or trained nurse. Within the programme, education, symptom monitoring, nutrition counselling, relaxation, energy conservation and follow up support was included.

Table 11. Components of the Nurse-Led Symptom Management Programme

Intervention component	Core purpose	Mode of delivery	Documentation
Education	Improve knowledge and self-management	Structured nurse-led session	Session record
Symptom monitoring	Identify and track fatigue and nausea	Systematic assessment and participant reporting	Monitoring record
Nutrition counselling	Support practical symptom-related dietary management	Individual/group counselling	Counselling record

Relaxation	Promote coping and comfort	Demonstration and guided practice	Intervention checklist
Energy conservation	Support management of fatigue and daily activities	Nurse-led instruction	Intervention checklist
Follow-up support	Reinforce strategies and identify concerns	Scheduled follow-up	Follow-up record

The fatigue-management featured energy conservation, rest-activity balance, sleep hygiene and light activity. Nausea management was part of the education, and consisted of the following: dietary advice, hydration, small frequent feeding, and relaxation techniques. The quality-of-life element included the themes of counselling, coping, social support and self-care education. To support the management strategies, symptom monitoring and follow up was added to the program to help identify issues that may need more clinical attention.

3.6 Outcome Measures

The Brief Fatigue Inventory was used to determine fatigue. Nausea was measured using the Rhodes Index of Nausea, Vomiting and Retching. The EORTC QLQ-C30 was used to evaluate the quality of life in the global group. These instruments contained instrument-based, standardized patient-reported symptom burden and perceived quality of life measures.

3.7 Data Collection Procedure

Participants were screened based on the study inclusion/exclusion criteria. Potential subjects were briefed on the study and their informed consent was taken prior to their participation. Demographic and clinical data was gathered and baseline fatigue, nausea and quality of life measured. The nurse-led symptom management programme was then introduced to the experimental group whose care was otherwise routine, but who had been receiving institutional care. The intervention group received follow-up monitoring and the post-test assessments were conducted for both groups.

3.8 Ethical Considerations

This study documented administrative permission, ethical approval, participant information and informed consent procedures. Participation was done within the approved research framework and the intervention was to be used in

addition to normal chemotherapy care and cancer treatment.

3.9 Statistical Analysis

Data from participants were summarized using descriptive statistics. Continuous variables were analyzed using mean and standard deviation, and categorical variables were analyzed using frequency and percentage. Paired comparisons were used to assess within group changes and independent comparisons were used to assess between group changes. After controlling for pre-test scores, post-test group differences were investigated using ANCOVA. The relationships among the study outcomes were examined using correlation analysis and the predictors of quality of life were examined using multiple regression analysis. Correlations between selected demographic variables and outcome measures were performed using association tests. The level of statistical significance was set at $p < 0.05$.

4. Results

4.1 Primary Outcome: Fatigue

Based on this study, it was found that fatigue reduced significantly in the experimental group as compared to the control group. The main findings are reported a reduction from 6.05 ± 1.50 to 5.44 ± 1.70 in the experimental group and from 5.77 ± 1.40 to 5.60 ± 1.46 in the control group. This value of fatigue is, however, reported in the statistical-output appendix as 4.44 ± 1.70 , with an average change of 1.61 points in the experimental post-test fatigue value. The inferential paired t statistic of 25.426 is consistent with the latter reported change. For this reason, there is an internal transcription error in this study with regard to this value of the post-test. The between-group t value was 16.899, with $p < 0.001$; and the ANCOVA F value was 282.035, with $p < 0.001$.

Table 12. Fatigue Outcome

Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD as reported in principal results	Reported mean change	Statistical result
Experimental	6.05 ± 1.50	5.44 ± 1.70	1.61	$p < 0.001$
Control	5.77 ± 1.40	5.60 ± 1.46	0.17	—

The experimental post-test value is also given in the statistical appendix as 4.44 ± 1.70 . This should be aligned with the original statistical data prior to submission to the Journal.

4.2 Primary Outcome: Nausea

The experimental group showed significant decreases in nausea. Results of the principal thesis reported a decrease in the mean score before the intervention (15.80 ± 3.68) to after the intervention (10.63 ± 3.87), a reported mean

improvement of around 5.18 points. The improvement in the control group was significantly less. The between-group t statistic was 19.765 with $p < 0.001$. The ANCOVA analysis gave the results of $F = 385.094$, $p < 0.001$.

