Effect of Self-Care Guidelines on Symptoms Burden for Patients with Lung Cancer Undergoing Chemotherapy

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ABSTRACT

Context: Lung cancer is common cancer worldwide. Because of the high-symptoms burden and severe morbidity, effective symptoms management requires comprehensive self-care strategies.
Aim: This study was aimed to assess the effect of self-care guidelines on symptoms burden for patients with lung cancer undergoing chemotherapy.
Methods: This study was conducted at the outpatient clinics in Radiation Oncology and Nuclear Medicine Center, affiliated to Ain Shams University. A quasi-experimental (pre/posttest) design was employed on a purposive sample of 50 adult patients were recruited for this study. The data were collected through a structured interview questionnaire to assess the patients' socio-demographic characteristics, medical health profile, and knowledge about lung cancer. Lung Cancer and Chemotherapy Associated Symptoms Self-care Practices' Assessment Questionnaire and M. D. Anderson Symptom Inventory-Lung Cancer (MDASI-LC) were also used.
Results: The present study revealed that 36% of the patients had a satisfactory level of knowledge pre-implementation of self-care guidelines, which improved significantly for 48% of the patients post-implementation at p 0.007. 26.3% of them exhibit a satisfactory level of self-care practice pre-implementation of self-care guidelines that improved significantly (57.9%) post-implementation at p 0.001. Also, lung cancer symptom burdens and symptoms' influence on patients' lives were significantly improved after the implementation compared with preintervention level at p 0.001. A non-significant difference between pre and post-implementation of self-care guidelines regarding symptoms interference with patients' life was revealed at p 0.801. There were statistically negative correlations between patients' total symptom severity and self-care practice pre- and post-self-care guidelines implementation**.**
Conclusion: self-care guidelines have a statistically significant positive effect on decreasing the severity of lung cancer symptoms. While chemotherapy-associated symptoms were slightly improved, there were no significant differences between pre and post-self-care guidelines implementation regarding symptoms interference with patients' life. Health education programs about the disease and its management should be provided for lung cancer patients.

Keywords: Lung cancer, chemotherapy, self-care, symptom burden

1. Introduction

Lung cancer is an uncontrollable growth of the cells in the respiratory system. About 14 percent of all new cancers are lung cancers. Lung cancer is the leading cause of cancer death among both men and women. The average 5-year survival is 16.8 percent. Lung cancer mainly occurs in older people *(American Cancer Society, 2017).*

According to the World Health Organization (WHO), there are two main types of lung cancer: small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC), each with its pathology, which also affects the treatment and management plan. A comprehensive recognition of the different lung cancer types, how they present, and how they

may be treated is important in providing the best possible care for patients *(Mason et al., 2010).*

Several risk factors for lung cancer have been associated with lifestyle choices, meaning that the risks can be either managed or avoided in many cases. The most common lifestyle risk factor in the development of lung cancer is smoking. Other risk factors contributing to lung cancer development include involuntary or secondhand smoking and industrial and environmental hazards *(Chapman et al., 2014).*

Lung cancer rarely gives an early sign of its presence. It may be accidentally detected when viewing a routine chest x-ray, or it may be suspected by symptoms that presented by the patient such as cough, especially one that changes or becomes productive, unilateral wheezing, dyspnea, pneumonia, chest pain, or pain in the shoulder and

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arm, hemoptysis, vocal cord paralysis, atelectasis, neurologic changes and weight loss *(Bezjak et al., 2017).*

Multiple treatment options are available for lung cancer patients. Traditional methods, including surgery, chemotherapy, and radiation, continue to be the mainstays, but alternative methods are being increasingly developed and used. Many of the treatment options available to lung cancer patients have extensive side effects, which should be discussed and minimized as much as possible *(Crawford, 2014).*

Serious short-term side effects occur with aggressive chemotherapy. The hematopoietic system's side effects can be life-threatening and are the most common reason for changing the dosage or schedule. The suppressive effects on the blood-forming cells of bone marrow cause anemia, neutropenia, and thrombocytopenia. Common distressing side effects include nausea and vomiting, weight loss, alopecia, mucositis, skin changes, anxiety, sleep disturbance, altered bowel elimination, and cognitive function changes. These side effects are referred to as cancer therapy symptom distress *(Ignatavicius et al., 2017).*

It is frequently difficult for patients (and clinicians) to accurately ascertain the underlying basis of symptoms. Symptoms can be produced by the disease itself or by disease treatment, in which case they are often referred to as side effects or toxicities. Symptoms can also arise from comorbid medical conditions or acute injuries. These sources of distress collectively impose a "symptom burden" upon the patient that is a subjective counterpart of summary expressions of disease such as tumor or treatment burden. Symptom burden can be thought of as the sum of the severity and impact of symptoms reported by a significant proportion of patients with a given disease or treatment *(Dahlberg et al., 2015).*

Self-care is the practice of activities that individuals initiate and perform on their behalf in maintenance life, health, and well-being. Self-care is purposeful and conducted to meet self-care requisites (need) of individuals themselves or others in need of care (dependent care). Self-care depends on knowledge, resources, and action *(Black & Hawks, 2008). Piamjariyakul et al. (2010)* reported that helping cancer patients cope with chemotherapy's side effects and providing education and information on care are necessary. Patient education can improve the patients' health, which remains a high priority, especially in patients with metastatic disease *(Gampenrieder et al., 2010).*

2. Significance of the study

Lung cancer is the most lethal malignancy in Egypt. According to the latest WHO data published in 2017; Lung Cancers Deaths in Egypt have reached 4,869 or 0.95 percent of total deaths. The age-adjusted death rate ranks Egypt 116 in the world at 7.50 per 100,000 populations. Egypt does not have a national screening program, so most patients are diagnosed with either locally advanced or metastatic diseases *(Ibrahim et al., 2014).*

Although advancements in the diagnosis and treatment of lung cancer made in the last few decades, lung cancer remains the deadliest cancer, knowledge of lung cancer and its effects on patients will better prepare healthcare professionals for the disease process's realities and the necessity for comprehensive care and patient teaching.

