

Effect of Educational Program for Nurses on Clinical Outcomes of Cancer patients with Metastatic Spinal Cord Compression

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Abstract

Background: Spinal cord compression is a common oncological emergency that requires early detection and prompt treatment as it can result in permanent neurological deficit. Nurses are often involved in supporting patients living with cancer. They may be the first healthcare professional to recognize the “red flag” symptoms of MSCC. Early recognition by the nurses will prompt timely investigation, treatment and potentially reduce the risks of patient’s having a permanent disability. **Aim:** To determine the effect of educational program for nurses on clinical outcomes of cancer patients with Metastatic Spinal Cord Compression. **Method:** Design, A quasi- experimental research design was utilized in this study .Setting, the study was conducted at Clinical Oncology and Nuclear Medicine Department at Tanta University Hospital.. **Subjects:** convenience sample of 40 nurses and 30 cancer patients. **Tools: Tool I:** Structured Interview Schedule. **Tool II:** Nursing Care Observational Checklist. **Tool III:** Patient's Assessment Structured Interview Schedule. **Tool (IV):** Patient's Outcomes sheet. **Results :** a highly significant difference was noticed related to the total level of knowledge and practice of studied nurses through periods of study (pre-immediate and post one month assessment periods) with P value= 0.0001.A highly significant difference was found related to the total level of knowledge for the studied patients thought the periods of the study as P value =0.0001.**Conclusion:**The oncology nurse's knowledge and practice improved significantly after attendance of program sessions. **Recommendation:** Conduct periodical training programs, workshops and seminars for oncology nurses to refresh their knowledge, and practice about metastatic spinal cord compression and its early detection and management.

Key words: Metastatic, spinal cord compression, red flag, educational program.

Introduction

Metastatic spinal cord compression can be defined as an oncological emergency and serious complications of metastatic cancer (cancer cells spread to the spine) or cancer disease progression in which the spinal cord becomes compressed through direct pressure of the tumor. Patients with suspected MSCC can experience inappropriate delays in accessing their acute care in medical services⁽¹⁾. Although the exact incidence of SCC isn't known, it's estimated to affect 5% of patients with cancer; the incidence is reported at 10% in patients with spinal metastases. In the United States, more than 20,000 cases of MSCC are reported each year⁽²⁻⁴⁾.

MSCC is a feature of advanced cancer, commonly seen in patients with breast, lung and prostatic cancer which estimated 60% of cases. It can be also seen in patients with solid tumors as renal, gastrointestinal and pelvic which typically impact the lumbosacral spine. Tumors may spread to the spine vertebro-venous plexus, or by direct invasion^(5, 6). The most common presenting feature and often the first symptom for spinal metastases are increasing back pain. Spinal pain may be the only symptom as the tumor puts more

pressure on the spine; the signs and symptoms become worse and more serious. The pain may be localized or generalized and is due to compression, pathological fractures, Pain is reported by 90 to 98 % of all cases.⁽⁷⁻¹⁰⁾.

Usually the progression of other symptoms of spinal cord compression as motor, sensory, autonomic, bowel and bladder dysfunction may occur slowly. Tingling, numbness, clumsiness, stiffness and heaviness of the limbs may be the early signs of motor deficit they may present with an unsteady gait or ataxia (failure of muscle co-ordination) and foot drop^(10, 11).

Treatment depends on the type of tumor, its location, the level and severity of the compression and the patient's functional level. SCC treatment is usually effective and includes the following: Radiation therapy is the standard treatment; it resolves pain by decreasing or shrinking the tumor mass⁽¹²⁻¹⁴⁾. Treatment in the early stages of The first-line treatment for severe pain in patients with SCC is opioids. No steroidal anti-inflammatory drugs may also be used if pain isn't severe. Adjuvant therapies, including antidepressants, antiepileptic drugs, or steroids, may be prescribed to augment the effects of analgesics^(15, 16).

Surgery is preferred in the presence of spinal instability and neurological signs in patients who have a moderate to good prognosis. Patients might be given radiotherapy once have recovered from surgery, to shrink any areas of cancer that might be left in the spine⁽¹⁷⁻²⁰⁾. Radiotherapy treatment aims to shrink the cancer cells that are pressing on the spinal cord⁽²⁰⁾.

Nurses play a vital role in the detection and management of SCC. After diagnosis of this oncologic emergency, the nurse will assist with stabilizing the patient's clinical status and work to prevent further complications⁽²⁰⁻²³⁾. Nursing role can be concluded in many steps as assessment of patient airway and necessitating emergency end tracheal intubation specially if the tumors located in the cervical spine may alter pulmonary function, neurological assessment, optimize patient mobility and mitigate sequelae of immobility, assessment and care of the skin and risk for pressure ulcer development, assessment of bowel and bladder functions and also patient education and support⁽²⁴⁻²⁶⁾. Nursing assessment usually consists of two main domains, taking the patients health history and physical examination. The history of the symptoms and disease process will help determine if the patient is

experiencing autonomic dysfunction⁽²⁷⁻³⁹⁾. Therefore, Nurses play a vital role in the management of SCC. The nurse will assist with stabilizing the patient's clinical status and work to prevent further complications, and also play an important role in the rehabilitation of the patients and their families before and after hospital discharge, so this study was done to evaluate the effect of educational program for nurses on clinical outcomes of cancer patients with metastatic Spinal Cord Compression⁽⁴⁰⁻⁴⁷⁾.

Aim of the study: To determine the effect of educational program for nurses on clinical outcomes of cancer patients with Metastatic Spinal Cord Compression.

Research hypothesis

Improvement of oncology nurses knowledge and practice.

-Cancer patients who receive nursing intervention about Metastatic Spinal Cord Compression (MSCC) were exhibited to improve their knowledge and clinical outcomes.

Study design

Setting

The study was conducted at Clinical Oncology and Nuclear Medicine Department at Tanta University Hospital. The hospital

has 2 floors for males and females consist of 5 wards, eachward contains 6 beds (The capacity of the two units includes 30 beds).

Subjects

The sample of this study will consist of:

- a) A convenient sample of 40 nurses.
- b) A purposeful sample of 30 adult patients of both sexes.

Tools: The data of the study collected using four tools:

Tool (I): Structured Interview Schedule:

This tool was developed by the researcher after reviewing of the related literature ⁽⁴⁸⁾ and it included two parts:

Part one: "Nurses' Socio-Demographic data" This includes: nurses' code, age, sex, marital status, experience in general nursing and in oncology department and their previous training programs.

Part two: Nurses' Knowledge Assessment Sheet:

It was constructed by the researcher after reviewing of related literature ⁽⁴⁹⁾ and used to assess the nurse's knowledge before and after implementation of pre and post education program regarding Metastatic spinal cord compression.

Scoring system of nurses' knowledge assessment

All nurses need to choose one or more correct answer to each question. Three levels of knowledge scoring for questions as the following: Correct and complete answer scored (2) While Correct and incomplete answer scored (1) and wrong and don't know (0).

Tool (II): Nursing Care Observational Checklist

This tool was developed by the researcher based on review of relevant literature ⁽⁵⁰⁾ to assess the actual nursing care provided for patients with Metastatic spinal cord compression (MSCC) before and after implementation of the Educational program.

