

Nursing care standards for cancer patients undergoing chemotherapy

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Abstract: The aim of the study is to develop nursing care standards for cancer patients undergoing chemotherapy. A study was conducted in oncology unit and outpatient clinic of oncology at Assiut university hospitals. To accomplish the purpose of this study data were collected from all head nurses and nurses works in oncology unit and out patient clinic of oncology (30), physician (24) who had an experience in the field of the study for determining the basic competencies. Tool utilize for data collection were Health team opinionnaire sheet, Nurses knowledge standards level test for cancer patient undergoing chemotherapy, and Nurses performance observation standards level checklist for cancer patient undergoing chemotherapy. The results show that the majority of physician and nurses agreed about all competencies to be performed by physician and nurses whom works at oncology field as these competencies required for cancer patients undergoing chemotherapy, as regard nurse's knowledge about cancer there was a highly significant statistical difference between four stages (Pre, Immediate, after one month, and after three months) application of standards. On pre standards application 53.3% of study group were Poor in knowledge, on immediate standards application 100% of study group were good in knowledge, after 1 month of standards application 80% of study group were good in knowledge, and after 3 months 60% of study group were satisfied in knowledge, and regarding to nurse's performance the results show that the level of performance improved in all procedures immediately, after one month and after three months than pre- standards application.

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1. Introduction

Cancer is a group of more than 200 disease characterized by uncontrolled and unregulated growth of cells. It is a major health problem that occurs in people of all ethnicities (Tannok et al, 2005). Every year at least 200,000 people die worldwide from cancer related to their workplace. Millions of workers run the risk of developing cancers such as lung cancer from tobacco smoke, or leukemia from exposure to benzene at their workplaces. Currently, most cancer deaths caused by occupational risk factors occur in the developed world (Jemal et al, 2008).

Treatment options offered to cancer patients should be based on realistic and achievable goals for each specific type of cancer. The range of possible treatment goals may include complete eradication of malignant disease (cure), prolonged survival and containment of cancer cell growth (control), or relief of symptoms associated with the disease (palliation). Multiple modalities are commonly used in cancer treatment. A variety of therapies, including surgery, radiation therapy, chemotherapy, gene therapy, and biologic response modifier (BRM) therapy may be used at various times throughout treatment (Eiser and Weiss 2001).

Chemotherapy is the use of chemical drugs to kill cancer cells. It aims to provide a cure, control spread of the disease, or palliate signs of suffering. Chemotherapy works by stopping or slowing the growth of cancer cells, which grow and divide quickly. But it can also harm healthy cells that divide quickly, such as those that line the mouth and intestines or cause the hair to grow. Damage to healthy cells may cause side effects. Often, side effects get better or go away after chemotherapy is over (National Cancer Institute, 2007).

Chemotherapy has side effects on gastrointestinal system, hematologic system, integumentary system, genitourinary tract, nervous system, respiratory system, and cardiovascular system. The nurse plays an important role in identifying, reporting, and helping patients deal with the side effects chemotherapy (Benson AB et al, 2004). So standards of care should be established to meet the patients and family needs.

Standards are authoritative statements by which the nursing profession describes the responsibilities for which its practitioners are accountable. Standards reflect the values and priorities of the profession and provide direction for professional nursing practice and a framework for the evaluation of this practice. They also define the nursing profession's accountability to

the public and the outcomes for which registered nurses are responsible (American Nurses Association, 2006).

The main purpose to nursing standard is to promote, guide and direct professional nursing practice. It is Important to outlines what the profession expects of its members, promotes guides and directs professional nursing practice-important for self-assessment and evaluation of practice by employers, patients and other stakeholders, provides nurses with a framework for developing competencies and aids in developing a better understanding and respect for the various and complimentary roles that nurses have (Lillies et al, 2005).

The role of the nurse in the administration of chemotherapy is continuously developing. The importance of education and training for staff administering these treatments is widely recognized, as safety for both patient and staff is essential. The risks associated with handling chemotherapy are associated with the time, dose and routes of exposure. Chemotherapy can be absorbed through the skin and this may be through handling the drug or through exposure to patient waste products as a result of drug metabolism (Jack, 2002).

After a vigorous review process, the final list of chemotherapy administration safety standards consists of nine standards covering many topics. Such as (chemotherapy clinic is ready to receive patients, all infection control measures are properly followed in all procedure throughout chemotherapy administration, caring is provided for each patient before chemotherapy administration, caring is provided for each patient during chemotherapy administration, caring is provided for each patient after chemotherapy administration patient education is carried out pre, intra, and post chemotherapy administration, continuous monitoring, recording are followed during all phases of chemotherapy administration, all staff is follow professionalism, and all staff is follow ethics and patients right during chemotherapy administration).