Since many patients receive treatment in outpatients or stay in the hospital for short periods that placed a significant burden on patients with lung cancer, forcing them to manage disease symptoms and treatment side effects at home, this demonstrates the importance of educational interventions, which include the application of self-care guidelines related to lung cancer and chemotherapy side effects and its management, symptoms assessment and re-evaluation of symptoms.

3. Aim of the study

The present study was conducted to fulfill the following aim: Assess the effect of self-care guidelines on symptoms burden for patients with lung cancer undergoing chemotherapy through the following:
- Assessing patients' knowledge related to lung cancer and its management.
- Assessing the patients' self-care practice related to lung cancer symptoms.
- Assessing symptoms severity and its interference with patients' life.
- Developing and implementing self-care guidelines based on patients' symptom assessment.
- Evaluating the effect of self-care guidelines on patients' knowledge, self-care practice, and symptoms burden.

3.1. Research hypotheses

The current study hypothesized that:
- The implementation of self-care guidelines for patients with lung cancer undergoing chemotherapy will positively affect their knowledge compared with their pre-intervention level.
- Implementing self-care guidelines for patients with lung cancer undergoing chemotherapy will positively affect their self-care practice compared with their pre-intervention level.
- Implementing self-care guidelines for patients with lung cancer undergoing chemotherapy will significantly reduce the symptoms burden compared with their pre-intervention level.

4. Subjects & Methods

4.1. Research Design

A quasi-experimental (pre/posttest design) was employed to collect the study's data. It is an empirical intervention study used to estimate the causal impact of an intervention on the target population with random assignment *(Silverman, 2016).*

4.2. Study setting

This study was conducted in outpatient clinics in Radiation Oncology and Nuclear Medicine Center, affiliated with Ain Shams University. The building is located next to Arab Elmohamdy Garden, Cairo. The center contains in-patient and outpatient departments. The

chemotherapy clinic located on the second floor in the in-patient department contains two-room. Each one had eight beds.

4.3. Subjects

A purposive sample of 50 adult patients admitted to the previously mentioned setting during data collection was recruited in this study. The sample size calculation is done based on power analysis:

The sample size was calculated using Epicalc, 2000 software with the following inputs: The minimal sample size was 50 cases.
- Type I error (α) =5% with confidence level 95%
- Study power 90 % (power of test) with type error II 10% (Beta)
- The significance level (α) at 0.05

The total sample size was calculated according to this equation

$$n = \frac{N}{1 + N(e)^2}$$

- Where: 'n' is the sample size.
- 'N' is the number of the year (2016/2017) at Ain Shams University Hospital was 123 patients.
- 'e' is coefficient factor=0.05.
- Sample size=50.

Inclusion criteria

Adult patients of both genders, primarily diagnosed with lung cancer, never had an educational program about the disease and its management, and free from other chronic diseases were selected.

4.4. Tools of data collection

4.4.1. Structured Interview Questionnaire

It was designed for patients with lung cancer undergoing chemotherapy. This questionnaire was developed by the researcher in simple Arabic language based on reviewing the related recent literature *Linton (2011); DeGroot and Munden (2012); Washington and leaver (2015); Polanski et al. (2016); Wong (2017); Ten-Haaf et al. (2017); Wingard (2018)* and filled in by the researcher. It includes the following three parts:

Part 1 is concerned with the patients' socio-demographic characteristics such as age, gender, occupation, marital status, education level, and residence.

Part 2 encompassed the patients' medical health profile, such as patient's medical history, including present history (as (time of the complaint, time of hospital admission, type of tumor, stage of the disease, types of treatment), family, and smoking history.

Part 3designed to assess the patients' knowledge related to lung cancer disease. This part consisted of 23 "yes/no questions" and" 20 "MCQ questions" aimed to assess the patients' knowledge related to the following:
- Lung cancer definition, types, causes, stages, signs and symptoms, diagnostic procedures, and lung complications (13 yes/no questions).

- Types of treatment, factors that contribute to choosing the line of treatment, and possible complications of treatment (10 yes/no questions).
- Self-care practices for associated symptoms (20 MCQ questions). It aimed to assess patient learning needs about self-care practices for lung cancer symptoms (breathlessness, cough, pain, weight loss, fatigue) and chemotherapy-associated symptoms (nausea/vomiting, diarrhea, constipation, mucositis, alopecia, infection, bleeding, anemia, neurological problems, urological problems, skin problems, sleep problems, extravasation, concentration/memory problems, sexual problems, and psychological problems).

Scoring system

Each correct answer was given one grade, and the incorrect answer was given zero. The total score of knowledge was 43 grades. The total score was classified as follows:
- <70% was considered unsatisfactory (<30.25 marks)
- ≥ 70% was considered satisfactory (≥30.25 marks).

4.4.2. Lung Cancer and Chemotherapy Associated Symptoms Self-care Practices' Assessment Questionnaire

The researcher developed this questionnaire in the Arabic language based on the related literature *Kreidieh et al. (2016); Polanski et al. (2016); American Cancer Society, (2017); Dupuis et al. (2019); Lange et al. (2019); Polovich (2014); Valpey et al. (2019).* It was used to assess patients' self-care practices for lung cancer and chemotherapy-associated symptoms. This questionnaire includes two parts:

Part 1 included the self-care practices related to lung cancer symptoms. It was composed of 38 items that involved the assessment of the patient's self-care practices regarding lung cancer symptoms dyspnea (6 practices), cough (6 practices), pain (6 practices), dysphagia (6 practices), anorexia/weight loss (7 practices), and fatigue (7 practices). Part 2 comprised self-care practices related to chemotherapy-associated symptoms. It was composed of 118 items. It was concerned with the assessment of the patient's self-care practices regarding chemotherapy-associated symptoms nausea/vomiting (11 practices), diarrhea (6 practices), constipation (7 practices), mucositis (10 practices), alopecia (8 practices), infection (11 practices), bleeding (9 practices), anemia (5 practices), neurological problems (6 practices), urological problems (3 practices), skin problems (9 practices), sleep problems (8 practices), extravasation (6 practices), concentration/memory problems (7 practices), sexual problems (7 practices), psychological problems (5 practices).

