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Evaluation of Nurses' Practices toward Safe Intravenous Chemotherapy Infusion in Baghdad City Hospitals

تقويم ممارسات الممرضين تجاه التسريب الوريدي الكيمياوي الآمن في مستشفيات مدينة بغداد

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المستخلص

الهدف: تهدف الدراسة الحالية إلى تقويم ممارسات الممرضين المتعلقة بالتسريب الكيمياوي الوريدي وإيجاد العلاقة بين ممارسات الممرضين والمستوى التعليمي وسنين الخدمة والدورات التدريبية.

المنهجية: دراسة وصفية اجريت في مستشفى بغداد التعليمي ومستشفى الامل الوطني لعلاج الاورام لغرض تقويم ممارسات الممرضين المتعلقة بتسريب العلاج الكيمياوي الوريدي، للفترة من ٢٠ تشرين الاول ٢٠١٧ الى ١٤ آذار ٢٠١٨، حيث اختيرت العينة المتكونة من ٥٠ ممرض وممرضة بشكل عشوائي من كلا المستشفيتين، وتم استخدام استبانة لرصد الممارسات التمريضية والتي تكونت من جزئين الجزء الاول تضمن المعلومات الديموغرافية للممرضين والجزء الثاني تضمن الممارسات التمريضية لاعطاء العلاج الكيمياوي الوريدي بثلاث محاور تتكون من ٥٢ فقرة، وقد تم استخدام البرنامج الاحصائي للعلوم الاجتماعية الاصدار ٢٣ لتحليل البيانات وتم استخدام التحليل الوصفي (النسب المئوية، التكرارات والوسط الحسابي) و التحليل الاستدلالي (معامل الارتباط (بيرسون)، اختبار T).

النتائج: اظهرت نتائج الدراسة بان الغالبية العظمى للممرضين لم يطبقوا الممارسات التمريضية الصحيحة قبل واثناء وبعد اعطاء العلاج الكيمياوي الوريدي وبنسبة (٧٣% و ٥٤% و ٩٢,٣%) على التوالي وعدم وجود علاقة ذات دلالة احصائية بين المستوى التعليمي وسنين الخدمة مع الممارسات التمريضية للعلاج الكيمياوي.

التوصيات: توصي الباحثات بتطبيق برامج تدريبية مستمرة لجميع العاملين في وحدات الامراض السرطانية تتعلق بالقواعد الصحيحة في اعطاء العلاج الكيمياوي والسيطرة على التلوث.

المفتاح الكلمات: مهارات الممرضين، العلاج الكيمياوي،التسريب الوريدي الكيمياوي الامن

Abstract

Objectives: The study aims to evaluate the nurses' practices that concerning intravenous chemotherapy infusion and to find out the association between nurses' practices and their level of education, year of experiences, and training course.

Methodology: A descriptive study was conducted in Baghdad Teaching Hospital and Al Amal National Hospital for Treatment of Tumors for the purpose of evaluating the practices of nurses related to infusion of intravenous chemotherapy for the period from 20th October 2017 to 14th March 2018. The sample was randomly selected from both hospitals. Who were evaluated by using a checklist to observe their practices which consisted of two parts; the first part included the demographic information of the nurses and the second part included nursing practices to give intravenous chemotherapy in three domains and 52 items. SPSS version 23 was used to analyze data by applying descriptive analysis (percentages, frequencies and arithmetic mean) as well as inferential analysis (person correlation coefficient and T-test).

Results: The results of the study showed that the majority of nurses did not apply proper nursing practices before, during and after chemotherapy, which of 73%, 54%, and 92.3%, respectively, and there is no statistically significant relationship between the educational level and years of service with the nurses' practices of chemotherapy.

Recommendation: The researchers recommend the implementation of continuous training programs for all workers in oncology units which, related to the correct rules in chemotherapy administration and infection control.

Key words: Nurses' practices, Chemotherapy, Safe chemotherapy infusion.

Introduction

Cancer has been at the forefront of causing deaths worldwide, which caused about 8.2 million deaths in 2015 were occurred in for poor- and moderate-income countries. Therefore, globally it is estimated that by 2030, the incidence of cancer will rise from 14.1 to 21.6 million cases [(1)].

In the United States at 2017 were expected occurrence (1,688,780) new cancer cases and (920,600) deaths. While, in the rest of the world, men were 20% more likely to have cancer than women and 40% more deaths. According to statistics conducted since (2004- 2013) the incidence of the disease decreased by 2% per year in men while the ratio remained stable in women. The mortality rate has dropped by 1.5% annually for women and men in the years from 2005 to 2015. Also, the overall mortality rate has decreased by 25% since (1991-2014), which has led to a decrease in the number of deaths from cancer by about 214,320 more than expected [(2)].

In other hand the patients who underlying chemotherapy treatment may expose to Infectious complications that cause of morbidity and mortality in patients with patients, where were studies determined that about 60 % of deaths are from infections, Although another data exist on mortality due to in patients with solid organ tumors, about 50 % of these patients are estimated to have an infection [(3)].

In order to treating cancer many scientists, doctors and researchers searched for a chemical compound that could cure cancer. At the beginning of the 20th century, Dr. George Beatson of Glasgow Royal Cancer Hospital was made the first attempt to find effective treatment. Also in 1941, the second attempt was made by the American doctors Charles Huggins and Clarence Hodges, where they observed the response of prostate cancer to the treatment of females' hormone stilboestrol. After that, many anti-cancer treatments that target rapidly dividing cells, including cancer cells, were developed to treat cancer [(4)].