Significance of the study:

Chemotherapy drugs are different from other drugs classes and cancer patients are special having special needs and are usually very sensitive to external factors. Errors in chemotherapy are fatal and its hazards have been proven to be carcinogenic on repeated exposure. Chemotherapy has side effects; those side effects appear on patient as symptoms. The majority of patients expose to chemotherapy side effects, so the nurse who deal with those patients should be professional nurse and standard of care must be available for health team to minimize those side effects.

Aim of the study:

The aim of the study is to develop nursing care standards for cancer patients undergoing chemotherapy.

Research hypothesis:

Open heart surgery patient attending educational program will exhibited a positive effect on minimized surgical site infections post operatively.

2. Material and Methods:

Research design:

Quasi-experimental research design was utilized to fulfill the aim of this study.

Materials:

Setting:

The study was carried out in oncology unit and out patient clinic of oncology at Assiut University Hospitals.

Subjects:

The subjects of this study consisted of all head nurses and nurses works in oncology unit and out patient clinic (30), physician (24) who had an experience in the field of the study for determining the basic competencies at Assiut University Hospitals.

Tools of the study:

Three tools were developed by the researcher to collect the necessary data for this study.

Tool I: "Health team opinionnaire sheet"(Annex 1)

A structure opinionnaire was developed by the researcher based on the identified broad competency area, in order to elicit opinions of health team including physicians and all nursing categories related to the basic competencies required by the provision of care to cancer patient under going chemotherapy.

This tool covered major broad competencies which were further subdivided into sub-competencies.

The following are the major broad competencies:

1. Ensure that the chemotherapy clinic is ready to receive patients.
2. Ensure that all infection control measures are properly followed in all procedure throughout chemotherapy administration.
3. Ensure that caring is provided for each patient before chemotherapy administration.
4. Ensure that caring is provided for each patient during chemotherapy administration.
5. Ensure that caring is provided for each patient after chemotherapy administration.
6. Ensure that the patient education is carried out pre, intra, and post chemotherapy administration.
7. Ensure that continuous monitoring, recording are followed during all phases of chemotherapy administration.
8. Ensure that all staff is follow professionalism.
9. Ensure that all staff is follow ethics and patients right during chemotherapy administration.

Tool II: "Nurses knowledge standards level test for cancer patient undergoing chemotherapy" (Annex II)

A knowledge test was developed by the researcher derived from basic of nursing care standards for cancer patients undergoing chemotherapy related to the theoretical frame of the actual procedural performance of unit in cancer patients undergoing chemotherapy by nurses. It consists of three parts:

Part **(one)**: includes socio-demographic characteristics (e.g., age, sex, marital status, qualification, years of experiences, and attendances of training programme in oncology field).

Part **(two)**: used to assess nurse's level of knowledge as regard to: definition, causes, and different methods in treatment of cancer, and side effects of cancer treatment.

Part **(three)**: used to assess nurse's level of knowledge as regard to definition of chemotherapy, causes of chemotherapy administration, methods of avoidance of dizziness which comes at beginning of chemotherapy administration, methods of avoidance of constipation for patients undergoing chemotherapy, methods of avoidance of diarrhea for patients undergoing chemotherapy, advises for patients who has mouth sores, sexual problem which man and women undergoing chemotherapy may suffer from, also true and false question and multiple choice question was included. The total score of the questionnaire sheet was (70) degree. Less than 50% were poor, from 50 to 75% were satisfactory, and more than 75% were good.

Tool III: "Nurses performance observation standards level checklist for cancer patient undergoing chemotherapy" (Annex III)

This tool was developed by the researcher based on performances review of related nursing and medical literature in order to identify the level of procedures actually carried out by nursing staff in oncology unit at Assiut University Hospital in the form of procedure steps. It included the following items:

1. Drug preparation:
 - A. Preparation area.
 - B. Preparation equipment.
 - C. Infection control measures:
 - Hand washing.
 - Wearing mask. Wearing a gown.
 - Wearing a protective glove.
 - Management of chemotherapy spill.
 - If chemotherapy spill on hard surface.
 - If chemotherapy spill on linen.
 - If chemotherapy spill on personal of patient.
2. Drug administration (safe handling during administration):
 - A. Oral.
 - B. Intravenous (intravenous catheter (cannula) insertion, IV infusions, and IV injections)