Scoring system

Each step's response was divided into (always done, sometimes done, and never done). Two grades were given to the item, which was always done, and one grade was given to the step, which was sometimes done, and zero to the step, which was never done.

The score for part one was 76 grades for 38 items, and the score for part two was 236 grades for 118 items. The total score of the patient's self-care practice was 312 grades for 156 items. The subtotal and total scores were considered as the following:

- > 70% was considered a satisfactory level of self-care practice.
- < 70% was considered an unsatisfactory level of self-care practice.

4.4.3. M. D. Anderson Symptom Inventory-Lung Cancer (MDASI-LC)

This tool was adapted from *Mendoza et al. (2011)* and modified by the researcher, then translated and back-translated into Arabic. It contains two sections as follow:

4.4.3.1. Symptom Severity Subscale

This scale aimed to assess the severity of lung cancer symptoms (9 symptom items) as cough, hemoptysis, chest pain, breathlessness, chest wheezing, pain, dysphagia, anorexia/weight loss, and fatigue. Also, it assessed chemotherapy-associated symptoms (16 symptoms items) as nausea/ vomiting, diarrhea, constipation, mucositis, alopecia, infection, bleeding, anemia, cognitive, neurological, urological, skin, sleep, sexual, extravasation, and psychological problems.

4.4.3.2. Symptom Interference Subscale

This scale aimed to measure symptom impact on functioning, and it contains six items measuring symptom interference with activity dimensions (walking ability, general activity, work) and affective dimensions (relations with other people, enjoyment of life, and mood).
Scoring system
The patients' response (MDASI-LC) scale was made on a 10 point Likert scale, where 0= no problem, from 1-<3= mild symptoms interference, from 4-<6 = moderate symptoms interference, from 7-<10 = severe symptoms interference. The subtotal mean score was calculated and categorized as:

- Low severity interference = 0-<50%
- Moderate severity interference =50-75%
- High severity interference =≤75%

The items in each subgroup were summed up, and the total scores were divided by the number of items in each subgroup, giving a mean score for the subgroup; also, the total mean for the (MDASI-LC) scale was calculated.

4.5. Procedures

The study included a preparatory phase, pilot study, and fieldwork.

The preparatory phase included reviewing related literature and theoretical knowledge of various aspects of the study using books, articles, the internet, periodicals, and journals to develop data collection tools.

Content validity and reliability: Testing the validity of the proposed tools by using face and content validity. Face validity refers to the extent to which a test appears to measure what it is intended to measure. Content validity

was conducted to ascertain whether the tools measured what was supposed to measure. The face and content validity of the suggested tools was assessed through a jury of 7 experts that consisted of 3 professors, two assistant professors, and two lecturers from the Medical-Surgical Nursing department at the Faculty of Nursing, Ain Shams University, and Oncology and Nuclear Medicine department at Faculty of Medicine, Ain Shams University. The jury reviewed the tools for clarity, relevance, comprehensiveness, and simplicity; then, based on the jury's opinion, minor modifications were carried out, and the final forms were developed. The same jury was validating the self-care guidelines.

Testing the reliability: It was referred to the extent to which the same answer can be obtained by using the same instruments more than one time of the same tool *(Sharma, 2014),* testing was done by using Alpha-Cronbach Test, it was 0.885 for knowledge assessment section, 0.887 for self-symptoms care practice, and 0.870 for symptoms severity.

An official letter was issued from the faculty of nursing, Ain Shams University, to the medical and nursing director of Ain Shams University hospital and the medical and nursing director of the oncology center at Ain Shams University hospital at which the study was conducted, explaining the purpose of the study and requesting the permission for data collection from the study group.

Ethical Considerations: Ethical approval was obtained from the faculty ethical committee before starting the study. The researcher clarified the objectives and aim of the study to the selected patients before starting. The researcher assured maintaining anonymity and confidentiality of subjects' data. Patients were informed that they were allowed to choose to participate or not in the study, and they had the right to withdraw from the study at any time.

A pilot study was conducted on five patients (10%) of total study subjects. They were included and chosen randomly from the previously mentioned setting to test the feasibility of the research process, the applicability, and the clarity of the study tools. Also, it estimates the average time needed to complete the tools. Accordingly, necessary modifications were made for the final development of the study tools. Some questions and items were omitted, added, or rephrased, and the final forms were developed. Patients selected for the pilot study were excluded from the study subjects.

Fieldwork: The study was started and finished through the following phases.

Assessment and planning phase: The researcher met the patients with lung cancer at the outpatient clinics in Radiation Oncology and Nuclear Medicine Center. The patients who fulfilled the inclusion criteria were selected. The researcher obtained the patients' verbal consent for participating in this study after explaining the aim of the study. Filling in the previously mentioned tools was done by the researcher before the implementation of the self-care guidelines. These tools were completed within an average time of 75 minutes.

All information collected through data collection tools was interpreted for identifying individualized teaching

needs. The researcher set up a teaching plan covering all objectives (equipping, acquiring, demonstrating knowledge, and practicing the disease, chemotherapy, associated symptoms self-care).