Chemotherapy drugs have been developed to treat cancer which was known under several names, including anti-cancer, antineoplastic, or cytotoxic drugs. These drugs contain several compound chemical substances, which interfere with the division of cancer cell in order to kill it [(5)].

Therefore; chemotherapy is an effective treatment for cancer patients, it is used either for the purpose of cure from cancer, prolong the patient's life, or is used as palliation and this depends on the stage of tumor progress and its type. In order to design chemotherapy, must keep in consideration cell cycle kinetics, biochemical and pharmacological factors to reduce the signal transmission function of cancer cell [(6)].

The nurse who works in the oncology unit should have high quality nursing practices and sufficient experience to deal with cancer patients. These practices must be autonomy and taking into consideration cooperation in working with physicians and health care workers in order to perform better care for patients as well as to protect them against cancer by early detection and diagnosis of the disease and work on treatment with health follow-up in addition to the palliative treatment [(7)].

Throughout history, the nurse had played an active role in care of cancer patient. These care included assessing the patient, treating the symptoms of the disease, providing supportive care and educating him towards the disease. In oncology units, the nurse is responsible for administer chemotherapy to the patient, handling it in safety manner, calculation of doses based on the surface area of the patient's body, insertion of venous cannula as well as infusion of intravenous chemotherapy in addition to continuous monitoring of the patient's condition and follow-up laboratory tests constantly [(8)].

Despite the importance of the nurse's role in chemotherapy administration to the patients, but there are errors may be occur before or during treatment, where these errors

were revealed through a statistical survey conducted on nurses and found that there are 63% of nurses responsible for chemotherapy administration have medical errors including calculation of therapeutic doses, giving the patient an overdose, error in scheduling treatment times, incorrect preparation of the chemotherapy drugs, and sometimes administering wrong chemotherapy to the patient or the wrong patient himself, error in infusion rate that not corresponds to the medication dose. As there are several factors contribute to the occurrence of such errors, including stress experienced by the nurse, lack of experience, in addition to unclear physician order [(9)].

In other hand, the nurse must preserve patient's life and keep him away from complication as a result of chemotherapy administration as well as, preventing him from exposure to infections which can be achieved through performance nursing practices free of mistakes include using of sterile techniques, hand washing, and wearing of personal protective equipment during performance of invasive procedures such as peripheral or central venous cannula insertion and chemotherapy infusion, this is will minimize the number of pathogens that causing infections as well as keeping patient's life safe [(10)].

Methodology

Design of the Study: A descriptive-analytic study designed to evaluate nurses' practices toward safe chemotherapy infusion in Baghdad Teaching Hospitals from 20th October 2017 to 14th March 2018.

Setting of the Study: The study was conducted in Al Amal National Hospital for tumors treatment and in Baghdad Teaching Hospital.

Sample of the Study: A non-probability sample consist of (50) nurses selected randomly from both hospitals.

Instrument: A constructional observational checklist was conducted by the researchers based on review of literatures and relevant references to evaluate nurses' practices which consist of two parts

First part: regarding nurses' demographic data that include (gender, age, level of education, marital status, level of income, Residency and years of experience in nursing career), also training courses in chemotherapy and control of infection.

Second part: included three domains, which as:

First domain: concerning nurses' practices before chemotherapy infusion which deals (22) items.

Second domain: concerning nurses' practices during chemotherapy infusion which deals (18) items.

Third domain: concerning nurses' practices after chemotherapy infusion which deals (12) items.

Validity: the checklist was examined by 10 experts from different scientific branches having at least 9 years' experience in their field of work.

Reliability of the checklist Items: The reliability had been evaluated through applying Cronbach's Alpha for (52) items, the results was (0.906).

Statistical Methods: A statistical program such as SPSS (Statistical Package for Social Science) version 23 was used to analyze the data through descriptive data analysis that included frequencies, percentages, and arithmetic mean as well as inferential analysis, person correlation coefficient and T-test.

The Results:

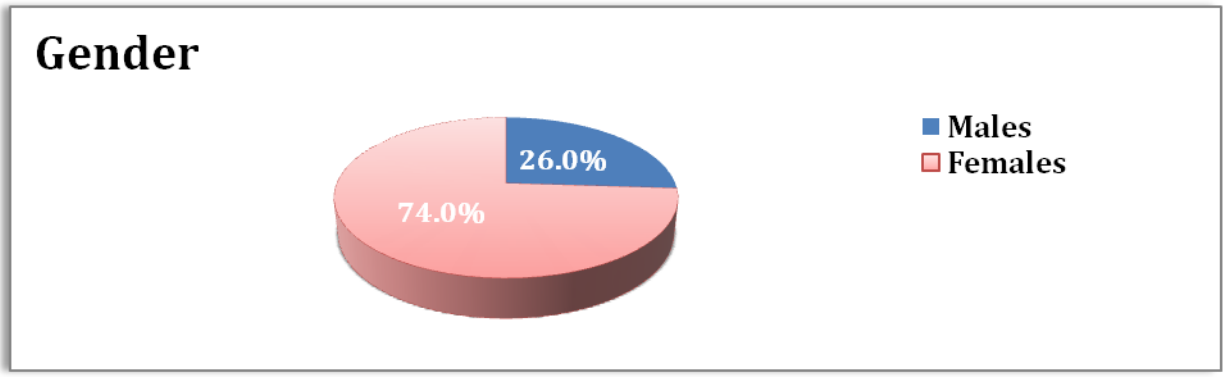

Figure (1) Distribution of nurses according to gender

Figure (1) shows that the majority of nurses are females which of (74.0%) more than males.