3. Post administration of chemotherapy.
 4. Treatment of extravasations.
 5. Precautions following drug administration.
 6. Dispose waste materials after administration of chemotherapy (cytotoxic waste material).
- The score for each step-performance was distributed as follows:

Step performance	Score
Correct	1
Incorrect	2
Not done	3

Methods:**Techniques for data collection:**

1. An official permission to conduct the study was obtained by the researcher from the head of oncology department after explanation of the aim of the study.
2. The actual routine of nursing care was observed by the researcher in the oncology unit and out patient clinic of oncology for a period of one month to identify the procedures most frequently implemented in the oncology unit and out patient clinic of oncology.
3. The structured interview (tool 1) was developed by the researcher based on the review of pertinent literature and the routine nursing care implemented for management of cancer patients undergoing chemotherapy.
4. Interview was conducted by the researcher using (tool 1) to elicit the opinions of the expert group regarding the required competencies. Each interview lasted for 45 minutes to an hour.
5. The basic competencies for cancer patients undergoing chemotherapy were formulated in a form of basic standards and criteria for measuring of care.
6. Develop nurses knowledge standards level test for cancer patient undergoing chemotherapy" (Annex II), and Nurses performance observation standards level checklist for cancer patient undergoing chemotherapy" (Annex III) was done by researcher.
7. Tool (II, III) were tested for content validity by experts in the field of the study and necessary modifications were done (five experts).
8. A pilot study carried out to test the feasibility and practicability of the study tools on 10% of sample.
9. Tool (II, III) were used to determine the nurses knowledge and performance.
10. Nursing care standards for cancer patients undergoing chemotherapy is performed in four sessions, verbal information, demonstration, and booklet are used.
11. Data collection took approximately (nine) months from January 2009 till the end of October 2010.

Analysis of data

The collected data were coded then transformed into specially designed form so as to be suitable for entering into IBM compatible computer. All entered data were verified for any errors using Statistical Package for Social Sciences (SPSS) version 16 for windows. Descriptive statistics as number, percentage, mean and standard deviation. Data were collected, tabulated and statistically analyzed using Chi-square test, t-test, and ANOVA test. Correlation coefficient (r) was calculated between continuous variables.

Limitations of study:

1. The facilities in the oncology unit and outpatient clinic of oncology are limited.
2. Number of participant not covered the work.
3. Unavailability of a teaching place for nurses in oncology unit.
4. Limited in generalizability because the participant was selected from one geographical area in Arab Republic of Egypt (Assiut university hospital).

3. Results:

The results of this study were divided into the following parts:

Part 1:

This part is concerned with opinion of physicians and nursing staff regarding the basic competencies required for cancer patients undergoing chemotherapy.

Table (1)

Part 2:

This part is concerned with level of oncology nurse's knowledge about cancer and chemotherapy in pre, immediate, after 1 month and after 3 months among study group. **Table (2, 3, 4, 5)**

Part 3:

This part is concerned with nurse's level of practice pre, immediate, after one month and after three month of implementing designed nursing care standards regarding total practice score. **Table (6, 7, 8,9,10)**

Table (1): This table showed that almost all physicians and head nurses whose works in medical and nursing field agreed about all nursing competencies required for cancer patients undergoing chemotherapy.

Table (2): This table demonstrates that there is statistically significant difference in definition of cancer on pre test and immediate test, there is statistically significant difference in causes of cancer on pre test, immediate, after 1 month, and After 3 month, and also there is statistically significant difference in Side effects for cancer treatment on pre test and immediate test.

Table (3): This table shows that there is statistically significant difference in majority of items on pre and immediate test. Also there is statistically significant difference in two items (Methods of avoidance diarrhea and Sexual problem related to

chemotherapy) on pre test, immediate, after 1 month, and After 3 month.

Table (4): This table Illustrated that there was a highly significant statistical difference between four stages as regard knowledge level Pre versus Immediate ($P= 0.000 X^2= 52.50$), versus after 1 month ($P= 0.000 X^2= 36.62$), and versus after 3 months of a program ($P= 0.000 X^2= 20.67$).

Table (5): This table shows that: As regards to age, the mean and SD of oncology nurse's knowledge are more higher at age (<20 years), as regards to marital status the mean and SD more higher in single than married, as regards to qualification the mean and SD more higher in nursing technical and bachelor than in diploma, as regards to years of experience the mean and SD of oncology nurse's knowledge are more higher at age (1-<5 years), as regards to attending training program the mean and SD high in group who attended training course in chemotherapy. There is statistical significant difference between mean knowledge score of marital status, years of experience, and attending training course about chemotherapy.