Scoring system

The total scoring system was as following: A correct practice scored (1) score, while the incorrect (zero) score. The total score will be categorized as (70% and more) considered as satisfactory level of practice and (less than 70%) considered as unsatisfactory level of practice.

Tool (III): Patient's Assessment Structured Interview Schedule

This tool was developed by the researcher to collect baseline data based on review of relevant literature ⁽⁵¹⁾ and it included two parts

Part one: Patient Socio-demographic and medical data

-Socio-demographic data include: patient's age, sex, marital status, educational level, occupation.

-Medical data include: date of admission, diagnosis, previous and duration of hospitalization, past and present medical history, family history...etc.

Part two: Patient's knowledge assessment tool:

This tool was developed by the researcher based on review of relevant literature⁽⁵²⁾ to assess patient's knowledge about the disease.

Scoring system

The total score of patient's knowledge was calculated and classified as following:

Correct answer scored (1), while incorrect or incomplete answer scored (0).

Tool (IV): Patient's Outcomes sheet: It was consist of two parts to assess patient physical and psychological outcomes which include:

Part (1): Physical assessment tool:

This part was developed by the researcher and consists of 2 parts:

Part A: Spinal Cord Independence Measurer scale

This scale was developed by Catz et al 1997⁽⁵³⁾ was be adopted by the researcher and to assess the Confidentiality and Privacy of the

studied patients was maintained. patient's activity of daily living which included three items as the following:

- 1) Self-care (feeding, grooming, bathing, and dressing).
- 2) Respiration and sphincter management.
- 3) Mobility (bed and transfers and indoor/outdoor).

Scoring System:

Scores range from (0-100), where a score of 0 defines total dependence and a score of 100 is indicative of complete independence. Each subscale score is evaluated within the 100-point scale (self-care: 0-20; respiration and sphincter management: 0-40; mobility: 0-40).

Part B: Pain Assessment Tool:

This tool was developed by Jensen et al at 1992⁽⁵⁴⁾ and was adopted by the researcher and to assess pain severity using the Numerical rating scale (NRS) which has internal validity and a reliability coefficient of 0.95.

Scoring system: classified into (no pain (0), mild (1-3), moderate (4-6), severe (7-9) and worse pain.

Part (2): Psychological assessment tool

Anxiety assessment Scale: Beck anxiety inventory (BAI)⁽⁵⁵⁾.

This scale and was developed by Beck et al (1988) and was adopted by the researcher to assess the patient and family emotions, mood and anxiety level related to disease and treatment.

It uses a four point rating scale ranging from not at all(0),mildly but it didn't bother(1),moderately: it was very unpleasant, but I could stand it(2),severely: I could barely stand it(3). Anxiety levels are defined as minimal (0-7), mild (8-15), moderate (16-25), and sever (26-63).

Methods: The study was accomplished through the following steps:

Administrative process

1-An official hospital permission and written approval to carry out the study was obtained from the responsible authority of Tanta oncology and Nuclear Medicine Department before conducting this study through official letters from Faculty of Nursing explaining the purpose of the study.

2. Ethical consideration

- Informed and written consent was obtained from every nurse & patient and caregiver included in the study after explanation of the aim of the study.
- They were informed that participation is voluntary and that they could withdraw at any time of the study.

- Confidentiality and autonomy were maintained by the use of code number instead of name.
- Consent from the faculty's ethical committee was obtained before the study conduction.

3. Validity of the tools

- All tools were tested for content validity by nine jury of experts in the field of Medical-Surgical nursing, critical care nursing at the faculty of Nursing, and oncology field professors and accordingly needed modifications were done.

4. Reliability of the tools.

Reliability statistics:

- Alpha Cronbach's test was used to test tool reliability and reliability factor was =0.896.
- Cronbach's Alpha for Tool 1 is 0.912 applied on 5 nurses.
- Cronbach's Alpha for Tool 2 is 0.873 applied on 5 nurses.
- Cronbach's Alpha for the sheet of nurses in total is 0.894 applied on 5 nurses.
- Cronbach's Alpha for Tool 4 is .94 items applied on 5 patients.

5. A pilot study

It was conducted before the actual study on 10% of the patients (Five nurses and five cancer patients), in order to test the clarity, feasibility and applicability of the different

items of the developed tools Modifications, rephrasing and some additional terms were done by the researcher before the main study, according to the experience gained from this pilot study. Data obtained from those patients were excluded and not included in the current study.

- **The present study was conducted at 3 phases as the following**

- **I- Assessment phase**

a-For nurses: -Nurses' knowledge related to cancer patients with Metastatic Spinal Cord Compression will be assessed two time pre and post (immediately and post one month) the educational program by using Tool (I) part (2)

b-For patient's:-The researcher used Tool (III) part I at the first time of patient's admission for collection of patient's data.

II-Planning phase

This phase was formulated based on data from the assessment phase, literature review priorities, goals, determined needs, baseline measures, researches and expected outcomes criteria were taken into consideration when planning patients care.

III- Implementation Phase: Educational program for nurses regarding care of patients with Metastatic spinal cord compression was developed and implemented by the

researcher based on determining needs, baseline measures, relevant literature ,researches and expected outcomes .

Educational methods and aids

Teaching methods and aids was used during the session It included: Group discussions, demonstration and re-demonstration.

Teaching aids include: Arabic language booklet, Handout, Data show presentation, lab top and posters. The booklets distributed to the studied nurses at the end of sessions.

Statistical analysis

Statistical presentation and analysis of the Present study was conducted, using the mean, and Linear Correlation Coefficient [r]tests by SPSS V20.

Results

Table (1) illustrates the percentage distribution socio-demographic characteristics of the studied nurses. In relation to age, it was noticed that (37.5%) of the studied nurses ranged from (30 - < 40) years old. (87.5%) were females and (12.5%) were males (80%) were married, (20%) were single, and there was about (70%) of the studied sample had experience from < 10 to < 20 years compared with more than two third (75%)

of them had experience in oncology department.

Figure (1): showed the Levels scores of total nurses' knowledge about the disease.

It was found that there was a highly statistically significant difference as P value= 0.0001.

Table (2) showed Percent distribution of levels and mean scores of total nurses' practice about nursing care. There was a highly statistically significant difference between total practice scores through the periods of the study as P value= 0.0001.

Figure (3): Mean scores of total patients' physical assessment; It was found that the mean scores of total patients' physical assessment before implementing the program was about 88.13 compared with 97.43 after one month.

Figure (4): Levels scores of total patients' anxiety, It was notices that (40%) of the studied patients had moderate level of anxiety before the program compared with (96.7%) after one month of implementation program.

Table (4): Relationship between total anxiety state of patient and total pain score before and after program

implementation (n=30).It was revealed that there was a significant positive correlation between the total anxiety state of patient and total pain score before and after program implementation as P value 0.026 and 0.001.

Table (5): Relationship between total knowledge, practice of the studied nurses and their socio-demographic data before and immediate after implementation the program, It was found that there was a positive correlation between total knowledge, practice of the studied nurses and their socio-demographic data before and immediate after program intervention.