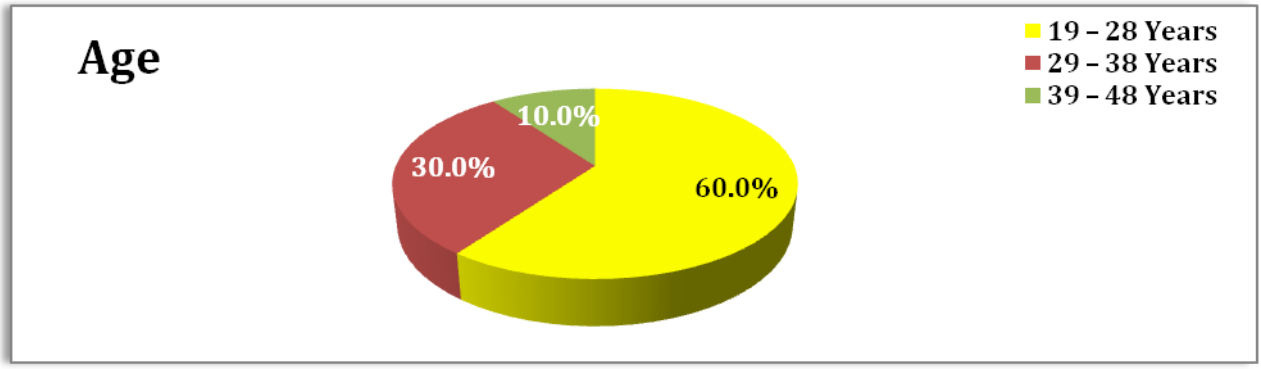

Figure (2) Distribution of nurses according to age

Figure (2) represents that most of nurses (60.0%) at age group (19-28) years about

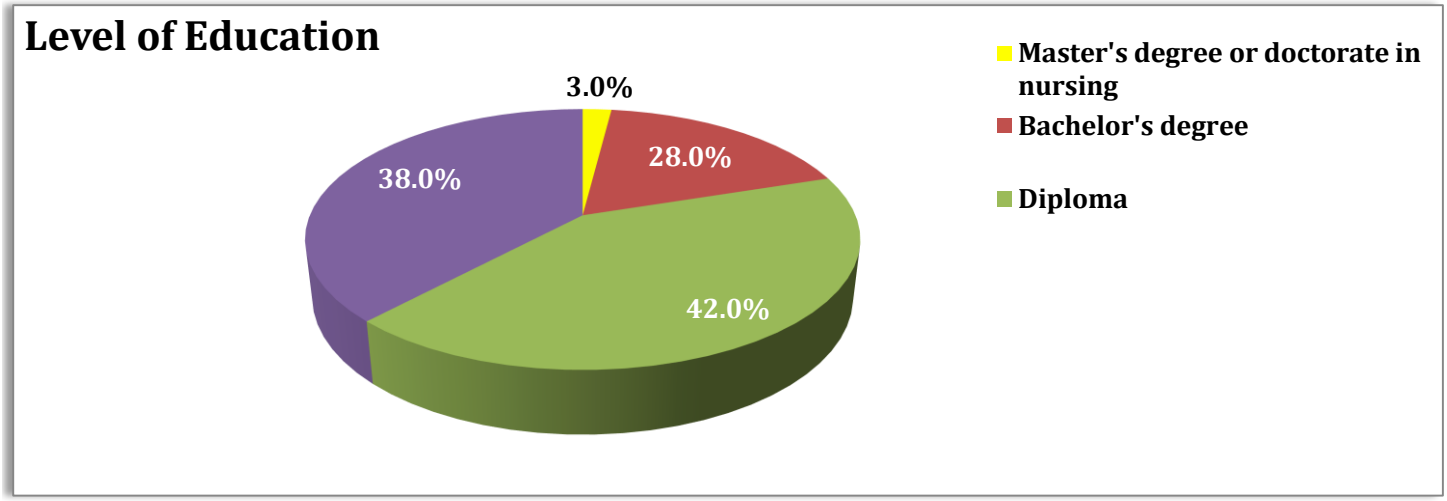

Figure (3) Distribution of nurses according to educational level

Figure (3) shows the majority of nurses have Diploma in nursing which as (42.0%)