The resources and facilities for applying self-care guidelines were allocated (printed material, PowerPoint presentation, videos, and sessions) that best assist the learners. The appointment for starting teaching sessions was determined and scheduled with the patients (Monday, Thursday weekly).

Implementation phase: The teaching sessions were conducted in a classroom in the chemotherapy unit. The classroom was conditioned, quiet had adequate lighting, was well ventilated and furnished, and had adequate spacing for implementing self-care guidelines.

Each self-care practice session had taken 30-45 minutes/day for two days (Monday, Thursday) per week. These sessions were conducted for a small group; each group number did not exceed 3-5 patients. The total number of sessions is six sessions for each patient.

At the beginning of each session, an orientation of the importance of self-care practices was explained to the patients to motivate them to follow the guidelines. Each session started by greeting the patients, assessing patients' motivation for learning, presenting the objectives, showing, and explaining the topic using simple language to suit the patients' educational level. Getting feedback about what was explained and given through the session and facilitating questions about the topic.

The researcher emphasized the importance of adherence to each step of self-care guidelines on lung cancer and chemotherapy-related side effects through building a supportive environment. The researcher encouraged patients to express his/her readiness for changing their behavior. Implementation of self-care guidelines on lung cancer and chemotherapy-related side effects lasted for three months for all patients.

The collection of data and application of self-care guidelines lasted over one year; it started from February 2019 to the end of January 2020. Guidelines' content covered the following outlines
- Lung cancer definition, risk factors, clinical manifestations.
- Chemotherapy definition, types, uses, and side effects.
- Self-care guidelines for the patients with lung cancer undergoing chemotherapy are as the following:
    - Lung cancer symptoms self-care guidelines.
    - Chemotherapy side effect self-care guidelines.
    - Psychological self-care guidelines.
    - Social self-care guidelines.
    - Spiritual self-care guidelines.

Evaluation phase: The evaluation phase emphasized the effect of self-care guidelines on lung cancer symptoms and chemotherapy-related side effects among patients with lung cancer by filling in the tools concerned with knowledge, self-care practices, and symptoms experience again after implementing the self-care guidelines.

Comparing the collected data before, after (three months) from the application of self-care guidelines.

4.6. Data analysis

All data were collected, tabulated, and subjected to statistical analysis. Statistical analysis is performed by the computer Statistical Package for Social Science (SPSS), version 20.0, used for data handling and graphical presentation. Quantitative variables are described by mean, Standard Deviation (SD), while proportions and percentages describe qualitative categorical variables. The comparison was made using the X^2 test. Linear Correlation coefficient Test of significance was used to detect the correlation between two quantitative variables in one group. The significance of the result, the observed difference, and association were considered as follows:
- Non-significant (NS) $P > 0.05$
- Significant (S) $P \leq 0.05$
- Highly significant (HS) $P \leq 0.01$

5. Results

Table 1 reveals that the mean age of the studied patients was 55.9 ± 8.7, and 56.0% were males. Also, 72.0% were not working, 84.0% were married, 38.0% could not read and write, and 80.0% were residents in urban areas.

Table 2 shows that 58.0% and 60.0% of studied patients complained of symptoms up to 12 months and were admitted to the hospital from 6 months, respectively. Also, 84.0% of the studied patients had NSCLC, and 50.0% of the studied patients were at stage three of the tumor, and 100% of the studied patients were receiving chemotherapy, while none of them had surgical interventions.

Table 3 shows that 18% of the studied patients had a family history with the cancerous disease; lung cancer represents 55.0% of cancerous disease among studied patients' families. Also, 55.0% of cancerous diseases occur among second-degree relatives.

Table 4 illustrates that 44.0% of the studied patients were active smokers, and 100% of them were smoking cigarettes, and 59.1% were smoking two packs of cigarettes per day. Also, 95.5% of the studied patient started smoking for equal or more than 15, and 53.6% were passive smokers.

Table 5 shows that 36% of the studied patients had a satisfactory level of total knowledge pre-implementation of self-care guidelines, which improved to 48% post-implementation of self-care guidelines with statistically significant differences (p≤0.05).

Table 6 shows that 26.3% of the studied patients had a satisfactory level of total self-care practices pre implementing self-care guidelines, which improved to 57.9% after implementing self-care guidelines with highly statistically significant differences (p≤0.001).

Table 7 shows that 76% of the studied patients had severe lung cancer symptoms pre-implementation of self-care guidelines, which improved, post-implementation of self-care guidelines to 8% with a highly statistically significant difference (p<0.001).

Table 8 shows that 40% of the studied patients had severe chemotherapy-associated symptoms pre-implementation of self-care guidelines that did not improve in the post-implementation phase of self-care guidelines with no statistically significant difference (p≤0.801). Some symptoms were significantly improved, such as diarrhea, constipation, urological and skin problems (P≤0.05).

Table 9 shows that 64% of the studied patients had severe symptoms that interfered with their life pre-implementation of self-care guidelines, which improved significantly to 20% post-implementation of self-care guidelines with highly statistically significant differences (p<0.001).

Table 10 reveals that the total mean score of symptoms severity was 64.17±8.21 pre-implementation of self-care guidelines, which improved significantly to 23.53±3.55 after implementing self-care guidelines (p≤0.001). The table also shows that there is a non-significant improvement in chemotherapy-associated symptoms (p=0.346).

Table 11 shows statistically significant negative correlations between patients' total symptom severity and pre-and post-self-care guidelines implementation (p<0.05).

Table 12 reveals statistically significant positive correlations between patients' total practice and knowledge pre-self-care guidelines implementation (p<0.011) while, post-self –care guidelines implementation becomes a highly significant positive correlation (p<0.001). There were also highly statistically significant negative correlations between patients' total symptoms severity and total knowledge pre-and post-self-care guidelines implementation (p<0.001).

Table (1): Frequency and percentage distribution of socio-demographic characteristics of the studied patients (n=50).