Table (6) Correlation between levels of total knowledge, nurses' practice about nursing care before and after the program. It was noticed that there was a positive correlation in the immediate and one month after implementing the program.

Table (1): Percentage distribution of socio-demographic characteristics of the studied nurses. (n=40)

Socio-demographic characteristics of nurses	The studied nurses (n=40)	
	No.	%
Age in years:		
< 20	3	7.5
20 - <30	10	25.0
30 - < 40	15	37.5
40 - < 50	10	25.0
≥ 50	2	5.0
Range	18 - 56	
Mean ± SD	34.000 ± 10.104	
Sex:		
Male	5	12.5
Female	35	87.5
Marital status		
Married	32	80.0
Single	8	20.0
Educational level		
Diplome	13	32.5
Intermediate education degree	27	67.5
Years of experience in nursing		
< 10	13	32.5
10 - < 20	15	37.5
20 – < 30	10	25.0
≥30	2	5.0
Range	2 – 31	
Mean ± SD	13.925 ± 8.671	
Years of experience in oncology department		
< 10	15	37.5
10 - < 20	15	37.5
20 – 30	10	25.0
Range	2 – 30	
Mean ± SD	12.375 ± 8.008	
Previously in-service training program		
No	40	100.0

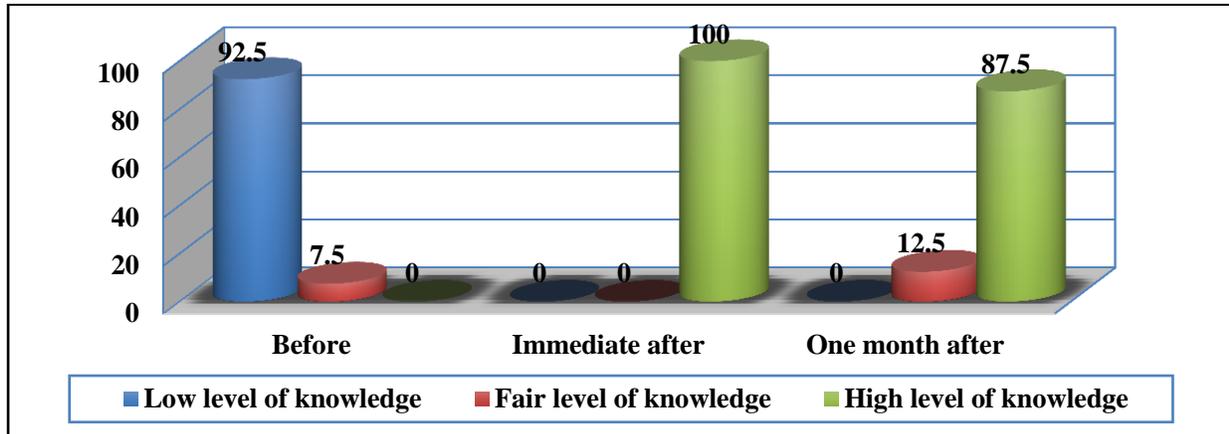


Figure (1): Levels scores of total nurses' knowledge about the disease

Table (2): Percent distribution of levels and mean scores of total nurses' practice about nursing care

Total practice scores	Practice of the studied nurses before, immediate and one-month after program implementation (n=40).						χ^2	P	
	Before (n=40)		Immediate after (n=40)		One month after (n=40)				
	No	%	No	%	No	%			
Levels of total practice:								107.93	0.0001**
Unsatisfactory level of practice < 70% (0 - 48)	40	100.0	0	0.0	3	7.5			
Satisfactory level of practice \geq 70% - 74% (49 -69)	0	0.0	40	100.0	37	92.5			
Total practice scores:									
Range	19 - 29		59 - 69		47 - 66				
Mean \pm SD	23.08 \pm 2.47		63.60 \pm 2.15		54.45 \pm 4.45				
F value	1770.19								
P	0.0001**								
Changes of total practice scores before and immediate after program intervention:									
Range	33 - 46								
Mean \pm SD	40.52 \pm 3.01								
Z value	5.522								
P	0.0001**								
Changes of total practice scores before and after one month of program intervention:									
Range	23 - 41								
Mean \pm SD	31.37 \pm 5.20								
Z value	5.514								
P	0.0001**								

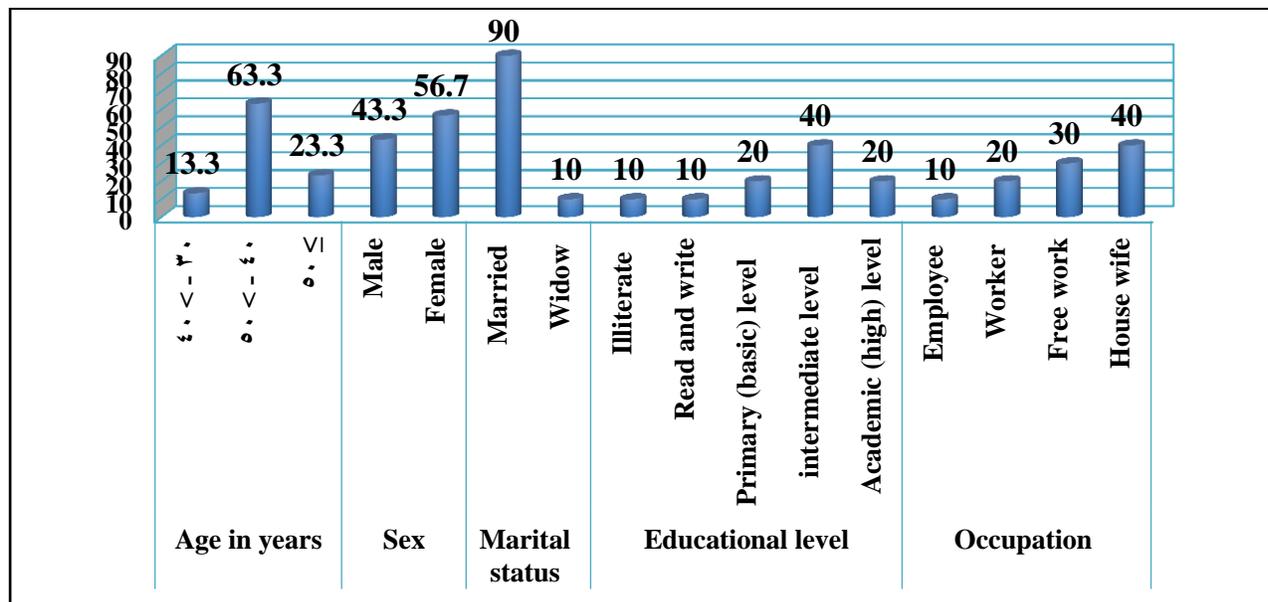


Figure (2): Biosocial-demographic characteristics of the studied patient. (n=30)

Table (3): Percent distribution of levels and mean scores of total patients' knowledge about the disease