Table (6): This table Illustrated that in **pre standards application** 100% of the study group done correctly two steps (cleanse surface with absorbent towels using detergent solution and wipe clean with clean tap water and remove PPE in waste bag). **In immediate standards application** 100% of the study group done correctly all steps except (wearing gown and goggles, obtain drug spill kit, and Place all contaminated materials in double bagged waste disposal bags). **After one month and after three months of standards application** 100% of the study group done correctly these steps (cleanse surface with absorbent towels using detergent solution and wipe clean with clean tap water, remove PPE in waste bag, discard waste bag and contents in approved containers, and wash hands with soap and water).

Table (7): This table illustrated that in **pre standards application** 66.7% of the study group done correctly (Restrict area spill) and 50% of the study group done correctly (remove solid, contaminated lien from the patient's bedside). **In immediate standards application** 100% of the study group done correctly all steps except (wearing gown and goggles, obtain drug spill kit, and Place all contaminated materials in double bagged waste disposal bags) as these steps not available. **After one month and after three months of standards application** 100% of the study group done correctly one step (Put on protective gloves).

Table (8): This table shows that in **pre standard application** 100% of the study group done correctly two steps (restrict area of spill and wash affected skin area with soap and water). **In immediate** 100% of the study group done correctly all steps except (obtain drug spill kit) as this step not done because it is not available. **After one month and after three months**

100% of the study group done correctly two steps (restrict area of spill and wash affected skin area with soap and water).

Table (9): shows that in **pre** standard application 100% of the study group done correctly these steps (Put on personal protective equipment gloves, discard all equipment into cytotoxic waste container, document drug and dosages administered and venous access, needle size, type, and location). **In immediate** standard application the study group done correctly most steps except (**wearing gown and mask**, document type of pump (if IV infusion). **After one month, and after three months** of standard application 100% of the study group done correctly these steps (put on personal protective equipment gloves, remove cytotoxic agent bag at waist level using a non-touch technique discard

all equipment into cytotoxic waste container, document drug and dosages administered, sequence of drugs administered and venous access, needle size, type, and location).

Table (10): shows that in **pre** standard application 100% of the study group done correctly one step (use latex gloves). **In immediate** standard application the study group done correctly all steps except (wearing gown, and place contaminated linen in plastic bag (not red) then in laundry bag). **After one month** the majority of the study group done correctly these items (use latex gloves, flush toilet once, and cleanse the skin with soap and water), **and after three months** the majority of the study group done correctly these items (use latex gloves and flush toilet once).

Table (1) Opinion of physicians and nursing staff regarding the basic competencies required for cancer patients undergoing chemotherapy.

	Nursing staff (n= 30)		Physicians (n= 24)	
	No.	%	No.	%
1. Ensure that the chemotherapy clinic environment is ready to receive patients.	30	100	24	100
2. Ensure that all infection control measures are properly followed in procedure.	30	100	24	100
3. Ensure that caring and competent nursing care is provided for each patient before chemotherapy administration.	27	90	22	91.7
4. Ensure that caring and competent nursing care is provided for each patient during chemotherapy administration.	28	93.3	24	100
5. Ensure that caring is provided for each patient after chemotherapy administration.	30	100	24	100
6. Ensure that the patient education is carried out pre, intra, and post chemotherapy administration.	27	90	21	87.5
7. Ensure that continuous monitoring, recording are followed during all phases of chemotherapy administration.	30	100	24	100
8. Ensure that all staff is follow professionalism.	28	93.3	22	91.7
9. Ensure that all staff is follow ethics and patients right during chemotherapy administration.	27	90	22	91.7

Table (2): Assessment of oncology nurse's knowledge about cancer

	Pre		Immediate		After 1 month		After 3 months		P ₁	P ₂	P ₃
	No.	%	No.	%	No.	%	No.	%			
1. Definition of cancer:									0.000*	0.112	0.073
Complete correct	10	33.3	24	80.0	13	43.3	10	33.3			
Incomplete correct	9	30.0	5	16.7	13	43.3	16	53.3			
Incorrect	11	36.7	1	3.3	4	13.3	4	13.3			
2. Causes of cancer:									0.000*	0.000*	0.000*
Complete correct	0	0.0	12	40.0	1	3.3	1	3.3			
Incomplete correct	16	53.3	18	60.0	29	96.7	29	96.7			
Incorrect	14	46.7	0	0.0	0	0.0	0	0.0			
3. Different methods of treatment cancer:									0.313	0.313	--
Complete correct	0	0.0	1	3.3	1	3.3	0	0.0			
Incomplete correct	30	100.0	29	96.7	29	96.7	30	100.0			
Incorrect	0	0.0	0	0.0	0	0.0	0	0.0			
4. Side effects for cancer treatment:									0.006*	0.317	0.341
Complete correct	16	53.3	27	90.0	19	63.3	16	53.3			
Incomplete correct	12	40.0	3	10.0	11	36.7	14	46.7			
Incorrect	2	6.7	0	0.0	0	0.0	0	0.0			