Table 13. Nausea Outcome

Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Reported mean change	Statistical result
Experimental	15.80 $\pm$ 3.68	10.63 $\pm$ 3.87	5.18	$p < 0.001$
Control	15.50 $\pm$ 3.95	15.83 $\pm$ 5.24	0.67*	—

*The means shown for both pre-test and post-test in this study are not the same, resulting in a different arithmetic difference, but there is a mean change of 0.67. The thesis value reported here is the same as the one from the thesis, and it is smaller than the one from the thesis. Another inconsistency is that the pre-test score for the experimental group is listed as 14.80 $\pm$ 3.68 and the post-test score as 14.83 $\pm$ 4.24 for the control group.

4.3 Primary Outcome: Global Quality of Life

The experimental group had an improvement in the quality of life of its people around the world. The major findings indicated that the pre-test score was 57.39 $\pm$ 12.89 whereas the post-test score was found as 67.15 $\pm$

13.41, showing a difference of 9.77 points. A smaller increase was seen in the control group. The between-group *t* statistic was 15.434 with $p < 0.001$. The ANCOVA *F* statistic was 230.072 with $p < 0.001$.

Table 14. Global Quality-of-Life Outcome

Group	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Reported mean change	Statistical result
Experimental	57.39 $\pm$ 12.89	67.15 $\pm$ 13.41	9.77	$p < 0.001$
Control	52.77 $\pm$ 12.28	55.88 $\pm$ 12.65	2.11	—

The number of control post-test scores is reported as 54.88 $\pm$ 12.65 in the statistical-output appendix instead of 55.88 $\pm$ 12.65. As the principal table has a main result of 55.88 $\pm$ 12.65, the uncertainty is clearly noted in the table but the value maintained.

4.4 Inferential Statistical Analysis

The overall inferential analysis showed significant statistical differences between the groups for all three main outcomes.

Table 15. Inferential Statistical Analysis

Outcome	Experimental paired <i>t</i>	<i>p</i>	Control paired <i>t</i>	<i>p</i>	Between-group <i>t</i>	<i>p</i>	Cohen's <i>d</i>	ANCOVA <i>F</i>	ANCOVA <i>p</i>
Fatigue	25.426	<0.001	3.140	0.002	16.899	<0.001	2.390	282.035	<0.001
Nausea	35.577	<0.001	5.157	<0.001	19.765	<0.001	2.795	385.094	<0.001
Global quality of life	-28.169	<0.001	-5.960	<0.001	15.434	<0.001	2.183	230.072	<0.001

The results of the paired analyses revealed statistically significant differences between both groups (experimental and control) for all three outcome variables. The between groups comparisons also showed the results were statistically significant, suggesting there

were varying degrees and directions of change between the nurse led programme and the routine care group. The baseline score was used to adjust the ANCOVA, and the findings were still statistically significant.

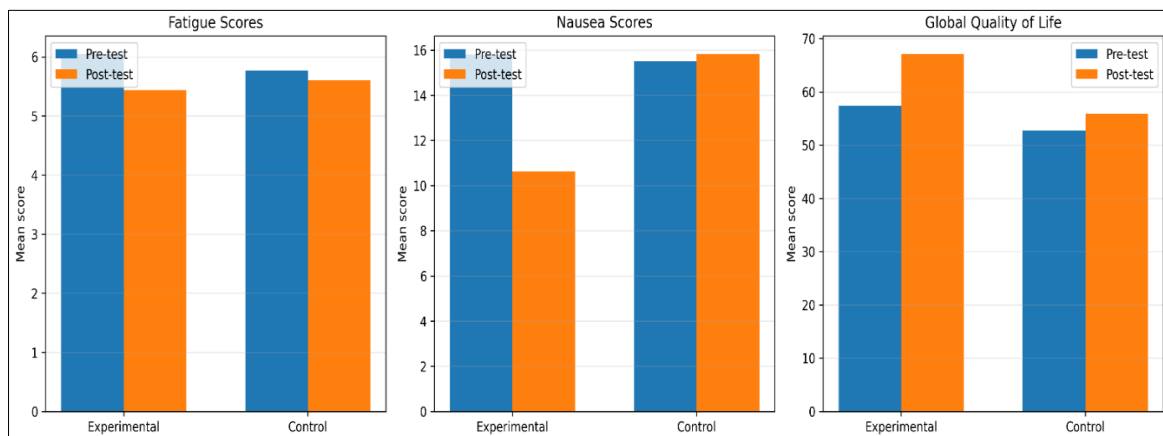


Fig 1. Distribution of study participants between the experimental and control groups.