Total knowledge about the disease	Knowledge of the studied patients before, immediate and after one-month of program implementation (n=30).						χ^2	P
	Before (n=30)		Immediate after (n=30)		One month after (n=30)			
	No	%	No	%	No	%		
Levels of total knowledge:								
Low level of knowledge < 60% (0 - 5)	23	76.7	3	10.0	6	20.0	40.449	0.0001**
Fair level of knowledge 60% - 74% (6 -7)	5	16.6	3	10.0	6	20.0		
High level of knowledge ($\geq 75\%$) (8 - 10)	2	6.7	24	80.0	18	60.0		
Total knowledge scores:								
Range	1 - 8		5 - 10		4 - 9			
Mean \pm SD	3.933 \pm 1.85		8.033 \pm 1.27		7.166 \pm 1.55			
F value	56.160							
P	0.0001**							
	4.482							
	0.0001**							

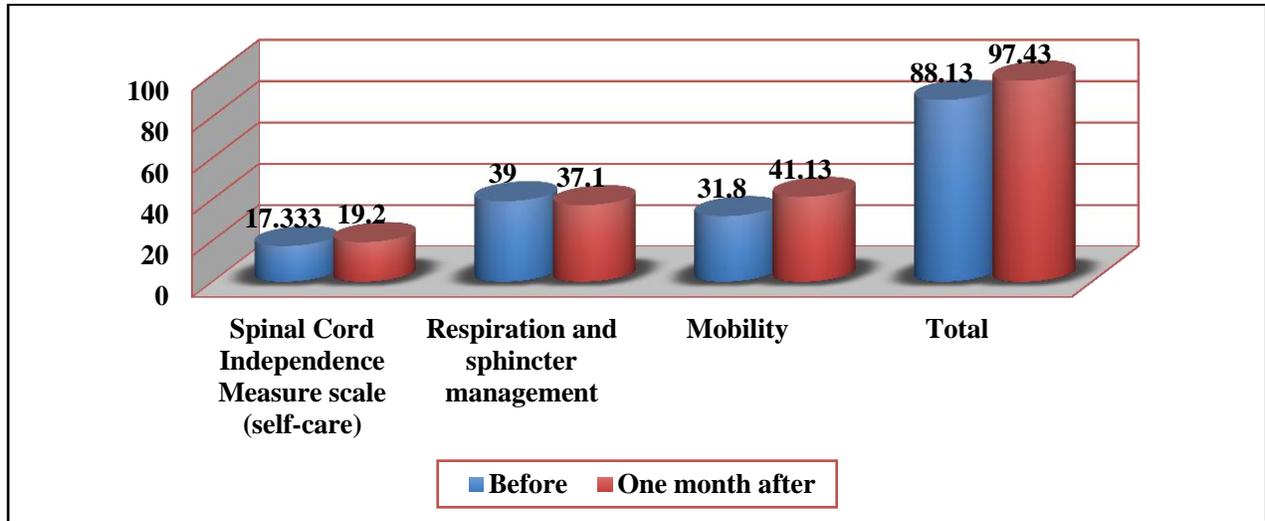


Figure (3): Mean scores of total patients' physical assessment

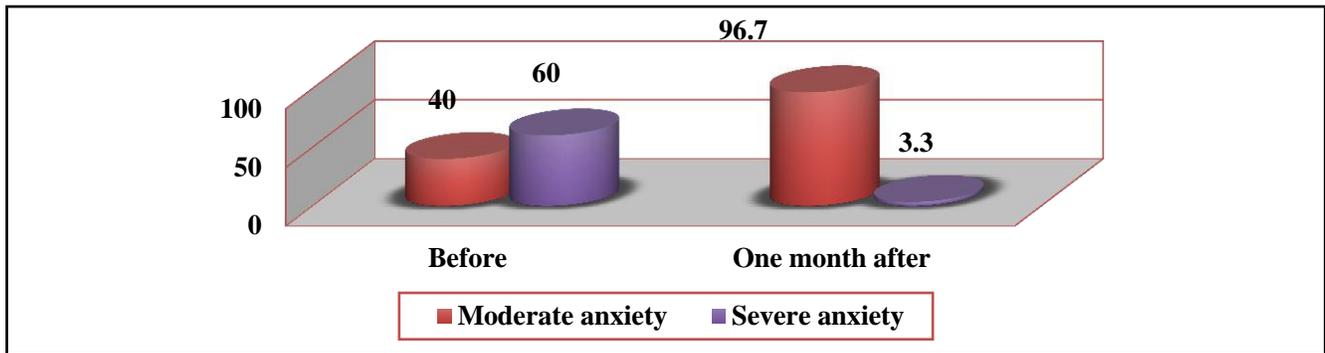


Figure (4): Levels scores of total patients' anxiety

Table (4): Relationship between total anxiety state of patient and total pain score about before and after program implementation (n=30).

Total anxiety levels	Total pain scale of the studied patients (n=30)											
	Before intervention (n=30)						After implementation (n=30)					
	Moderate (n=24)		Severe (n=6)		χ^2	P	Mild (n=4)		Moderate (n=26)		χ^2	P
	No.	%	No.	%			No.	%	No.	%		
Levels of total anxiety:												
Moderate anxiety	11	36.7	1	3.3	1.70	0.192	4	13.3	25	83.3	0.159	0.690
Severe anxiety	13	43.3	5	16.7			0	0.0	1	3.3		
r	0.348						0.563					
P	0.026*						0.001*					

r=Correlation Coefficient*Statistically Significant difference at (P<0.05)

Table (5): Relationship between total knowledge, practice of the studied nurses and their socio-demographic data immediate after than before program intervention

Socio-demographic data	Mean change of total knowledge scores among the studied nurses immediate after than before (n=40)		Mean change of total practice scores among the studied nurses immediate after than before (n=40)	
	Mean ± SD	χ ² Value P	Mean ± SD	χ ² Value P
Age (years):				
<20	20.66 ± 6.02	1.646 0.800	41.33 ± 1.15	1.014 0.908
20 - <30	24.88 ± 6.84		41.30 ± 2.26	
30 - <40	23.73 ± 5.35		40.00 ± 3.52	
40 - <50	22.10 ± 5.60		40.30 ± 2.94	
≥ 50	25.50 ± 0.70		40.50 ± 3.53	
Sex:				
Male	24.00 ± 6.24	0.061	41.80 ± 2.04	0.939
Female	23.34 ± 5.54	0.806	40.34 ± 3.10	0.332
Marital status				
Married	24.12 ± 6.19	0.007	40.37 ± 3.50	0.003
Single	23.25 ± 5.47	0.932	40.56 ± 2.93	0.959
Educational level				
Diplome	21.92 ± 6.34	0.887	40.61 ± 3.25	0.042
Intermediate education degree	24.14 ± 5.09	0.346	40.48 ± 2.95	0.838
Years of experience in nursing				
< 10	23.76 ± 6.37	0.656 0.883	41.30 ± 2.01	0.987 0.804
10 - < 20	23.73 ± 5.35		40.00 ± 3.52	
20 – < 30	22.10 ± 5.60		40.30 ± 2.94	
≥ 30	25.50 ± 0.70		40.50 ± 8.36	
Years of experience in oncology department				
< 10	24.00 ± 6.08	0.259 0.879	41.53 ± 2.26	2.275 0.321
10 - < 20	23.20 ± 5.17		39.73 ± 3.17	
20 – 30	22.20 ± 5.65		40.20 ± 3.58	

Statistically Significant difference at (P<0.05)

Table (6): Correlation between levels of total knowledge and total nurses' practice about nursing care before and after the program

	Total knowledge scores	
	R	P
Total practice scores		
Before	-0.040	0.807
Immediate after program intervention	0.012	0.942
One month after program intervention	0.166	0.305

Discussion

Metastatic spinal cord compression (MSCC) is one of the most serious complications of cancer. All current cancer patients with a diagnosis of cancer and bone metastases are issued with an alert card detailing the potential symptoms of spinal cord compression and the emergency pathway contacts ⁽⁵⁶⁾. Metastatic spinal cord compression (MSCC) remains a challenging oncological emergency and requires effective multidisciplinary management for optimal effects on patients' morbidity and quality of life ⁽⁵⁷⁾.