Chi-square test * Statistical significant difference

P₁: Pre vs. Immediate P₂: Pre vs. after 1 month P₃: Pre vs. after 3 months

Table (3): Assessment of oncology nurse's knowledge about chemotherapy

	Pre		Immediate		After 1 month		After 3 months		P ₁	P ₂	P ₃
	No.	%	No.	%	No.	%	No.	%			
1. Definition of chemotherapy:											
Complete correct	20	66.7	27	90.0	27	90.0	27	90.0	0.083	0.083	0.083
Incomplete correct	2	6.7	1	3.3	1	3.3	1	3.3			
Incorrect	8	26.7	2	6.7	2	6.7	2	6.7			
2. Causes of chemotherapy administration:											
Complete correct	10	33.3	21	70.0	11	36.7	10	33.3	0.012*	0.354	0.835
Incomplete correct	18	60.0	9	30.0	19	63.3	19	63.3			
Incorrect	2	6.7	0	0.0	0	0.0	1	3.3			
3. Methods of avoidance dizziness:											
Complete correct	6	20.0	20	66.7	10	33.3	10	33.3	0.000*	0.331	0.331
Incomplete correct	23	76.7	10	33.3	20	66.7	20	66.7			
Incorrect	1	3.3	0	0.0	0	0.0	0	0.0			
4. Methods of avoidance constipation:											
Complete correct	16	53.3	27	90.0	16	53.3	16	53.3	0.007*	0.595	0.595
Incomplete correct	13	43.3	3	10.0	14	46.7	14	46.7			
Incorrect	1	3.3	0	0.0	0	0.0	0	0.0			
5. Dangerous of diarrhea for cancer patient:											
Complete correct	10	33.3	17	56.7	14	46.7	11	36.7	0.031*	0.058	0.063
Incomplete correct	15	50.0	13	43.3	16	53.3	19	63.3			
Incorrect	5	16.7	0	0.0	0	0.0	0	0.0			
6. Methods of avoidance diarrhea:											
Complete correct	8	26.7	16	53.3	9	30.0	8	26.7	0.000*	0.000*	0.000*
Incomplete correct	10	33.3	14	46.7	21	70.0	22	73.3			
Incorrect	12	40.0	0	0.0	0	0.0	0	0.0			
7. Advises for patients who has mouth sores:											
Complete correct	8	26.7	20	66.7	15	50.0	11	36.7	0.002*	0.063	0.405
Incomplete correct	22	73.3	10	33.3	15	50.0	19	63.3			
Incorrect	0	0.0	0	0.0	0	0.0	0	0.0			
8. Sexual problem related to chemotherapy:											
Complete correct	12	40.0	20	66.7	16	53.3	12	40.0	0.002*	0.002*	0.001*
Incomplete correct	8	26.7	10	33.3	14	46.7	18	60.0			
Incorrect	10	33.3	0	0.0	0	0.0	0	0.0			

* Statistical significant difference

Table (4): Comparison of oncology nurse's knowledge about cancer and chemotherapy in pre, immediate, after 1 month and after 3 months among study group

Knowledge about cancer	Poor		Satisfactory		Good	
	No.	%	No.	%	No.	%
Pre	16	53.3	12	40.0	2	6.7
Immediate	0	0.0	0	0.0	30	100.0
After 1 month	0	0.0	6	20.0	24	80.0
After 3 months	1	3.3	18	60.0	11	36.7
P-value ¹ (X ² value)	0.000* (52.50)					
P-value ² (X ² value)	0.000* (36.62)					
P-value ³ (X ² value)	0.000* (20.67)					

* Statistical significant difference

¹: Pre vs. Immediate²: Pre vs. after 1 month³: Pre vs. after 3 months**Table (5): Relation between oncology nurse's knowledge about cancer and chemotherapy and sociodemographic characteristics in pre standards among study group**