Fig 2. Pre-test and post-test fatigue scores among the experimental and control groups.

Fig 3. Pre-test and post-test nausea scores among the experimental and control groups.

Fatigue, pre and post intervention, is compared (Fig 2). Fatigue was found to be lower in the

experimental group (6.05 $\pm$ 1.50 to 5.44 $\pm$ 1.70) compared to the control group (5.77 $\pm$ 1.40 to 5.60 $\pm$

1.46). The ANCOVA F-value was 282.035 with the reported between group difference being statistically significant ($t = 16.899$, $p < 0.001$).

The results of the nausea score changes after the intervention are presented in Fig 3. The experimental group showed a decrease from 15.80 ± 3.68 in pre-test to 10.63 ± 3.87 in post-test. The control group however, had little change in its score from 15.50 ± 3.95 to 15.83 ± 5.24 . The statistical difference between the groups was significant ($t = 19.765$, $p < 0.001$) and the ANCOVA analysis gave an F-value of 385.094.

The distribution of the 200 cancer patients included in the study are shown in Fig 1. A total of 100 subjects were required and these were equally divided between the experimental and control groups, with 100 subjects in each group. The education programme was given to the experimental group along with routine care, while the educational programme was not given to the control group, and only routine institution care was given to them.

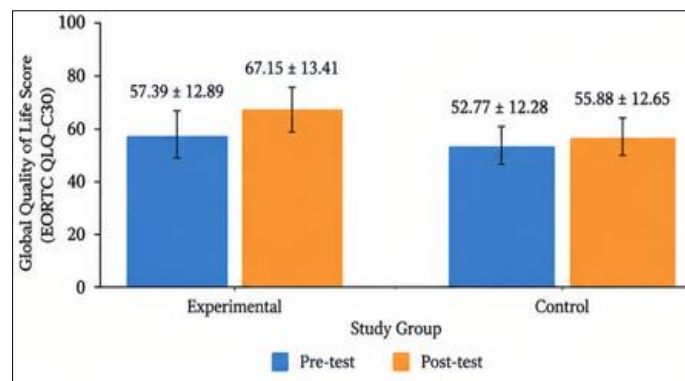


Fig 4. Pre-test and post-test global quality-of-life scores among the experimental and control groups

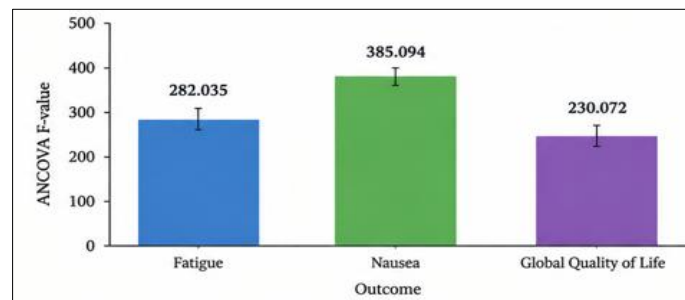


Fig 5. Comparison of ANCOVA F-values for fatigue, nausea, and global quality of life

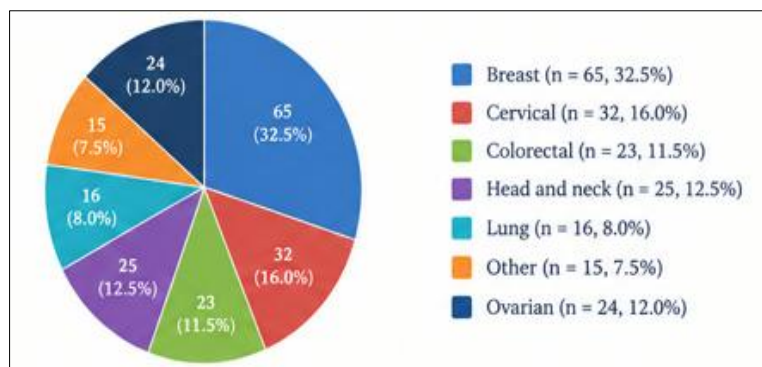


Fig 6. Distribution of participants according to cancer type

The changes in global quality-of-life scores have been shown in Fig 4. The experimental group showed a pre-test (57.39 ± 12.89) and post-test (67.15 ± 13.41). The control group showed a comparatively smaller increase from 52.77 ± 12.28 to 55.88 ± 12.65 .