The finding of current study revealed that ages of nurses in this study ranged from (30 - < 40) years old. . These findings were in agreement with **Al Attar W.2015** ⁽⁵⁸⁾ who report that the majority (55%) of nurses in study group are within the age of (31-40), and also supported by **Won Kim H and et al 2019** ⁽⁵⁹⁾ who reported that Majority (57.2 %) of respondents belonged to the age group of (26-35) years.

In relation to sex, in the present study it was found that (87.5%) were females and (12.5%) of them were males .This is in line with **Musleh Band et al 2015** ⁽⁶⁰⁾, who reported that (87.3%) of the studied nurses were females and 12.7% were males. This is

with disagreement with **Sharour L 2018** ⁽⁶¹⁾ who report that 61.8 % were males and 47.3 % were females, and also rejected by **El-Aqoula and et al A 2020** ⁽⁶²⁾, who reported that 60.3 % were males and 39.7% were females.

Regarding educational level, the current study revealed that nearly two third (67.5%) of the studied nurses had intermediate educational degree. This is in same line with **Majeed H and Al Attar W 2015** ⁽⁶³⁾, who reported that **60% had** intermediate educational degree level (Nursing institute). This study is in contrast with **Abdullah D And Rasheed O 2018** ⁽⁶⁴⁾, who recorder that 62.5% of the studied nurses had nursing school educational level. This study differs from what was reported by **Admass B, Endalew N, Tawuye H, and Mersha A2020** ⁽⁶⁵⁾ who reported that the majority (83.3%) of participants had a bachelor's degree in nursing. This difference is due to the different setting of data collection (oncology clinics, wards, intensive care units).

Concerning to marital status our study showed that (80%) of the studied nurses were married, (20%) were single, which in line with **Salim N. and et al 2019** ⁽⁶⁶⁾, who reported that (67%) were married and (32%)

were single. Similarly, **Zayed Hand et al 2019⁽⁶⁷⁾**, who recorded that more than two thirds of the respondents (70.9%) were married. **Related to years of experience** in oncology department, the current study showed that there was about two third (75%) of the studied nurses had experience in oncology department from < 10 to < 20 years. This is in agreement with **Metwaly E and Hamad A 2019⁽⁶⁸⁾**, who reported that (66.7%) of nurses had more than 5 years of experience. This study and its results are against with to what was reported by **Habib A and et al 2018⁽⁶⁹⁾**, who recorded that the Participant's Experience (48.1%) had from 5 to less than 10 years of experience, and also contradicted **with Germossa Gand et al 2018⁽⁷⁰⁾**, who reported that the participant's experience (67.7%) had from 2-5 years of experience.

Regarding attendance of the studied sample for previous educational program, the current study showed that (100%) of the studied nurses were not attend any educational program before. This is supported by **Hosen S and et al 2019⁽⁷¹⁾**, who recorded that 72.9% of nurses had not any training. This differ may result because the studied sample in the previous setting had not attend before any educational

program about metastatic spinal cord compression and care of their patients.

Concerning to the total nurses' level of knowledge, it was revealed that 92.5% of the studied nurses had low level of knowledge in pre assessment period, while 100 % (all of them) had high level of knowledge in the immediate post period, and then decreased to be 87.5% in the post one month assessment period. It was found that there was a highly statistically significant difference as P value= 0.0001. This result is nearly in line with **Elsevier B 2019⁽⁷²⁾**, who reported that Fifty-seven (57%) of the participants had an unsatisfactory level of knowledge. Most of them had knowledge deficits regarding pathology, Oral mucositis definition, assessment, scoring, treatment, and patient education and advice. These results also in agreement with **b M and et al 2020⁽⁷³⁾**, who reported that there was a significant improvement in knowledge. The post-tests after course completion and again at the 6-month interval showed mean values of 88.28% and 89.30%, respectively (p = .36),

In the current study, there was a highly statistically significant difference between total practice scores in before and immediately after implementing the

program and also between the total practice scores in before and after one month period as P value= 0.0001. These result are in agreement with Jihad Sh and Khudur K 2020⁽⁷⁴⁾, who reported that the knowledge and practice scores of participants were inadequate for study group in the pre-test.

The finding of current study revealed that ages of patients in this study ranged from 40 - < 50 years. The findings of the current study are contradicted with **Younsi A, and et al 2020⁽⁷⁵⁾**, who reported that patient's age ranged from 57-75 years. This study and its results also against with to what was reported by **Morgen S and et al 2016⁽⁷⁶⁾**, who recorded that the average age of the patients was 65 years old, and it was also not comparable to that reported by **Iida K and et al 2018⁽⁷⁷⁾**, who recorded a median age ranged from 61 to 64 years old. This is as a result of the researcher commitment of the inclusion criteria regarding the studied patients age.

Regarding the sex of the studied patients, In the present study, it was revealed that (56.66%) were females and (43.33%) were males, this result is in line with **Bellut D and et al 2015⁽⁷⁸⁾** who reported that (50.8%) were females and

(49.2%) were males. This study is rejected by **Yolu W and Yang Sh 2017⁽⁷⁹⁾** who reported that 54(60.7%) were male and 35(39.3% were females). This is may be due to most of the studied patients had a diagnosis of breast cancer.

Regarding patient diagnosis, the current study revealed that the most common patient diagnosis was breast(60%) followed by prostatic (23.3%), (10%) had Multiple myeloma and 6.66 % had other types of cancer, which is supported by **Nakata E and et al 2020⁽⁸⁰⁾** who reported that patient diagnosis were breast(12 patients,31.5%), lung(8 patients,21.05), prostatic(8 patients,21.05), stomach, colorectal and other cancers(10 patients,26.3). This study differs from what was reported by **MCQUAIL M and et al 2018⁽⁸¹⁾**, who reported that (26.8%) of studied patients had prostatic and lung cancer and only (14.6%) had breast cancer. This study and its results also against with to what was reported by **Shah S and et al 2021⁽⁸²⁾** who reported that lung (37.9%), breast (17.2%), and renal (10.3%). This difference as a result of increased the females sample in the study.