Sociodemographic characteristics	Mean ± SD	Range	P-value
1. Age: (years)			0.104
< 20 years	47.8 ± 2.2	46 – 51	
≥ 20 years	42.5 ± 6.1	32 – 53	
2. Marital status:			0.047*
Single	47.5 ± 3.9	41 – 52	

Married	42.1 ± 6.0	32 – 53	
3. Qualifications:			0.056
Diploma	42.3 ± 5.8	32 – 52	
Nursing technical institute/ Bachelor	48.5 ± 5.6	41 – 53	
4. Years of experience:^o			0.025*
< 1 year	45.5 ± 3.0	41 – 47	
1 - < 5	46.6 ± 6.2	36 – 53	
≥ 5	40.5 ± 5.4	32 – 50	
5. Training courses about chemotherapy:			0.028*
Yes	46.1 ± 5.8	36 – 53	
No	41.2 ± 5.5	32 – 50	

* Statistical significant difference

Unpaired t-test

Table (6): Intra-rater test-re-test reliability of observation checklist for oncology nurse's performances base for standards related to management of chemotherapy spill if chemotherapy spill on hard surface

Items	Pre (n= 30)			Immediate (n= 30)			After 1 month (n= 30)			After 3 months (n= 30)		
	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D
	%	%	%	%	%	%	%	%	%	%	%	%
1- Restrict area of spill	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
2- Obtain drug spill kit	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
3- Put on protective:												
• Gloves	50.0	0.0	50.0	100	0.0	0.0	50.0	0.0	50.0	50.0	0.0	50.0
• Gown	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
• Goggles	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
4- Open waste disposal bags	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
5- Place absorbent gauze pad/towel over spill	0.0	0.0	100	100	0.0	0.0	93.3	0.0	6.7	90.0	0.0	10.0
6- Pick up glass fragments by using a small scoop or by donning utility gloves over the chemotherapy gloves	16.7	0.0	83.3	100	0.0	0.0	66.7	33.3	0.0	66.7	33.3	0.0
7- Cleanse surface with absorbent towels using detergent solution and wipe clean with clean tap water	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
8- Place all contaminated materials in double bagged waste disposal bags	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
9- Remove PPE in waste bag	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
10- Discard waste bag and contents in approved containers	0.0	0.0	100	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
11- Wash hands with soap and water	83.3	0.0	16.7	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0

Table (7): Intra-rater test-re-test reliability of observation checklist for oncology nurse's performances base for standards related to management of chemotherapy spill if chemotherapy spill on linen

Items	Pre (n= 30)			Immediate (n= 30)			After 1 month (n= 30)			After 3 months (n= 30)		
	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D
	%	%	%	%	%	%	%	%	%	%	%	%
1- Restrict area spill	66.7	0.0	33.3	100	0.0	0.0	66.7	0.0	33.3	66.7	0.0	33.3
2- Obtain drug spill kit	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
3- Obtain specially marked, approved laundry bag and a labeled impervious bag	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
4- Put on protective gown, gloves and goggles												
• Gloves	0.0	0.0	100	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
• Gown	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
• Goggles	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
5- Remove solid, contaminated linen from the patient's bedside	50.0	0.0	50.0	100	0.0	0.0	50.0	0.0	50.0	50.0	0.0	50.0
6- Place linen in approved, specially marked impervious laundry bag	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
7- Contaminated linen should be washed two times in laundry	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
8- Clean the spill area three times, beginning with the least contaminated area and finishing with the most contaminated area.	0.0	0.0	100	100	0.0	0.0	50.0	0.0	50.0	33.3	0.0	66.7
9- Use a detergent solution followed by water	0.0	0.0	100	100	0.0	0.0	50.0	0.0	50.0	33.3	0.0	66.7
10- Place all contaminated supplies used for management of spill in waste disposal container	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
11- Wash hands thoroughly with soap and water	0.0	0.0	100	100	0.0	0.0	50.0	0.0	50.0	33.3	0.0	66.7

Table (8): Intra-rater test-re-test reliability of observation checklist for oncology nurse's performances base for standards related to management of chemotherapy spill if chemotherapy spill on personal of patient

Items	Pre (n= 30)			Immediate (n= 30)			After 1 month (n= 30)			After 3 months (n= 30)		
	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D
	%	%	%	%	%	%	%	%	%	%	%	%
1- Restrict area of spill	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
2- Obtain drug spill kit	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
3- Immediately remove contaminated protective garments	20.0	66.7	13.3	100	0.0	0.0	70.0	30.0	0.0	70.0	30.0	0.0
4- Wash affected skin area with soap and water	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
5- Eye exposure: Immediately flood the effected eye with water for at least 5 minutes	53.3	43.3	3.3	100	0.0	0.0	80.0	20.0	0.0	73.3	26.7	0.0