The between-group difference was statistically significant ($t = 15.434$, $p < 0.001$) and an ANCOVA F value of 230.072. Fig 5 shows comparisons of the ANCOVA F-values for the three main outcome variables. The F-values were 282.035 for fatigue,

385.094 for nausea, and 230.072 for global quality of life. All three results were statistically significant at $p < 0.001$, meaning that there were significant differences between the study groups after the intervention, compared to pre-intervention differences. The cancer type distribution of the study participants is shown in Fig

6. Breast cancer had the highest number of participants with 65 (32.5%), followed by cervical cancer (32), head and neck cancer (25), ovarian cancer (24), colorectal cancer (23), lung cancer (16) and other cancer forms (15). The Fig shows the clinical diversity of the subjects in the study.

4.5 Hypothesis Testing

Table 16. Hypothesis Testing Summary

Hypothesis	Outcome	Statistical finding	Decision
H1	Fatigue	$p < 0.001$	Supported
H2	Nausea	$p < 0.001$	Supported
H3	Global quality of life	$p < 0.001$	Supported
H4	Selected demographic variables	Based on individual association tests	Interpreted according to individual association results

The result of fatigue being significantly lower in the experimental group than the control group led to the support of H1. Nausea was supported due to the statistically significant between group difference ($p < 0.001$). H3 was supported as the global quality of life improved significantly more in the intervention condition ($p < 0.001$). Selected demographic features and study outcomes were analyzed in relation to H4, but no further unsupported p-values are added here since the

source thesis does not contain complete numerical association statistics with the results retrieved.

4.6 ANCOVA Analysis

The results from ANCOVA are important as a supplemental assessment as baseline differences may impact post-test comparisons in quasi-experimental research. This study found statistically significant adjusted effects for fatigue, nausea and quality of life.

Table 17. ANCOVA Results

Outcome	ANCOVA F	p-value
Fatigue	282.035	<0.001
Nausea	385.094	<0.001
Global quality of life	230.072	<0.001

The results of ANCOVA suggested that the observed differences between groups in post-test remained statistically significant controlling for pre-test outcome levels.

5. Discussion

The present study compared the effectiveness of a nurse-led structured symptom management programme for adults undergoing chemotherapy. All major results showed a statistically significant difference between the experimental group and the control group in terms of fatigue, nausea and global quality of life. This consistency is crucial because chemotherapy side effects are multi-faceted and cross-cutting patient-reported outcomes were used. The intervention was not symptom specific, but included symptom knowledge, monitoring, nutrition, hydration, energy conservation, relaxation, self-care and follow-up. The results with regard to fatigue showed that the nurse-led programme led to a higher decrease in fatigue compared to the routine care group. The statistical analysis revealed a high between group effect: Cohen's $d = 2.390$ and ANCOVA F value = 282.035 ($p < 0.001$). The outcome is in line with the conceptual underpinning of the intervention which consisted of practical activities focused on energy

conservation, rest-activity balance, sleep hygiene and suitable activity. These strategies are especially important for patients who are going through chemotherapy, as these patients may not be able to get enough rest. Patients may benefit from structured nursing education, which can help them determine when they are more and when they are less energetic, and plan activities accordingly. This decrease in nausea was also statistically significant. The t statistic between the experimental and control group is 19.765 and Cohen's d is 2.795, indicating a marked difference between the two groups. The F statistic (385.094) was found to be statistically significant for the adjusted group difference, when compared to the ANCOVA value of < 0.001 . The part of the intervention that focused on nausea management consisted of dietary changes, maintaining hydration, providing small frequent meals, and providing relaxation and reinforcement of symptom reporting. These factors are clinically relevant due to the ability of nausea to influence food and fluid intake, daily functioning, emotional well-being. A nurse-led approach offers the chance to see patterns of symptoms again and again, and to practice strategies. The relevance of the quality-of-life findings is noteworthy because symptom management should aim to lead to an improvement in a

patient's overall treatment experience, and not simply decrease symptom scores. According to the content of the main thesis, the results of the experimental group were: an improvement in the quality-of-life scores was reflected in an increase from 57.39 ± 12.89 to 67.15 ± 13.41 . This gain is significantly higher than the gain reported by the control group (9.77 points). All the means of the between group t statistic, Cohen's d, and ANCOVA F were statistically significant at $p < 0.001$.