Regarding patients' physical assessment related to Spinal Cord Independence Measure scale (self-care, respiration and

mobility), this study showed that there was a statistical significance difference as P value as P value 0.0001. These findings were in agreement with a study result about "Functional status of patients with metastatic spinal cord compression "reported by **Santos D,Leite I and Guerra M 2018**⁽⁸³⁾ who reported that there was difference in the functional status (p = 0.004) and in the motor domain (p = 0.001) according to the level of neurological deficits. These findings were also supported by **Fatima N 2020**⁽⁸⁴⁾ who reported that there was significant difference in the ambulatory functional status of the patents through the study as P value .001.

Conclusion

Based on the findings of the present study, it can be concluded that:

The educational program improved the knowledge and practice score of the studied nurses towards care of cancer patient with Metastatic Spinal Cord Compression.

- Concerning to the bio-sociodemographic characteristics of the studied nurses, it was noticed that (37.5%) of the studied nurses ranged from (30 - < 40) years old. Also, it was found that (87.5%) were females and (12.5%) of them were males. Also, it was

found that half (80%) of the studied nurses were married, (20%) were single.

- Concerning to the bio-sociodemographic characteristics of patients, it was noticed that (63.3%) of the studied patients ranged from (40 - < 50) years old. Also, it was found that (43.33%) were males and (56.66%) of them were females,(90%) were married, (10%) were widow.
- It was found that there is a highly significant difference related to the total level of knowledge and practice of studied nurses through periods of study (pre-immediate and post one month assessment periods) with P value= 0.0001.

Recommendations

Based on the findings of the current study, the following recommendations are derived and suggested:

1-Recommendation for patients:

All patients are in need to a simplified illustrated and comprehensive Arabic booklet about spinal cord compression treatment.

2- Recommendation for nurses:

- In-service educational program should be conducted for oncology nurses to enhance their knowledge and practice toward their cancer patients to reduce complications of metastatic spinal cord compression.

References

- 1-Robson P. Metastatic spinal cord compression: a rare but important complication of cancer. *Clin Med Journal of Clinical Medicine (Lond)*. 2014; 14(5): 542–45.
- 2- Bader D., Worsley P. Technologies to monitor the health of loaded skin tissues. 2018; 17(1): 40.
- 3- Fisher M., Davies C., Lacy H. Doherty D. Oncology Section EDGE Task Force on cancer: measures of cancer-related fatigue - a systematic review. *Rehabil Oncol*. 2018; 36(2): 93-105.
- 4- Fremmelevholm A. , Soegaard K. Pressure ulcer prevention in hospitals: a successful nurse-led clinical quality improvement intervention. *Br J Nurs*. 2019; 28(6): 56- 70.
- 5-Boussios S., Cooke D., Hayward C., Kanellos F., Tsiouris A., ChatziantoniouA., Kyriakou N., Rathansi A. *International Journal of Cancer Research and Treatment*.2018;38(9):4987-4997.
- 6- McCurdy M., Shanholtz C. Oncologic emergencies. *Crit Care Med*. 2012; 40(7): 2212-22.
- 7-Watanabe N., Sugimoto Y., Tanaka M., Mazaki T., Arataki S., Takigawa T., Kataoka M., Kunisada T. , Ozaki T. Neurological recovery after posterior spinal surgery in patients with metastatic epidural spinal cord compression. *Acta Med Okayama* . 2016; 70(6): 449-53.
- 8-Hoskin P., Misra V., Hopkins K., Holt T., Brown G., Arnott S., Sharon T., Reczko K., Beare S., Lopes A., Forsyth S. SCORAD III: randomized noninferiority phase III trial of single-dose 15- Coleman R. The use of bisphosphonates in cancer treatment. 2011;1218(1):3-14.
- 9-Jabehdar P., Lo S., Redmond K., Soliman H., Myrehaug S., Husain A., Heyn C., Kapadia A., Chan A., Sahgal A. Spinal metastases: multimodality imaging in diagnosis and stereotactic body radiation therapy planning. *Future Oncol* 2017; 13(1): 77-91.
- 10-Lee A., Dunne M., Small C., Kelly P., McArdle O., O'Sullivan J., Hacking D., Armstrong J., Pomeroy M., Moriarty M., Clayton-Lea A., Parker I., Collins D., Thirion P. (ICORG 05-03): Prospective randomized non-inferiority phase III trial comparing two radiation schedules in malignant spinal cord compression (not proceeding with surgical decompression); the quality of life analysis. *Acta Oncol*,2018; 8(11): 1-8.

- 11-Roberta K., Karen I. Understanding spinal cord compression. Lippincott Nursing center Journal.2019; 46(9): 44-51.
- 12- National Institute for Health and Care Excellence. NICE pathways: metastatic spinal cord compression. 2019. <https://tinyurl.com/y4qmbdj6> (accessed 17 September 2020).
- 13- Miyoshi Y., Kawahara T., Yao M., Uemura H. Clinical outcome of surgical management for symptomatic metastatic spinal cord compression from prostate cancer. BMC Urol. 2020; 20(1):143-50.
- 14-Surveillance of metastatic spinal in adults: risk cord compression in adults: risk assessment, caused by metastatic tumor." Clinical Neurosurgery, 2016; 52(6): 65-70.
- 15- Coleman R. The use of bisphosphonates in cancer treatment. 2017;1218(1):3-14.
- 16-KassamaliH., Ganeshan A., Hoey E., Crow P. , Henerson J. Pain management in spinal metastases: the role of percutaneous vertebral augmentation. Ann Oncol,2011; 22(4):782–86.
- 17-Itagaki M., Talenfeld A., Kwan S., Talenfeld A., Kwan Sh., Brunner j., Mortell K., Brunner M. Percutaneous vertebroplasty, kyphoplasty for pathologic vertebral fractures in the Medicare population: safer and less expensive than open surgery. J VascInterv Radiol, 2012; 23(11):1423–29.
- 18-Bhatt A., Schuler J., Boakye M. , Woo Sh. Current and emerging concepts in non- invasive and minimally invasive management of spine metastasis. Cancer Treat Rev 2013;39(2):142–52.
- 19-Laufer I., Rubin D., Lis E., Cox B., Stubblefield M., YamadaY., Bilsky M. The NOMS framework: approach to the treatment of spinal metastatic tumors. Oncologist 2013;18(6):744–51.
- 20-Loblaw D., J. Perry, ,Chambers A. , Laperriere N. Systematic review of the diagnosis and management of malignant extradural spinal cord compression: the Cancer Care Ontario Practice Guidelines Initiative's Neuro-Oncology Disease Site Group. Journal of Clinical Oncology , 2015; 23 (9): 2028-37.
- 21-Gabriel J. Acute oncological emergencies. Nurs Stand. 2012; 27(4):35-41.
- 22-Patchell A., Tibbs P., Fregin W., .Payne R. Saris S.,JKryscio R., Young B. Direct decompressive surgical resection in the treatment of spinal cord compression caused by metastatic cancer: a randomized trial. Lancet.2015; 366 (9486): 643-8.