Table (9): Intra-rater test-re-test reliability of observation checklist for oncology nurse's performances base for standards related to post administration of chemotherapy

Items	Pre (n= 30)			Immediate (n= 30)			After 1 month (n= 30)			After 3 months (n= 30)		
	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D
	%	%	%	%	%	%	%	%	%	%	%	%
1. Put on personal protective equipment:												
• Chemotherapy gloves	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
• Gown	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
• Mask	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
2. Remove cytotoxic agent bag at waist level using a non-touch technique	33.3	66.7	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
3. Flush line with a compatible IV solution	90	0.0	10.0	100	0.0	0.0	90	0.0	10.0	90.0	0.0	10.0
4. Discard all equipment into cytotoxic waste container	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
5. Remove personal protective equipment and discard gloves in cytotoxic waste container	0.0	0.0	100	100	0.0	0.0	33.3	0.0	66.7	33.3	0.0	66.7
6. Wash hands following administration and disposal of cytotoxic agents and related waste	80.0	0.0	20.0	100	0.0	0.0	80.0	0.0	20.0	80.0	0.0	20.0
7. Documentation:												
The chemotherapy certified nurse documents the administration of the chemotherapeutic agent(s) including:												
a. Location of intravenous site	0.0	0.0	100	100	0.0	0.0	33.3	0.0	66.7	33.3	0.0	66.7
b. Type of pump (if IV infusion)	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
c. Establishment of blood returns before, during, and after chemotherapy administration	0.0	0.0	100	100	0.0	0.0	0.0	0.0	100	0.0	0.0	100
d. drug's name and dosages administered	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
e. Sequence of drugs administered	0.0	0.0	100	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
f. Venous Access, Needle size, type, and location.	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
g. Amount and type of flushing solutions	0.0	0.0	100	100	0.0	0.0	66.7	0.0	33.3	66.7	0.0	33.3
i. Adverse reactions	0.0	0.0	100	100	0.0	0.0	53.3	0.0	46.7	46.7	0.0	53.3
j. Specific side effects experienced or discussed	0.0	0.0	100	100	0.0	0.0	0.0	0.0	100	0.0	0.0	100
k. Specific discharge instructions	0.0	0.0	100	100	0.0	0.0	0.0	0.0	100	0.0	0.0	100

Table (10): Intra-rater test-re-test reliability of observation checklist for oncology nurse's performances base for standards related to precautions during and after administration of chemotherapy

Items	Pre (n= 30)			Immediate (n= 30)			After 1 month (n= 30)			After 3 months (n= 30)		
	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D	Done C	Done I	N.D
	%	%	%	%	%	%	%	%	%	%	%	%
1. Chemotherapy precautions regarding blood and body fluids are implemented during and for 48 hours post administration.												
a. Use:												
• Latex gloves	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0
• Gown when handling body fluids, particularly urine. A face shield is worn if splashing possible	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
b. Encourage men to sit on toilet to void instead of standing	16.7	0.0	83.3	100	0.0	0.0	66.7	0.0	33.3	56.7	0.0	43.3
c. Encourage use of toilets versus bedpans and urinals so that excreta can be disposed of immediately	0.0	0.0	100	100	0.0	0.0	56.7	0.0	43.3	56.7	0.0	43.3
d. Flush toilet once	13.3	0.0	86.7	100	0.0	0.0	90.0	0.0	10.0	90.0	0.0	10.0

Items	Pre (n= 30)			Immediate (n= 30)			After 1 month (n= 30)			After 3 months (n= 30)		
	Done	Done	N.D	Done	Done	N.D	Done	Done	N.D	Done	Done	N.D
	C	I		C	I		C	I		C	I	
	%	%	%	%	%	%	%	%	%	%	%	%
f. Discard disposable items contaminated with body fluids of patients who have received hazardous drugs in the previous 48 hours in the appropriate puncture proof hazardous waste container. These items include diapers, urinals, bedpans, measuring devices, Foley catheters, and drainage bags	0.0	0.0	100	100	0.0	0.0	66.7	0.0	33.3	66.7	0.0	33.3
g. Place contaminated linen in plastic bag (not red) then in laundry bag	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100	0.0	0.0	100
2. Protect the skin of incontinent patients from their own excreta.												
a. Cleanse the skin with soap and water	16.7	0.0	83.3	100	0.0	0.0	83.3	0.0	16.7	66.7	0.0	33.3
b. Apply moisture barrier to perineal and per rectal areas following each urination and stool	10.0	0.0	90.0	100	0.0	0.0	50.0	0.0	50.0	43.3	0.0	23.3
c. Apply clean disposable diaper	30.0	0.0	70.0	100	0.0	0.0	53.3	0.0	46.7	43.3	0.0	56.7