There is a consistent pattern of improvements in fatigue, nausea and quality of life at the same time. Limits to activity and independence may be caused by fatigue, and nausea can interfere with nutrition, hydration and daily functioning. These symptoms may overlap, and if they are experienced concurrently, can have a cumulative impact beyond each of the individual symptom domains. Hence, the observed outcome pattern is of dimension that is relevant to the intervention. The programme involved education and self-management support, as well as practical behavioural strategies and follow-up. Demographic distribution showed that both groups had participants of various ages, educational statuses, occupations, and marital statuses and income levels. Several cancer types and disease stages were also included in the cancer profile. Breast cancer was most common diagnosis and stage III was most commonly represented stage. The participants were evenly distributed throughout chemotherapy cycles 1-6. The characteristics suggest that the study population contained patients with diverse treatment experiences. There was not much difference in the mean age of the experimental and control group. Likewise, both groups represented the various demographic and clinical categories. These features offer contextual assistance to support comparison of the outcomes, but do so in light of the quasi-experimental design, which does not rule out unmeasured differences between participants. The potential association between fatigue, nausea and quality of life was also explored. The three outcomes are

conceptually linked as symptom burden can have a detrimental impact on physical functioning, nutritional intake, emotional wellbeing, social participation and self-care. A correlation observed across symptoms and QOL should not be considered as proof of direct causation, however. The observed results may be due to multiple disease characteristics, chemotherapy regimen, nutritional status, sleep, psychological factors, family support and other factors. The nurse's role is an integral part of this model as there is a high frequency of interaction between the nurse and patient throughout the cycles of treatment. This repeated contact provides a chance to evaluate the symptoms, to educate, reinforce self-care, and to recognize when changes are needed and/or refer a patient when symptoms are not within the range of routine supportive management. The findings thus have implications for the organization of supportive oncology nursing services.

5.1 Overall Study Findings

The study comprised of 200 adult chemotherapy patients, 100 patients in experimental group and 100 patients in control group. The mean age in the experimental group was 53.07 years while in the control group it was 51.59 years and a mean age of 52.33 years in both combined. The females accounted for 64.5% of the total sample, while the stage III cancer accounted for 46.0% of the sample. The largest cancer category represented was breast cancer with 32.5% of the participants. This intervention was multi-faceted and comprised structured education, symptom monitoring, nutrition counselling, relaxation, energy conservation and follow up. The experimental group showed significant differences in the three main outcomes. The effect sizes reported were large with Cohen's d values for fatigue of 2.390, nausea 2.795 and global quality of life 2.183. The results of ANCOVA were statistically significant for fatigue, nausea and global quality of life with F values of 282.035, 385.094 and 230.072, respectively ($p < 0.001$).

Table 18. Final Results Summary

Outcome	Direction of improvement	Between-group result	Cohen's d	ANCOVA F	ANCOVA p
Fatigue	Decreased	Significant	2.390	282.035	<0.001
Nausea	Decreased	Significant	2.795	385.094	<0.001
Global quality of life	Increased	Significant	2.183	230.072	<0.001

5.2. Clinical and Nursing Implications

The results indicated that a nurse-led, structured symptom management program is a viable and useful part of the care provided by oncology nurses. The programme is especially relevant as it does not call on the nurse to take the place of medical treatment. Rather, it is used as an adjunct to routine care, offering systematic symptom assessment, education, counselling and follow-up. Fatigue: Nurses can measure how severe fatigue is and how it affects a person's functioning and then offer tailored education about energy conservation, activity planning, and rest-activity balance and sleep. Nurses can review symptom patterns, and strengthen

adherence to the medication, adequate hydration, diet changes and early reporting of persistent symptoms for the case of nausea. In quality of life, social and functional issues can be included along with coping strategies, and self-care education and support. The programme also illustrates the need for continuity. Treatments given as part of the initial education may not be enough if chemotherapy is to be given for a long period of time and symptoms and patient needs may vary from one cycle to the next. It is important, therefore, that the process of assessment and reinforcement is repeated as an important part of supportive care.