- 23-Prasad D., D. Schiff . Malignant spinal-cord compression. *Lancet Oncology*.2005; 6 (1): 15-24.
- 24-Trok R., Andrewese T. Nursing considerations for supporting cancer patients with metastatic spinal cord compression: a literature review. *British Journal of Nursing*, 2019;28(17):24-9.
- 25- National Institute for Health and Care Excellence. NICE pathways: metastatic spinal cord compression. 2019. <https://tinyurl.com/y4qmbdj6> (accessed 17 September 2020).
- 26-Spratt D., Beeler W., Moraes F. RhinesL. Gemmete J.,Chaudhary N., Shultz D., Smith S., Berlin A., Dahele M., Slotman B., Younge K., Bilsky M., ParkP., Szerlip N. An integrated multidisciplinary algorithm for the management of spinal metastases: an International Spine Oncology Consortium report. *Lancet Oncol*. 2017;18(12): 720–30.
- 27-Wänman J, Grabowski P, Nyström H, Gustafsson P., Bergh A., A Widmark A., Crnalic S. Metastatic spinal cord compression as the first sign of malignancy. 2017;88(4):457–62.
- 28-Porth C. *Essentials of Pathophysiology: Concepts of Altered Health States*. 3rd ed. Philadelphia, PA: Wolters Kluwer Health/ Lippincott Williams and Wilkins; 2011,33-50.
- 29-Lewis Sh., Dirksen Sh., Bucher L. *Medical Surgical Nursing (assessment and management of clinical problems)*.10th ed., John Wiley& Sons, INC company, 2011;1(1):1118-1126.
- 30-Nieder C. Patients with metastatic spinal cord compression profit from rapid multidisciplinary diagnostics and treatment. *Strahlenther Onkol*. 2019; 195(4):367-68.
- 31-Hinkle J., Cheever K. *Medical-surgical nursing*. 14thed, china. Philadelphia com. 2018; 870-77.
- 32- Murakami H., Kawahara N., Demura S., Kato S., Yoshioka K., Sasagawa T. Perioperative complications and prognosis for elderly patients with spinal metastases treated by surgical strategy. *Orthopedics*. 2010; 33(3):165–8.
- 33- Lawton A., Lee K.,Cheville A., Ferrone M.,Rades D.,BalboniT., Abrahm J. Assessment and Management of Patients With Metastatic Spinal Cord Compression: A Multidisciplinary Review . *Journal of Clinical Oncology*, 2018; 37(1):51-71.
- 34- Tate D., Wheeler T., Lane G.,Forchheimer M., Anderson K.,

- Sorensen F. Recommendations for evaluation of neurogenic bladder and bowel dysfunction after spinal cord injury and/or disease. *Journal of spinal cord medicine*, 2020;43(2):141-64.
- 35- Trok R., Andrewese T. Nursing considerations for supporting cancer patients with metastatic spinal cord compression: a literature review. *British Journal of Nursing*, 2019;28(17):24-9.
- 36-McClurg D., Lowe-Strong A. Does abdominal massage relieve constipation? *Nurs Times*. 2011;107(12):20-26.
- 37-Krassioukov A., Eng J., Claxton G., Sakakibara B., Shum S. Neurogenic bowel management after spinal cord injury: a systematic review of the evidence. *Spinal Cord*. 2010;48 (10):718-33.
- 38-Slavin J. Fiber and prebiotics: Mechanisms and health benefits. *Nutrients*. 2013;5(4):1417-35.
- 39- Consortium for Spinal Cord Medicine Bladder management for adults with spinal cord injury: a clinical practice guideline for health-care providers. *J Spinal Cord Med*. 2006;29(5):527–73.
- 40- Goetz L., Cardenas D., Kennelly M., Bonne Lee B., Linsenmeyer T. Moser C, Pannek J. Wyndaele J., Sorensen F. *International Spinal Cord Injury Urinary Tract Infection Basic Data Set*. *Spinal Cord* 2013;51(9):700-704.
- 41- Sharpe L., Butow P., Smith C., McConnell D., Clarke S. The Relationship between Available Support, Unmet Needs and Caregiver Burden in Patients with Advanced Cancer and their Caretakers. *Journal of Psycho-oncology*. 2005; 14 (2):102–14.
- 42-Erdogan Z. and Yavuz E. Quality of Life in Caregivers of Cancer Patients. *Arch Med Rev J*. 2014; 23(2):726–36.
- 43-Ruff R., Adamson V., Ruff S. Wang X. Directed rehabilitation reduces pain and depression while increasing independence and satisfaction with life for patients with paraplegia 2007;44(1):1–10.
- 44-Kang E., Lee S., Kim H., Min K., Hur G., Shim J., Kang K., Oh S., Seo J., Lee S., Kim J. Prognostic Factors and Skeletal-Related Events in Patients with Small Cell Lung Cancer with Bone Metastases. *J Oncology*. 2016; 90(2):1-11.
- 45-Workman L. *Medical Surgical Nursing Care, Management of Patients with Problems of the Nervous System*. 7th ed., London: John Wiley and Sons Co,2011; 411-13.
- 46-Patnaik S., Turner J., Inaparthi P., Kieffer w. *Metastatic spinal cord*

- compression. *British Journal of Hospital Medicine*.2020;81(4):1-10.
- 47: Yin Q., Wang C, Yu J., and Zhang Q. Quantitative assessment-based nursing intervention improves bowel function in patients with neurogenic bowel dysfunction after spinal cord injury. *Medicine (Baltimore)*. 2020; 99(51): 23354.
- 48- Shah S, Kutka M, Lees K, AbsonCh, Hadaki M, CookeD, Neill Ch, Sheriff M, Karathanasi A, Boussios S. Management of Metastatic Spinal Cord Compression in Secondary Care: A Practice Reflection from Medway Maritime Hospital, Kent, UK.*Journal*. 2021; 11(2), 110.
- 49-Dea N, Versteeg A, Sahgal A, Verlaan J, Charest-Morin R, Rhines L, Sciubba D, Schuster J, Weber M, Lazary A., Fehlings M, Clarke M, , Arnold P,Boriani S Bettgowda H, Laufer, I ,Gokaslan Z, Fishe Ch. Metastatic Spine Disease: Should Patients With Short Life Expectancy Be Denied Surgical Care? *Neurosurgery*, 2020;87(2),303-11.
- 50-Nakata E, Sugihara Sh, Sugawara Y, Nakahara R, Furumatsu T, Tetsunaga T, Kunisada T, Nakanishi K, Akezaki Y and Ozaki T. Multidisciplinary treatment system for bone metastases *Oncology letters J*,2020;19(4),3137-144.
- 51- Rodger S .Management of patients with non-traumatic spinal cord injury. *Nursing Times*, 2019 ; 115: 3, 34-37.
- 52- LiJ.,Wei W., Xu F., Wang Y., Liu Y. and Fu Ch. Clinical Therapy of Metastatic Spinal Tumors. *The journal Frontiers in Surgery*,2021; 8(1),1-14.
- 53-Catz A., Itzkovich M., Agranov E., Ring H., Tamir A. SCIM-spinal cord independence measure: a new disability scale for patients with spinal cord lesions. 1997; 35(12):850-56.
- 54- Jensen T and Karoly P .Self-report scales and procedures for assessing pain in adults. In *The Handbook of Pain Assessment* (Turk DC &Melzack R eds). The Guildford Press CO., 1992; 135–51
- 55- Beck A., Epstein N., Brown G., Steer R. An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*. 1988, 56(6): 893-7.
- 56-Loblaw D., Laperriere N. Mackillop W.A Population based study of malignant spinal cord compression in Ontario. *Clin Oncol (R CollRadiol)* 2013; 15(4):211–7.
- 57- Macdonald, A., Lynch D., Garbett I. Nazeer N. Malignant spinal cord compression. *J. R. Coll. Physicians Edinb*. 2019;49(2): 151–6.