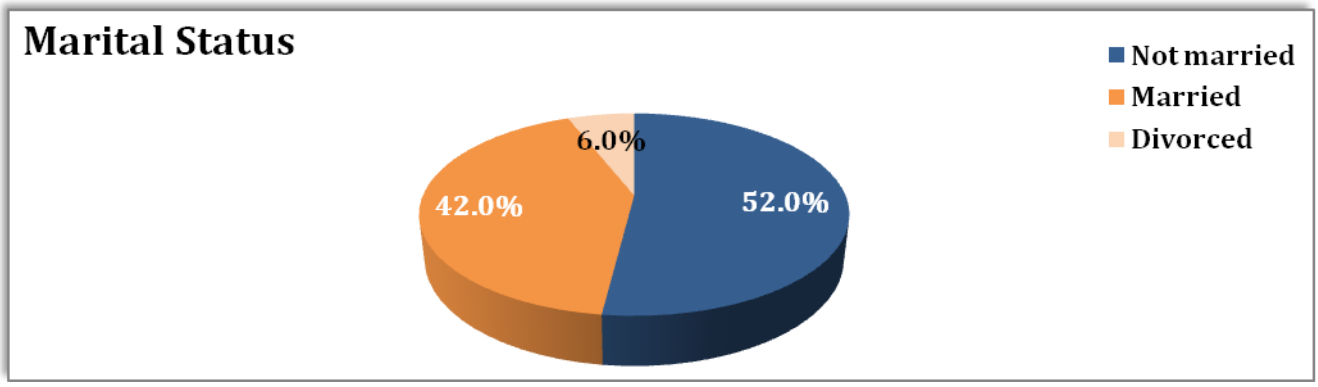

Figure (4) Distribution of nurses according to marital status

Figure (4) represents that (52.0%) of nurses are unmarried

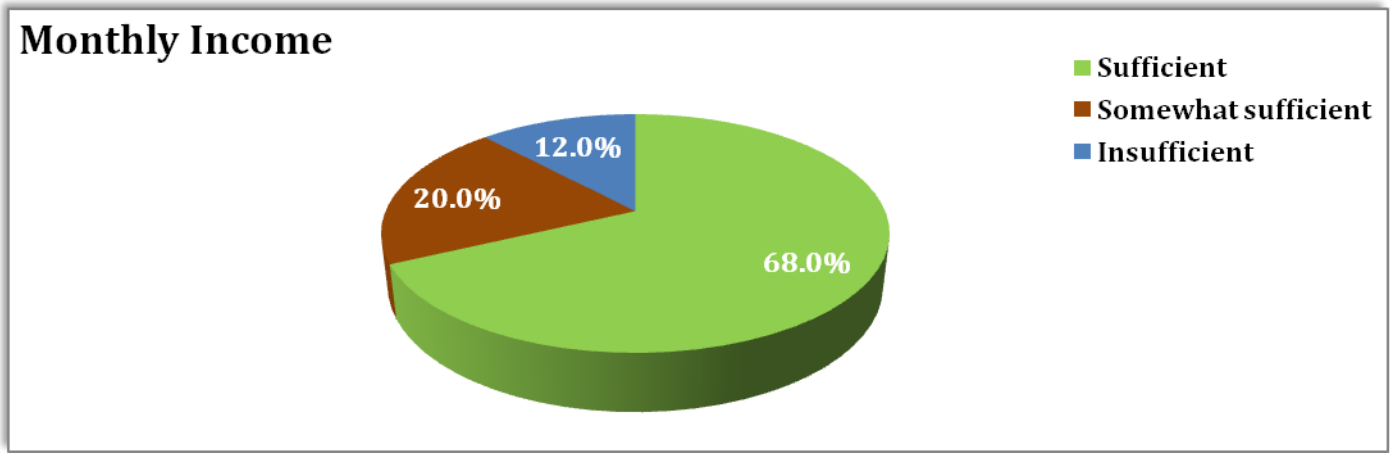

Figure (5) Distribution of nurses according to monthly income

In figure (5) about (68.0%) of nurses have sufficient monthly income

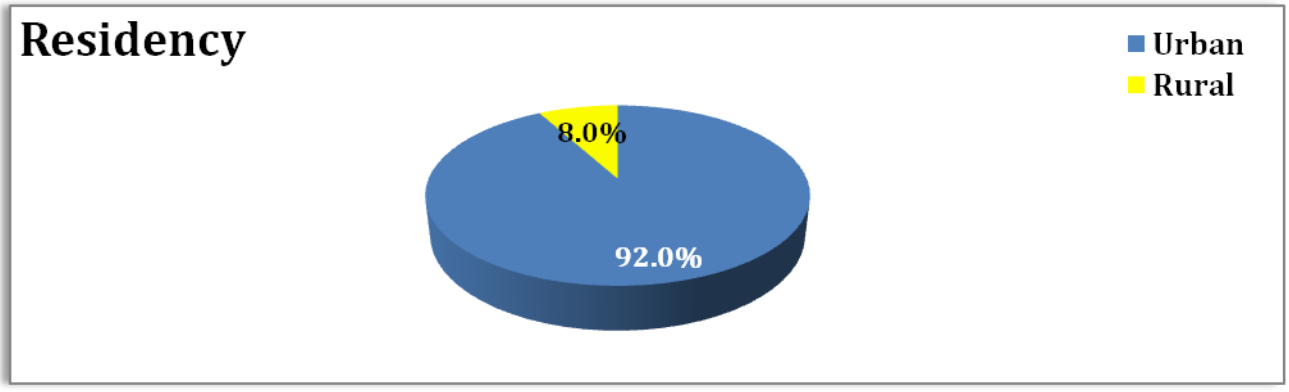

Figure (6) Distribution of nurses according to residency

Figure (6) perform that the majority of nurses are lives in urban areas which of (92.0%)