Items	N	%
Age		
40-49	12	24.0
50-59	20	40.0
≥60	18	36.0
Mean±SD	55.9±8.7	
Gender		
Male	28	56.0
Female	22	44.0
Work		
Work	14	28.0
Does not work	36	72.0
Marital Status		
Single	0	0.0
Married	42	84.0
Widow / Divorced	8	16.0
Educational level		
Cannot read and write	19	38.0
Reads & writes	8	16.0
Basic	11	22.0
Bachelor	12	24.0
Residence		
Urban	40	80.0
Rural	10	20.0

Table (2): Frequency and percentage distribution of the present history among the studied patients (n=50).

Present history	N	%
When symptoms started		
Up to 6 months	11	22.0
Up to 12 months	29	58.0
More than 12 months	10	20.0
Mean±SD	10.9±5.4	
When a patient admitted to a hospital		
Up to 6 months	30	60.0
Up to 12 months	17	34.0
More than 12 months	3	6.0
Mean±SD	6.6±5.1	
Type of tumor		
Non-small cell lung cancer (NSCLC)	42	84.0
Small cell lung cancer (SCLC)	7	14.0
Other	0	0.0
Stage of disease		
1	0	0.0
2	10	32.0
3	25	50.0
4	9	18.0
Type of treatment		
Chemotherapy	50	100.0
Radiation therapy	13	26.0
Surgery	0	0.0

Table (3): Frequency and percentage distribution of the family history among the study patients (N =50).

Items	Positive family history	
	N	%
Family history of cancer	9	18.0
Type of cancers among family		
Leukemia	1	11.1
Brain cancer	0	0.0
Liver cancer	0	0.0
Lung cancer	5	55.0
Breast cancer	3	33.3
Degree of relationship		
1st degree	4	44.4
2nd degree	5	55.6

Table (4): Frequency and percentage distribution of smoking history among the study patients (N =50).

Items	Patients smoking history	
	N	**%**
Active smokers	22	44.0
Type of smoking		
Cigarette	22	100.0
Shisha	0	0.0
Packs/day		
1	9	40.9
2	13	59.1
≥3	0	0
When start smoking		
5-10 yrs	0	0.0
11-15yrs	1	4.5
≥15 yrs	21	95.5
Passive smokers	15	53.6

Table (5): Comparison of patients' level of knowledge pre-and post-implementation of self-care guidelines (N=50).

Knowledge elements	Pre		Post		X^2	P-value
	Satisfactory	**Unsatisfactory**	**Satisfactory**	**Unsatisfactory**		
	%	**%**	**%**	**%**		
Lung cancer	40	60	80	20	4.367	0.037
Lung cancer treatment	32	68	84	16	5.882	0.015
Dealing with disease symptoms	40	60	88	12	6.349	0.012
Dealing with the side effects of chemotherapy	36	64	76	24	6.650	0.010
Total	36	64	48	52	7.219	0.007

Table (6): Comparison of patients' self-care practices pre-and post-implementation of self-care guidelines (N=50).

Items of practices	Pre		Post		X^2	P-value
	Satisfactory	**Unsatisfactory**	**Satisfactory**	**Unsatisfactory**		
	%	**%**	**%**	**%**		
Self-care practices for lung cancer symptoms	23.7	76.3	53.9	46.1	14.654	0.001
Self-care practices for chemotherapy side effects	26.3	73.7	61.8	38.2	19.457	0.001
Total	26.3	73.7	57.9	42.1	15.545	0.001

Table (7): Comparison of lung cancer symptoms' severity pre- and post-self-care guidelines implementation (n=50).

Lung cancer-associated symptoms	Pre			Post			X^2	P-value
	Severe	**Moderate**	**Low**	**Severe**	**Moderate**	**Low**		
	%	**%**	**%**	**%**	**%**	**%**		
Cough	100	0	0	8	32	60	22.133	<0.001
Hemoptysis	20	56	24	4	60	36	2.920	0.232
Chest pain	100	0	0	8	36	56	29.150	<0.001
Breathlessness	100	0	0	20	32	48	13.621	<0.001
Chest wheezing	84	16	0	12	56	32	11.027	0.004
Pain	100	0	0	12	24	64	10.933	0.004
Dysphagia	48	20	32	0	28	72	14.333	<0.001
Anorexia/weight loss	92	8	0	8	24	68	29.349	<0.001
Fatigue	84	8	8	16	20	64	17.915	<0.001
Total symptom burden	76	12	12	8	36	56	15.347	<0.001

Table (8): Comparison of chemotherapy-associated symptoms' severity pre- and post-self-care guidelines implementation (n=50).

Chemotherapy-associated symptoms	Pre			Post			X^2	P-value
	Severe	Moderate	Low	Severe	Moderate	Low		
	%	%	%	%	%	%		
Nausea/vomiting	40	36	24	48	32	20	0.332	0.847
Diarrhea	48	20	32	36	52	12	6.257	0.044
Constipation	12	24	64	48	48	4	20.635	<0.001
Mucositis	52	44	4	36	52	12	1.894	0.388
Alopecia	20	28	52	12	24	64	0.887	0.642
Infection	56	32	12	80	8	12	4.659	0.097
Bleeding	8	36	56	32	20	48	4.897	0.086
Anemia	28	40	32	52	24	24	3.086	0.214
Cognitive problems	40	28	32	32	36	32	0.472	0.790
Neurological problems	44	52	4	28	52	20	3.556	0.169
Urological problems	20	12	68	60	20	20	12.045	0.002
Skin problems	16	36	48	48	12	40	7.182	0.028
Sleep problems	44	48	8	52	28	20	2.768	0.251
Sexual problems	8	12	80	4	24	72	1.439	0.487
Extravasation	8	8	84	16	4	80	1.024	0.599
Psychological problems	52	24	24	76	20	4	4.787	0.091
Total symptom burden	40	28	32	44	32	24	0.444	0.801

Table (9): Comparison of symptoms interference with patients' life pre-and post- self-care guidelines implementation (n=50).