- 58- Al Attar W. Effectiveness of the nursing educational program upon nurse's knowledge and practices concerning chemotherapy precautions.2015;4(6):7-13.
- 59- Won Kim H ., Hee Kim D. , Hee Kim Y., Ju Lee E., Yi Kang S. , Bit Lee D ., ji Kim Y. Clinical nurses' awareness and caring experiences for patients with cervical cancer: A qualitative study.2019;14(5):217-40.
- 60- Musleh B.,Erfan S., Mohammed M. ,AbdElAziz M. Impact of an Educational Program about Cancer Pain Management on Nurses' Knowledge, Attitudes, and Practice at Intensive Care Unit.2015;3(6):40-9.
- 61-Sharour L. Improving oncology nurses' knowledge, self-confidence, and self-efficacy in nutritional assessment and counseling for patients with cancer: A quasi-experimental design.2018; 62 (2019) :131-4.
- 62-El-Aqoul A., Obaid A., Jarrah I., Al-Rawashdeh K., and Al Hroub A. Effectiveness of Education Program on Nursing Knowledge and Attitude toward Pain Management. 2020; 7(4): 382–8.
- 63-Majeed H. , Al Attar W. Effectiveness of an Educational Program on Nurses' Knowledge Concerning Side Effect of Radiotherapy at Al-Amal National Hospital for Cancer Management in Baghdad City.2015;5(2):511-37.
- 64-Abdullah D., Rasheed O. Nursing Staff Knowledge regarding Safe Chemotherapy Administration at Oncology Center in Kirkuk City. 2018 ;13(1):144-55.
- 65-Admass B., Endalew N., Tawuye H., Mersha A. Knowledge and Attitude of Ethiopian Oncology Nurses About Cancer Pain Management: National Survey. 2020; 12(1): Jordan. International Journal of Nursing Sciences.2019; 6(3):283-7.
- 66-Salim N. · Joshua R. AbuBaker N. Chehab F. Jose A. Effect of a Nursing In-Service Education Program on Nurses' Knowledge and Attitudes towards Pain Management in a Governmental Hospital in the United Arab Emirates: Experimental Random Assignment Study.2019; 2(4): 146-53.
- 67-Zayed H., Saied S. , El-Sallamy R. , Shehata W. Knowledge, attitudes and practices of safe handling of cytotoxic drugs among oncology nurses in tanta university hospitals. 2019; 43 (1): 75-92.
- 68-Metwaly E. and Hamad D. Effect of palliative care program on nurses'

- performance regarding prostate cancer and patients' outcomes.2019;16(3):195-205.
- 69-Habib A.,Zein El din Y. , Ibrahem E. Oncology Nurses' Knowledge andPractices Regarding Handling Hazardous Drugs: Developing Procedure Manual For Safe Handling Of Hazardous Drugs.2018; 7(2):1-11.
- 70-Germossa G., Sjetne I., Helles R. The Impact of an In-service Educational Program on Nurses' Knowledge and Attitudes Regarding Pain Management in an Ethiopian University Hospital.2018;6(1):229-35.
- 71-Hosen S., Hassan M., Islam S.,Raseduzzaman M., HossainM., NafiujjamanM,Nishat T , Hasan J. Evaluation of knowledge and practice of handling chemotherapy agents by nurses: 2019;6(10):69-78.
- 72-Elsevier B.A cross-sectional study on oncology nurses' knowledge and practice of oral mucositis among cancer patients in compression (MSCC) treated with palliative : Surgical timing and survival rate. 2017; 12(12): 128–33.
- 73-Taj M, Lalani B, Madhani N, Ouma C, Njumwa L, Ukani H, Oluoch M, Sayani S, Zaidi F, Sulaiman Z. Oncology nursing training: A blended teaching approach in resource-limited countries. Journal of Clinical Oncology,2020;38(15):189-99.
- 74- Jihad Sh. , Khudur K. Effectiveness of an Education Program on Nurses' Knowledge and practice toward Radioiodine therapy at Alamal Hospital in Baghdad city.2020;24(1): 6157-64.
- 75-Younsi A., Riemann L., Scherer M., Unterberg A. , Zweckberger K. Impact of decompressive laminectomy on the functional outcome of patients with metastatic spinal cord compression and neurological impairment. 2020; 37(2): 377–90.
- 76-Morgen S., Engelhom S., Larsen C., Sogaard R. , Dahl B. Health-related Quality of Life in Patients with Metastatic Spinal Cord Compression. 2016,8(3):309-15.
- 77- Iida K., Matsumoto Y., Nokitaka M., Setsu N., Harimaya K., Kawaguchi K., Hayashida M., Okada S., , Nakashima Y. The neurological outcome of radiotherapy versus surgery in patients with metastatic spinal cord compression presenting with myelopathy. 2018; 138(1): 7–12.
- 78-Bellut D., Burkhardt J., Mannion A., Porchet F. Assessment of outcome in patients undergoing surgery for intradural spinal tumor using the multidimensional patient-rated Core Outcome Measures Index

- and the modified McCormick Scale .2015;39(2):77-110.
- 79-Yolu W. , Yang Sh. Metastatic spinal cord compression (MSCC) treated with palliative decompression: Surgical timing and survival rate. 2017 ; 12(12): 128–33.
- 80- Nakata E., Sugihara Sh., Sugawara Y., Nakahara Y., Furumatsu T., Tetsunaga T., Kunisada T., Nakanishi K., Akezaki Y., Ozaki T. Multidisciplinary treatment system for bone metastases for early diagnosis, treatment and prevention of malignant spinal cord compression. 2020 ; 19(4): 3137–44.
- 81-Mcquail M., mrcsi m., Mccartney B., baker J., frsci m., Jaadan M., mrsc b., John P. , Mccabe J. Management of Metastatic Spinal Cord Compression in Ireland: Are SurgeonsOverlooked. 2018 ; 12(4): 428–33.
- 82- Shah S., Kutka M. , Lees K., Abson Ch., Hadaki M., Cooke D., Neill Ch., Sheriff M., Karathanasi A. , Boussios S. Management of Metastatic Spinal Cord Compression in Secondary Care: A Practice Reflection from Medway Maritime Hospital, Kent, UK.2021;11(110):1102-33.
- 83-Santos D. ,Leite I. , Guerra M . Functional status of patients with metastatic spinal cord compression.2018; 23(9):3225-31.
- 84- Fatima N. Predictors of Ambulatory Functional Status Following Decompressive Surgery for Metastatic Spinal Cord Compression.2020; 67(1): 447-814.