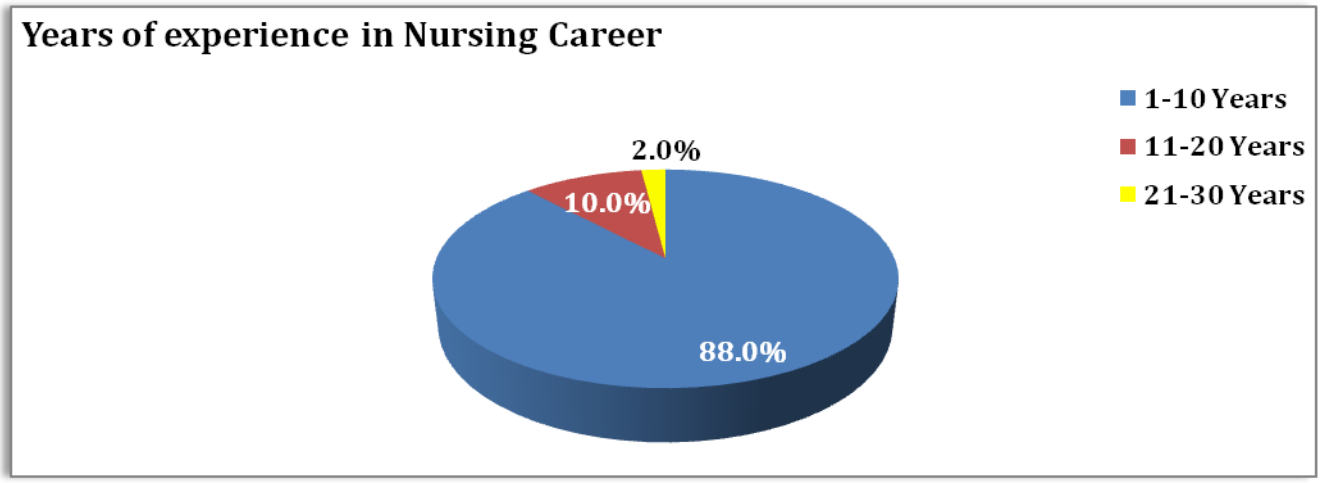

Figure (7) Distribution of nurses according to years of experience

In figure (7) about (88.0%) of nurses have (1-10) years of experience in nursing.

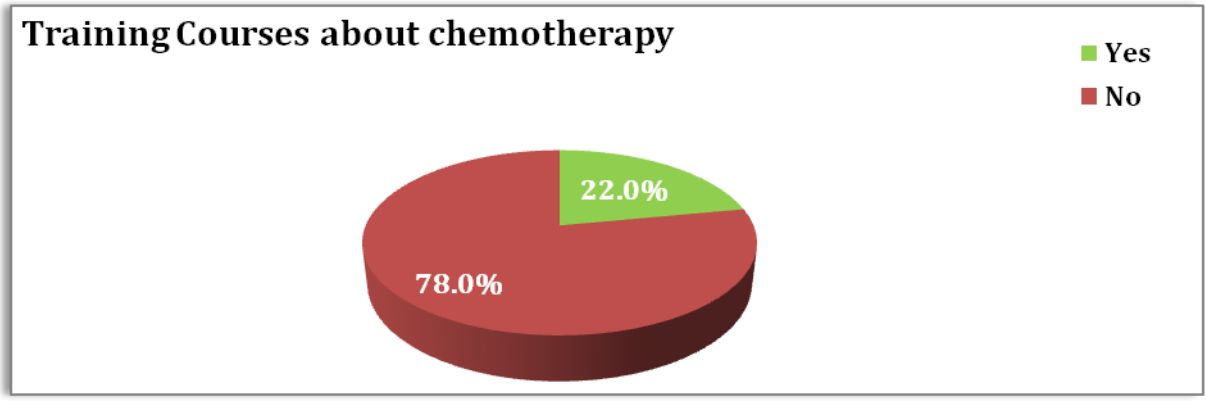

Figure (8) Distribution of nurses according to training courses about chemotherapy

Figure (8) represents that the nurses who were received chemotherapy training courses are less than who were not received which as (22.0%)

Table (1): Observational Checklist for Nurses' Practices before Chemotherapy Infusion for Patients (Three trails)