Symptoms' interference with patient life	Pre			Post			X^2	P-value
	Severe	Moderate	Low	Severe	Moderate	Low		
	%	%	%	%	%	%		
Walking	64	36	0	8	32	60	15.633	<0.001
General activity	72	24	4	40	12	48	6.286	0.043
Work including work around the house	60	28	12	8	52	40	23.860	<0.001
Relations with others	56	32	12	8	56	36	21.518	<0.001
Enjoyment of life	56	40	4	8	44	48	26.442	<0.001
Mood	72	28	0	48	16	36	7.255	0.027
Total	64	32	4	20	36	44	18.565	<0.001

Table (10): Comparison of symptoms severity pre and post-self-care guidelines implementation (n=50).

Items	Pre	Post	T	P-value
	Mean±SD	Mean±SD		
Lung cancer symptoms	20.52±3.64	5.67±2.1	19.027	<0.001
Chemotherapy associated symptoms	26.7±3.42	22.23±4.12	0.952	0.346
Symptoms interference with patients' life	12.78±2.7	4.68±1.23	15.707	<0.001
Total symptoms	64.17±8.21	23.53±3.55	19.030	<0.001

Table (11): Correlation between patients' total symptoms severity and self-care practice pre- and post-guidelines implementation (n=50).

Variable	Total practice			
	Pre		Post	
	R	P-value	r	P-value
Total symptoms	-0.265	0.041	-0.327	0.011

Table (12): Correlation between patients' total knowledge, symptoms severity, and practice pre-and post-implementation of self-care guidelines (n=50).

Variables	Total knowledge			
	Pre		Post	
	r	P-value	r	P-value
Total practice	0.303	0.011	0.543	<0.001
Total symptoms severity	-0.378	<0.001	-0.443	<0.001

6. Discussion

Lung cancer is a common malignancy leading to high morbidity and considerable mortality. When a person is diagnosed with it, the patients faced with the shocking experience of the diagnosis, the burden of a painful, lasting, and potential life-threatening treatment, and many social problems and financial concerns that had an impact on the patient's life *(Falk & Williams, 2009)*. So, lung cancer patients need information about the disease and its management, including medication they take and self-care they must practice avoiding serious complications. Studies state that many of the symptoms seen after chemotherapy can be significantly reduced by education and care *(Bahall, 2017)*. Patient education is inexpensive and does not require a particular place or time. This study aimed to assess the effect of self-care guidelines on symptoms burden for patients with lung cancer undergoing chemotherapy.

The studied patients' socio-demographic characteristics reveal that the mean age of the studied patients was 55.9±8.7, and above half of them were males. This age was the common age for cancer in Egypt. This finding was supported by *Shokralla and Rahouma (2016)* in a study entitled "Prognostic clinicopathological features of 99 cases with advanced non-small-cell lung cancer. *National Cancer Institute (2014)* reported that the median age of studied patients was 54 years (range 30-70), with 53% of cases are ≥54 years.

This finding is supported by The *American Cancer Society (2019)*, who stated that lung cancer occurs more commonly in males than females. The result of the current study was supported by *Elmesidy et al. (2016)*, who stated that most patients were males (87.9%). This finding may be because male patients were at greater risk in their work environment, and most of them were active smokers.

Most of the studied patients were married and not working. This finding may be because they are in retirement age or their health condition forced them to take sick leave or delegate their responsibilities. This finding is in the same line with what was reported by *Dorland et al. (2016)* in the study entitled "Factors influencing work functioning after cancer diagnosis: A focus group study with cancer survivors and occupational health professionals," the study informed that most of the studied patients with lung cancer were married, more than half of them did not work.

Concerning educational level among studied patients, more than one-third of them cannot read and write. This finding might be related to most of the studied patients from low social class who were not enrolled in formal education. This finding is inconsistent with *Willén et al. (2019)* in a study entitled "Educational level and management and outcomes in non-small cell lung cancer," which stated that only ten percent of study patients with cancer were illiterate. It may be related to differences between the countries' economic resources since Egypt had a high illiteracy rate.

The current study also shows that most patients were residents in urban areas. This result might be due to exposure to air pollution or occupational pollutants. This finding was supported by *Abo-Elkheir and Hafez (2018)* in a study entitled "Characteristics, risk factors and histopathological types of bronchogenic carcinoma among cases presented to Chest Department, Al-Zahraa Hospital," who stated that the urban: rural residence ratio of studied patients was 2.1:1, occupational exposure to cement dust was reported among 47.2% of cases.

Regarding the present history of the studied patients, the current study results indicate that more than half of the studied patients complained of symptoms up to 12 months ago and were admitted to the hospital for six months. There is a long-time interval between starting complaints and hospitalization that may be due to the public's unawareness about lung cancer symptoms or financial stressors that contribute to delay seeking medical advice.

This finding was supported by *Helsper et al. (2017)* in a research article entitled "Time to diagnosis and treatment for cancer patients in the Netherlands: Room for improvement?" who stated that time interval or delay from first cancer symptom to diagnosis and treatment, was 98 days. Most of the total delay stemmed from the patient (median 49 days) and system delay (median 54 days).

Related to the type of tumor, cancer stage, and type of treatment, the current study shows that most of the studied patients had NSCLC, and half of them were at the third stage of their lung cancer. All of them underwent chemotherapy, while none of them had surgical interventions. The researcher thought this is a normal sequence of delaying seeking medical consultation when the patients start complaint and lack screening programs for lung cancer in high-risk groups. These findings are supported by *Shokralla and Rahouma (2016),* who stated that non-small cell lung carcinoma (NSCLC) accounts for 80%-85% of all lung carcinomas. All cases received platinum-containing chemotherapy. Around two-thirds of cases (60.6%) experienced a progressive disease; most patients are diagnosed with a non-resectable disease.