5.3. Strengths of the Study

The advantages of the study are the three complementary patient-reported outcomes used. The assessment of fatigue, nausea and global quality of life enabled the intervention to be evaluated from both the symptom-specific and patient-centred perspectives. A balanced comparison was made since both groups had the same number of participants: 100. Standardized assessment tools were also used in the study and within-group and between-group statistical comparisons were made. The use of ANCOVA was used as an added measure to determine post-test group differences after controlling for baseline scores. One strength is the treatment of the multi-dimensional treatment. The programme did not focus on one single educational message, but rather used approaches to include education, symptom monitoring, nutrition counselling, relaxation, energy conservation, and follow-up. This design represents the multi-dimensionality of burden of chemotherapy-related symptoms.

5.4. Limitations

The research was not fully randomized design, but rather was a quasi-experimental design. The potential for selection bias and residual confounding therefore cannot be ruled out completely. The study was carried out in a selected hospital setting, thus the results may not be directly generalizable to other oncology settings and patients. The results largely relied on patient-reported outcomes, so the role of individual differences in symptom perception and reporting may have affected the results. Some types of cancer, disease stages and cycles of chemotherapy were included as participant groups. Clinical heterogeneity is seen in practice, and can be seen as a source of variation in symptom burden and treatment response. This study intervention period was the only period of follow-up used in this report, and the durability of effects over extended follow-up is unknown. Another caveat that was noted in the course of preparing this manuscript is that there are minor inconsistencies in the source thesis on number. Specifically, some post-test means and reported mean-change values differ between the principal results shows that and the statistical-output appendix. The inferential statistics are presented separately, and must be checked with the original data set prior to submission to a peer-reviewed journal. The issue is not one to justify invention of replacement values, hence the present paper aims to make the discrepancies explicit.

6. Conclusion and Future Scope

There was a significant difference between the cancer patients who were given the nurse-led symptom management programme and those who received routine care in fatigue, nausea and global quality of life. It was observed that the experimental group had a better improvement overall with regards to all three major outcomes. Fatigue was statistically significant with $p < 0.001$, nausea was statistically significant with $p < 0.001$,

and global QOL proved to be statistically significant with $p < 0.001$. Results from ANCOVA also confirmed the robustness of the group differences, with the baseline values for outcomes not influencing the results. The results suggest that supportive interventions provided by nurses could be effective in alleviating symptom burden associated with chemotherapy via an integrated approach that includes education, monitoring, nutrition counselling, relaxation, energy conservation and follow-up. The intervention thus offers a structured nursing care framework for caring for patients during chemotherapy and for connecting symptom management with outcomes in general quality of life. Due to the quasi-experimental design, the study took place in a selected clinical setting, so the results should be considered in that specific study design and population. However, the uniformity of the reported outcomes in fatigue, nausea, and quality of life may serve as a foundation to continue to assess the effects of symptom management using a structured approach by oncology nursing. Larger multicentre samples across various types of cancer, treatment regimens and healthcare contexts should be studied in the context of the effectiveness of nurse-led symptom management programmes in the future. Randomized controlled designs would help establish stronger evidence of the causal effect of the intervention and stratified analyses would allow for the determination of differences in the response by cancer type, stage, chemotherapy regimen or treatment cycle. Long term follow up will be able to confirm if there is long term improvement in fatigue, nausea and quality of life. Additional studies might also investigate whether nurse-led intervention over multiple chemotherapy cycles results in cumulative effects. This could include the use of digital symptom monitoring, telehealth follow-up or mobile health apps to assess symptoms in between office visits. Further investigation could include the economic impact of structured nurse led symptom management and the potential impact on unplanned health care utilization, treatment adherence, patient productivity or caregiver burden. A study focusing on the interactions between family involvement, health literacy, nutritional status, psychological distress and social support, and their effect on symptom management would also be of interest. Detailed mediation and longitudinal modelling are recommended to further examine the relationship between reductions in fatigue and subsequent improvements in QOL as well as the role of demographic or clinical factors on intervention response in future studies. The dosage of intervention and the frequency of sessions as well as follow-up measures should also be standardized across institutions in order to increase the level of reproducibility. Prior to dissemination as a final journal manuscript the original statistical data set should be reconcilable with this study tables and appendix to resolve discrepancies in the reported values of fatigue, nausea, and those of the control group in terms of quality of life.

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