No.	nurses' practices before chemotherapy infusion	First observation						Second observation						Third observation						Total not applied &applied incorrectly for three obo.
		Applied correctly		Applied incorrectly		Not Applied		Applied correctly		Applied incorrectly		Not Applied		Applied correctly		Applied incorrectly		Not Applied		
		f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	
1	Makes sure from the physician' orders accurately.	49	98.0	0	0	1	2.0	45	90.0	0	0	5	10.0	37	74.0	0	0	13	26.0	**12.6%**
2	Makes sure from patient's name, bed number and room number.	12	24.0	0	0	38	76.0	20	40.0	0	0	30	60.0	20	40.0	0	0	30	60.0	**65.3%**
3	Introduces himself to the patient and explain the procedure.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**100%**
4	Performs hand hygiene.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**100%**
5	Wears sterile mask.	8	16.0	0	0	42	84.0	14	28.0	0	0	36	72.0	5	10.0	0	0	45	90.0	**82%**
6	The nurse wears head cap.	2	4.0	0	0	48	96.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**98.6%**
7	Wears sterile gloves.	30	60.0	0	0	20	40.0	32	64.0	0	0	18	36.0	25	50.0	0	0	25	50.0	**42.0%**
8	Measures patient's body temperature.	3	6.0	0	0	47	94.0	3	6.0	0	0	47	94.0	4	8.0	0	0	46	92.0	**93.3%**
9	Takes patient's pulse rate.	2	4.0	0	0	48	96.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**98.6%**
10	Takes patient's respiration rate.	2	4.0	0	0	48	96.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**98.6%**
11	Measures patient's blood pressure.	2	4.0	0	0	48	96.0	5	10.0	0	0	45	90.0	6	12.0	0	0	44	88.0	**91.3%**
12	Clarifies to patient the necessity of taking the dose within the prescribed time.	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**99.3%**
13	Clarifies to patient the side effect of chemotherapy.	0	0	0	0	50	100.0	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	**99.3%**
14	Advise patient not to eat anything at least 4 hours before taking chemotherapy dose.	2	4.0	0	0	48	96.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**98.6%**
15	Gives patient antiemetic as physician's prescription	47	94.0	0	0	3	6.0	48	96.0	0	0	2	4.0	49	98.0	0	0	1	22.0	**10.6**
16	puts patient in comfortable position	20	40.0	17	34.0	13	26.0	45	90.0	0	0	5	10.0	46	92.0	0	0	4	8.0	**26%**
17	matches the prescribed drug with the patient's health file	30	60.0	16	32.0	4	8.0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	**10%**
18	notes drug appearance	1	2.0	1	2.0	48	96.0	11	22.0	0	0	39	78.0	10	20.0	0	0	40	80.0	**85.3%**
19	makes sure from expiration date	3	6.0	1	2.0	46	92.0	1	2.0	0	0	49	98.0	2	4.0	0	0	48	96.0	**96%**
20	Performs hand hygiene again.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**100%**
21	Wears personal protective equipment.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**100%**
22	Wears new sterile gloves.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	**100%**
	Total																			**73.0%**

F: frequency, %: percentage

Table (1) shows the evaluation of nurses' practices for three observational checklist about the important practices that should be applied by nurses before chemotherapy infusion to provide safe chemotherapy administration which revealed that many items were not applied by nurses such as (Performs hand hygiene, Wears sterile mask, The nurse wears head cap, Clarifies to patient the side effect of chemotherapy, and makes sure from expiration date) which was 100%,82%, 98%, 99%, and 96% respectively, and there were 73% of nurses' practices before chemotherapy infusion items were not applied by nurses.

Table (2): Observational Checklist for Nurses' Practices during Chemotherapy Infusion for Patients (Three trails)

No.	nurses' practices during chemotherapy infusion	First observation						Second observation						Third observation						Total not applied &applied incorrectly for three obo.
		Applied correctly		Applied incorrectly		Not Applied		Applied correctly		Applied incorrectly		Not Applied		Applied correctly		Applied incorrectly		Not Applied		
		f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	
1	Asks patient about his name to match it with the patient's health file.	6	12.0	0	0	44	88.0	20	40.0	0	0	30	60.0	13	26.0	0	0	37	74.0	74%
2	keeps patient's privacy	3	6.0	0	0	47	94.0	18	36.0	0	0	32	64.0	17	34.0	0	0	33	66.0	74%
3	puts patient in right position	47	94.0	0	0	3	6.0	43	86.0	0	0	7	14.0	40	80.0	0	0	10	20.0	13.3%
4	takes a comfortable position	14	28.0	0	0	36	72.0	26	52.0	0	0	24	48.0	21	42.0	0	0	29	58.0	59.3%
5	The nurse provides good lightening for vision.	32	64.0	0	0	18	36.0	48	96.0	0	0	2	4.0	48	96.0	0	0	2	4.0	14.6%
6	checks patient's arms	50	100.0	0	0	0	0	49	98.0	0	0	1	2.0	48	96.0	0	0	2	4.0	2%
7	chooses superficial veins	4	8.0	0	0	46	92.0	7	14.0	0	0	43	86.0	13	26.0	0	0	37	74.0	84%
8	Sterilizes skin with alcohol swap in circular form from inside to outside.	2	4.0	0	0	48	96.0	2	4.0	0	0	48	96.0	2	4.0	0	0	48	96.0	96%
9	Puts a cannula in non-dominant hand.	0	0	0	0	50	100.0	3	6.0	0	0	47	94.0	1	2.0	0	0	49	98.0	97.3%
10	Hung chemotherapy in suitable height for better infusion.	49	98.0	0	0	1	2.0	49	98.0	0	0	1	2.0	48	96.0	0	0	2	4.0	2.6%
11	Makes sure of cannula work by pushing amount of normal saline through the cannula.	8	16.0	0	0	42	84.0	4	8.0	0	0	46	92.0	10	20.0	1	2.0	39	78.0	85.1%
12	Gets rid of air bubbles from infusion set and connects it to cannula.	0	0	49	98.0	1	2.0	1	2.0	0	0	49	98.0	2	4.0	47	94.0	1	2.0	98%
13	Adjusts the number of drops per minutes according to prescribed time and dosage.	4	8.0	0	0	46	92.0	10	20.0	39	78.0	1	2.0	9	18.0	39	78.0	2	4.0	84.6
14	Monitor patient during chemotherapy infusion.	8	16.0	1	2.0	41	82.0	0	0	0	0	50	100.0	1	2.0	1	2.0	48	96.0	94%
15	Close infusion valve after chemotherapy infusion finish.	33	66.0	0	0	17	34.0	22	44.0	0	0	28	56.0	18	36.0	0	0	32	64.0	51.3%
16	gets rid from chemotherapy container,	0	0	0	0	50	100.0	46	92.0	0	0	4	8.0	44	88.0	0	0	6	12.0	40%
17	documents all the nursing intervention	49	98.0	0	0	1	2.0	50	100.0	0	0	0	0	48	96.0	0	0	2	4.0	2%
18	Put patient in comfortable position with reassuring him and removing his fear.	0	0	0	0	50	100.0	1	2.0	0	0	49	98.0	3	6.0	0	0	47	94.0	97.3%
	Total																			54.02%