In these findings, the *National Comprehensive Cancer Network (2018)* assured that patients diagnosed with SCLC are typically considered metastatic at diagnosis and therefore are not usually advised to consider surgery. Besides, patients with NSCLC beyond stage IIB are not considered to be surgical candidates.

Regarding family history, the current study shows that near to one-fifth of studied patients had a family history of cancerous disease. Lung cancer represents more than half of cancerous diseases. Also, more than half of cancerous diseases occurred among second-degree relatives. This finding may reflect a possibility of genetic inheritance in families.

This finding was conflicted with *Omar et al. (2017)* in a study entitled "Primary lung cancer in Assiut University Hospitals: Pattern of presentation," which reported that about 13.7% had a history of malignancy. On the other hand, family history was positive for malignancy in 8.6% of the cases. This finding was in the same line with *Kanwal et al. (2017)* in the study entitled "Familial risk for lung cancer," who reported that genetic factors are contributing

to the development of sporadic lung cancer, but only a few specific genes and other genetic factors affecting lung cancer have been identified to date.

Related to smoking history, nearly half of the studied patients were active smokers, and all of them smoked cigarettes and started smoking more than 15 years ago. More than half of smokers consume more than two packs of cigarettes per day. Also, half of the nonsmokers had smokers in their families, so, considered passive smokers. It indicates the strong relation of smoking as an independent risk factor for lung cancer.

This finding is in line with *Abo-Elkheir and Hafez (2018)*, who stated that smoking was the most significant risk factor among 93.5% of cases; 65.9% were current, 13.0% were ex-smokers, and 14.6% were passive smokers. The *Centers for Disease Control and Prevention (2012)* also revealed that nonsmokers exposed to secondhand smoke at home or work increase their lung cancer risk by 20% to 30%.

Concerning patients' total level of knowledge regarding lung cancer, its treatment, self-care for lung cancer symptoms, and chemotherapy-related symptoms, the current study reveals that more than one-third of the studied patients had a satisfactory level of knowledge pre-implementation of self-care guidelines, which improved to around than half of the patient post-implementation of self-care guidelines with a statistically significant difference at (P≤ 0.007). It might be attributed to the effectiveness of self-care guidelines on enhancing knowledge about lung cancer.

This finding is consistent with *Aziz (2011)*, in the study entitled "Patient Education: Its effect on the quality of life of patients with cancer on chemotherapy," who stated an unsatisfactory level of total knowledge of the studied patients regarding disease and its management before educational intervention and a highly statistically significant differences in patient's level of knowledge pre/post one month and post six months from the educational intervention about cancer regarding all items (definition & causes of cancer, treatment of cancer, definition, and purpose of chemotherapy, side effects, care to overcome these side effects, and relaxation techniques to reduce the side effects).

This finding was also supported by *Mahdy and Mohammed (2017)* in a study entitled "Effect of educational guidelines intervention on symptoms burden and information regarding chemotherapy among patients with lung cancer," who reported that educational intervention had a positive effect on patients' information regarding chemotherapy and the chemotherapy-induced symptoms burden among patients with lung cancer. These findings support the first research hypothesis.

Regarding the satisfactory level of total self-care practices, the current study reveals that more than a quarter of studied patients had a satisfactory level of self-care practices pre-self-care guidelines implementation, which improved to more than half of them with a highly statistically significant difference at (P≤0.001) post-implementation of self-care guidelines. This result reflects the positive influence of self-care guidelines on improving self-care practices.

This finding is on the same line as *Loerzel (2018)*, who found that, on average, strategies used to manage symptoms were moderately effective in a study entitled "Symptom self-management strategies used by older adults receiving treatment for cancer."

Also, this finding was consistent with *Zaki (2016)*, who studied "Assessment of patients' self-care for side effects of cancer chemotherapy" and reported that less than half of the studied patients had a satisfactory level of total self-care practices regarding physical, psychological, emotional, social, functional, and spiritual dimensions. This study was done before the implementation of any educational interventions study. These findings support the second research hypothesis.

About lung cancer symptoms severity, the current study shows that most studied patients had severe lung cancer symptoms pre-implementation of self-care guidelines, which decreased to less than a tenth of them with a highly statistically significant difference post-implementation of self-care guidelines at (P≤ 0.001). This finding might be due to self-care guidelines playing an important role in decreasing lung cancer symptoms. In addition to the effect of chemotherapeutic agents in decreasing tumor size, it decreases distressing lung cancer symptoms. However, comparing incidence rates of specific side effects with these previous studies is not easy, as follow-up duration differs between studies.

This result agrees with *Marzuk (2017)* in a study entitled "Educational program on quality of life for patients with cancer undergoing oral chemotherapy," who found that three-quarters of the patients in the study group have a good quality of life regarding the physical dimension post-implementation of self-care guidelines.

Concerning chemotherapy-associated symptoms, the current study shows that less than half of studied patients had severe chemotherapy symptoms pre-implementation of self-care guidelines, which was not improved after guideline implementation with no significant difference post-implementation of self-care guidelines at (P≤ 0.801). This finding might be referred that many of the studied patients experienced at least one or two severe side effects of chemotherapy that interfere seriously with their life circumstances and because the systemic effect of chemotherapy on cells needs more time to relieve some symptoms.

This finding is also supported by *Mahdy and Mohammed (2017)*, who reported that educational intervention positively affected patients' information regarding chemotherapy and the chemotherapy-induced symptoms burden among patients with lung cancer. These findings are partially supporting the third research hypothesis.

This finding is consistent with *Pearce et al. (2017)* in a cohort study entitled "Incidence and severity of self-reported chemotherapy side effects in routine care," which found that most participants experienced multiple side effects. For 60% of participants, at least one side effect was

serious. Many patients experienced mild side effects continuously throughout the treatment period captured in the study.

Regarding symptoms interference with the patient's life, the current study illustrates that about two-thirds of studied patients had severe symptoms interference with life pre-implementation of self-care guidelines, which improved to less than a quarter with a highly significant difference post-implementation of self-care guidelines at (P≤ 0.001). This finding indicates the positive effect of applying self-care guidelines in improving the patient's knowledge and decreasing distressing symptoms, subsequently decreasing the effect or interference of these symptoms on the patient's life. The patient finds a way to control their life aspects.

This result was supported by *Rukshani et al. (2018)*, who studied "Factors associate with quality of life among the patients with cancer in Sri Lanka" and mentioned that there was a significant improvement in the functional performance of the intervention group post-implementation of the education, while the group who did not receive education had a poor functional performance.

This finding is congruent with *Bosch (2017)*, who stated that most patients in the study group felt satisfaction about their condition with highly spiritual well-being after the intervention.

Regarding mean symptoms severity, the current study shows highly statistically significant differences between the mean and standard deviation regarding total symptoms severity (lung cancer symptoms, and symptoms interference with life) post-implementation of self-care guidelines (P ≤ 0.001) except for chemotherapy-associated symptoms; there was no statistically significant difference. This result indicates the important role of self-care guidelines in improving symptoms that patients experienced.

This finding is supported by *Howell et al. (2017)* in the research review entitled "Self-management interventions for breathlessness in adult cancer patients" that examined the effectiveness of nurse-delivered interventions and reported beneficial effects of nursing programs and psychotherapeutic, psychosocial, and educational interventions on quality of life. This review focused solely on lung cancer and quality of life endpoints.

This result was inconsistent with *Mosher et al. (2016)* in a study entitled "Randomized pilot trial of a telephone symptom management intervention for symptomatic lung cancer patients and their family caregivers," who reported non-significant group differences for all patient outcomes and caregiver self-efficacy for helping the patient manage symptoms and caregiving burden at two- and six-weeks post-intervention. These findings are partially supporting the third research hypothesis.

Regarding the correlation between patients' total symptoms severity and self-care practice pre and post-implementation of self-care guidelines, the current study shows statistically significant negative correlations between patients' total symptom severity and self-care practice pre and post-self-care guidelines implementation (p<0.05). The researcher interpreted that once the patient felt some improvement related to their symptoms following self-care

guidelines, they started to participate actively in self-care activities. At the beginning of the interview, most of them report that "nothing we can do to relieve our pain and other symptoms we ask doctors to describe medication."

These findings agree with *Tuominen et al. (2019)* in systematic reviews entitled "Effectiveness of nursing interventions among patients with cancer," who reported that educational nursing interventions positively affected the level of knowledge, symptom severity, sleep, and uncertainty. Psychosocial nursing interventions had a significant effect on spiritual well-being, the meaning of life, fatigue, and sleep. Psychological nursing interventions reduced cancer-related fatigue.

Concerning correlations between patients` level of knowledge, self-care practice, and symptoms severity pre- and post-implementation of self-care guidelines. The current study reveals statistically significant positive correlations between patients' total practice and knowledge pre-self-care guidelines implementation (p<0.011) while, post-self-care guidelines implementation, it becomes a highly significant positive correlation (p<0.001). There were also highly statistically significant negative correlations between patients' total symptoms severity and total knowledge pre- and post-self-care guidelines implementation (p<0.001), when the patient have the correct knowledge on how to deal with his/her symptoms, it is expected to be able to manage these symptoms. Subsequently, the burden of symptoms decreases.

This finding supported by *Howell et al. (2017)*, who reported that self-management education shows effectiveness in supporting patients with cancer and developing the self-management skills of their disease, and improve acute, long-term, and late harmful effects of treatments in the study about "Self-management education interventions for patients with cancer: A systematic review." This finding is in the same line with a study about "Self-care concept analysis in cancer patients" by *Hasanpour-Dehkordi (2016)*, who showed that patients with higher information about disease and treatment did self-care more frequently and had a higher quality of life compared to those with less or no information.

These findings are in harmony with the study about "Symptom self-management: Strategies used by older adults receiving treatment for cancer" by *Loerzel (2018)*, who found a statistically significant relationship between using self-management strategies by the studied patients and associated symptoms of cancer treatment.

The study results found that the implementation of self-care guidelines significantly and positively affects patient knowledge and practice and helps decrease disease and some chemotherapy-associated symptoms for lung cancer patients, which proves the study hypotheses.

Effective self-care strategies to manage lung cancer symptoms should be evidence-based and individualized to meet each patient's unique needs. It should start early from the time of diagnosis and go through the treatment journey.

7. Conclusion

This study concluded that applying self-care guidelines for patients with lung cancer undergoing chemotherapy has a statistically significantly positive, improving effect on patients' knowledge, self-care practice, and lung cancer symptoms burden. The results of the study support the research hypotheses.

8. Recommendations

Based on the results of the current research, the following suggestions for future research and practice are proposed:
- Educational programs about the disease and its treatment modalities should be provided for lung cancer patients.
- Developing a simplified illustrated and comprehensive Arabic booklet for all patients early when diagnosed, including the latest and evidence-based information about lung cancer, its therapeutic regimen, and how they can manage their symptoms.
- Supportive care services are directed towards meeting bio-psychosocial needs should be provided.
- The study should be replicated on a larger probability sample and different hospitals setting to generalize the results.
- Lung cancer screening programs should be implemented for those at risk at the national base by collaborating with various concerned institutions.
- Increase public awareness about smoking risks through directed programs to persons in the smoking community

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