F: frequency, %: percentage

The finding of table 2 revealed that the nurses' practices during introducing of chemotherapy about 54.02% were not applied by nurses, such as a chooses superficial veins, sterilizes skin with alcohol swap in circular motion from inside to outside, puts a cannula in non-dominant hand, makes sure of cannula work by pushing amount of normal saline through the cannula, gets rid of air bubbles from infusion set and connects it to cannula, adjusts the number of drops per minutes according to prescribed time and dosage, monitor patient during chemotherapy infusion, and put patient in comfortable position with reassuring him and removing his fear which of (84%, 96%, 97.3%, 85%, 98%, 94.6%, 94%. and 97.3% respectively).

Table (3): Observational Checklist for Nurses' Practices after Chemotherapy Infusion for Patients (Three trails)

No.	Nurses' practices after chemotherapy infusion	First observation						Second observation						Third observation						Total not applied &applied incorrectly for three obo.
		Applied correctly		Applied incorrectly		Not Applied		Applied correctly		Applied incorrectly		Not Applied		Applied correctly		Applied incorrectly		Not Applied		
		f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	f.	%	
1	Relief the effect of chemotherapy through giving Palliative medications	45	90.0	0	0	5	10.0	38	76.0	0	0	12	24.0	32	64.0	0	0	18	36.0	23.3%
2	Provides patient and his family with sufficient information about chemotherapy and its side effect	0	0	0	0	50	100.0	3	6.0	0	0	47	94.0	6	12.0	0	0	44	88.0	94%
3	provides patient with information concerning patient's health and prevention of infections	1	2.0	0	0	49	98.0	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	98.6%
4	Advices patient to be a far away from crowded areas	0	0	0	0	50	100.0	0	0	0	0	50	100.0	1	2.0	0	0	49	98.0	99.3%
5	Advices patient to be a far away from invasive instruments to prevent bleeding.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	1	2.0	0	0	49	98.0	99.3%
6	Advices patient to avoid psychological and physical stress.	1	2.0	0	0	49	98.0	3	6.0	0	0	47	94.0	0	0	0	0	50	100.0	97.3%
7	Teaches patient how to measure his body temperature.	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	99.3%
8	Advices patient to take care of his nutrition by eating small and soft frequent meals.	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	99.3%
9	Advices patient to avoid soft and caffeinated drinks, spicy foods, uncooked foods, fruits and vegetables.	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	99.3%
10	Advices patient to eat foods with dietary fiber to prevent constipation.	1	2.0	0	0	49	98.0	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	98.6%
11	Instructs patient to eliminate his body waste in safety manner.	0	0	0	0	50	100.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	100.0%
12	Notifies patient with his next date of chemotherapy dose.	1	2.0	0	0	49	98.0	0	0	0	0	50	100.0	0	0	0	0	50	100.0	99.3%
	Total																			92.3%

F: frequency, %: percentage

The results of table 3 shows the evaluation of nurses' practices after chemotherapy infusion for patients which as 92.3% of practices were not applied by nurses, that's mean all items of nurses' practices after chemotherapy infusion have not been applied at a high percentage.

Table (4): Relationship between Nurses' Practices for Chemotherapy Infusion and their level of education, and year of experiences

Variables		Educational Level	Years of experience in nursing career	Nurses' practices before chemotherapy infusion	Nurses' practices during chemotherapy infusion	Nurses' practices after chemotherapy infusion
Educational Level	Pearson Correlation	1	-.056-	-.066-	-.218-	-.165-
	Sig. (2-tailed)		.699	.649	.128	.253
	N	50	50	50	50	50
Years of experience in nursing career	Pearson Correlation	-.056-	1	.205	.163	-.104-
	Sig. (2-tailed)	.699		.153	.257	.471
	N	50	50	50	50	50
Nurses' practices before chemotherapy infusion	Pearson Correlation	-.066-	.205	1	.269	.556**
	Sig. (2-tailed)	.649	.153		.059	.000
	N	50	50	50	50	50
Nurses' practices during chemotherapy infusion	Pearson Correlation	-.218-	.163	.269	1	.144
	Sig. (2-tailed)	.128	.257	.059		.318
	N	50	50	50	50	50
Nurses' practices after chemotherapy infusion	Pearson Correlation	-.165-	-.104-	.556**	.144	1
	Sig. (2-tailed)	.253	.471	.000	.318	
	N	50	50	50	50	50

Significance: P: ≤ 0.01 level

Table 4 shows that there is no significant relationship between nurses' practices for chemotherapy infusion and nurses' level of education and year of experiences at $p \leq 0.01$ level

Table (5): Association between Nurses' Practices for chemotherapy infusion regarding training course about chemotherapy

Variables	Training courses about chemotherapy	N	Mean	S.D.	df	t. test	Sig. P≤0.05
Nurses' practices before chemotherapy infusion	No	39	31.25	3.266	48	-.015-	**0.968 N.S.**
	Yes	11	31.27	2.866	18.028	-.016-	
Nurses' practices during chemotherapy infusion	No	39	31.38	3.225	48	.110	**0.025 S.**
	Yes	11	31.27	1.678	32.412	.155	
Nurses' practices after chemotherapy infusion	No	39	14.00	1.777	48	-.636-	**0.784 N.S.**
	Yes	11	14.36	1.206	23.662	-.788-	

N= number of nurses, df= degree of freedom, S. = significant, N.S. = non-significant, S.D. = Standard Deviation

Table 5 presented that there is a significant relationship between the nurses' practices and their training course related to chemotherapy infusion at **P≤0.05 level.**

Discussion

The characteristics of present study revealed that the high percent was females, (60%) at age group (19-28) years, for their educational level, (42.0%) of nurses were graduated from medical institute, and about 52% of them were not married, 68% of nurses have sufficient income, 92% of them lives in urban area, 88.0% of nurses have 1-10 year of experiences, 78% of them not have training course, 22% of them participant in training course related to chemotherapy (figure 1,2,3,4,5, 6, 7, and 8)

Choudhary, V., (2016) conducted a non-experimental descriptive research to assess the knowledge and attitudes of nurses staff on nursing care of cancer patients undergoing chemotherapy on 50 nurses staff was selected from cancer hospitals of Punjab, the characteristics of their study was 96% of sample females, at 21-25 years ago, graduated from secondary school nursing, most of them were not married, 84% of nurses have 1-5 year of experiences, and 86% of them not attending on program related chemotherapy **(11)**.

Important practices that should be applied by nurses to provide safe infusion of chemotherapy before starting infusion were not applied by nurses in the present study such as (Performs hand hygiene, Wears sterile mask, The nurse wears head cap, Clarifies to patient the side effect of chemotherapy, and makes sure from expiration date) these were by 100%, 82%, 98%, 99%, and 96% respectively, and about 73% of items that related to nurses' practices before chemotherapy infusion were not applied by nurses (table 1).

Ahmed, and Jaddoue, (2016) stated in their study which conducted on (40) nurses who are working in oncology unit at Baghdad Pediatric Hospitals to assess the nurses' intervention toward treatment modalities, they were concluded that the nurses' skills were poor in all three observation in different skills items at pre- administration stage, these items are check patient's allergies, calculate dosage based on body surface area, verify dosages with RN, and check drugs and identify modifiers with register nurse witness **(12)**.

The nurses' practices during introducing of chemotherapy in present study there about 54.02% of their practices were not applied such as, chooses of superficial veins, sterilizing of skin with alcohol swap in circular motion from inside to outside, puts a cannula in non-dominant hand, makes sure of cannula work by pushing amount of normal saline through the cannula, gets rid of air bubbles from infusion set and connects it to cannula, adjusts the number of drops per minutes according to prescribed time and dosage, monitor patient during chemotherapy infusion, and put patient in comfortable position with reassuring him and removing his fear, which were about (84%, 96%, 97.3%, 85%, 98%, 94.6%, 94%. and 97.3% respectively**)** (table2).

Widespread use of chemotherapeutic drugs in the treatment of cancer has lead to higher health hazards among employee who handle and administer such drugs, so nurses should know how to protect themselves, their patients and their work environment against infection and toxic effect, Mohsen, and Fareed, (2013) examined the effect of chemotherapy safety protocol for oncology nurses on their protective measure practices. Their study was carried out in oncology department of Menoufia University hospital and Tanta oncology treatment center on forty five nurses in Tanta oncology treatment center and eighteen nurses in Menoufia

oncology department, they presented that the awareness of the nurses who handling and administering the chemotherapeutic drugs were not as good as permit safety for them [5].

The evaluation of nurses' practices after chemotherapy infusion for patients in present study was 92.3% of practices were not applied by nurses which that's mean, all items of nurses' practices after chemotherapy infusion have high percent to not applied (table3).

Cancer Care Ontario, (2015) described the role of oncology nurses that understand the impact of the cancer experience and strategizes when and how to best guide the patient and family throughout the cancer treatments. The oncology nurse will assess the patient's needs, establish a therapeutic relationship, and teach, counsel and support the individual and family through the continuum of care [7].

In the present study there was no significant relationship in between nurses' practices for chemotherapy infusion and nurses' level of education and year of experiences at $p \leq 0.01$ levels, and the study presents that there was significant relationship between the nurses' practices and their training course related to chemotherapy infusion at $P \leq 0.05$ level (table 4, and 5).

Quinn, (2008) stated in her study that the nurses who are working in cancer care focus on patient assessment, education, symptom management, and supportive care. In medical oncology they play an integral role in the administration of antineoplastic agents and are responsible for safe drug handling; evaluation of laboratory data; calculation of drug dosages on the basis of body surface area; insertion of intravenous lines or accessing central venous devices; continuous and time intensive monitoring to address potential adverse reactions or drug interactions, so the nurses who are working in oncology units will need to expand their knowledge base on new drugs, new technologies, and biologic therapies [8].

Recommendations

Due to the poor practices of nurses, we recommends to continues implementation of training program for all nurses who are works in chemotherapy units, in addition to increasing the recruitment of nurses who graduated from nursing college and appointment them in oncology and hematology units to improve the level of nursing services that provided to cancer patients.

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