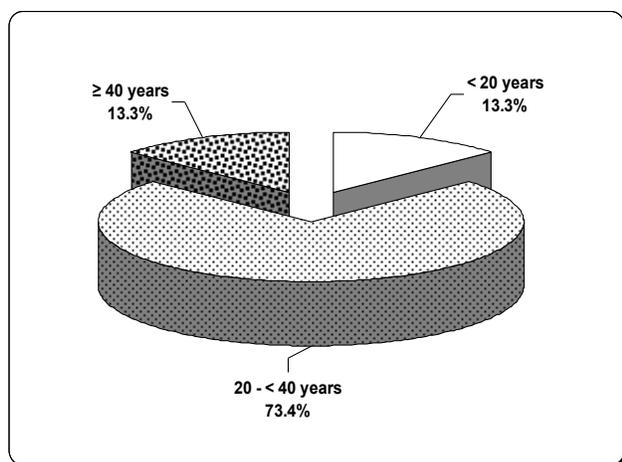


Fig. (1): Distribution of the studied group according to their age

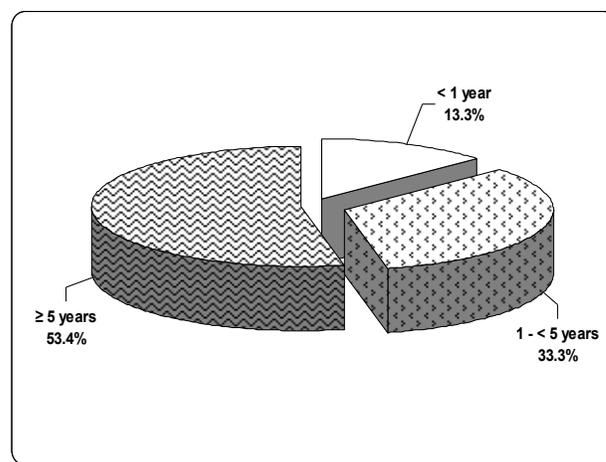


Fig. (3): Distribution of the studied group according to years of experience

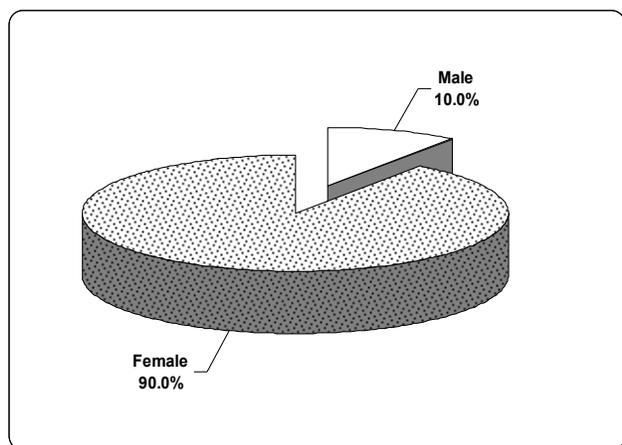


Fig. (2): Distribution of the studied group according to sex

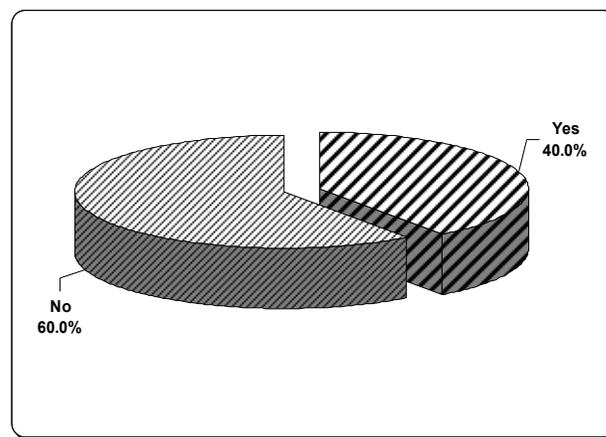


Fig. (4): Distribution of the studied group according to attending training, of programme courses about chemotherapy

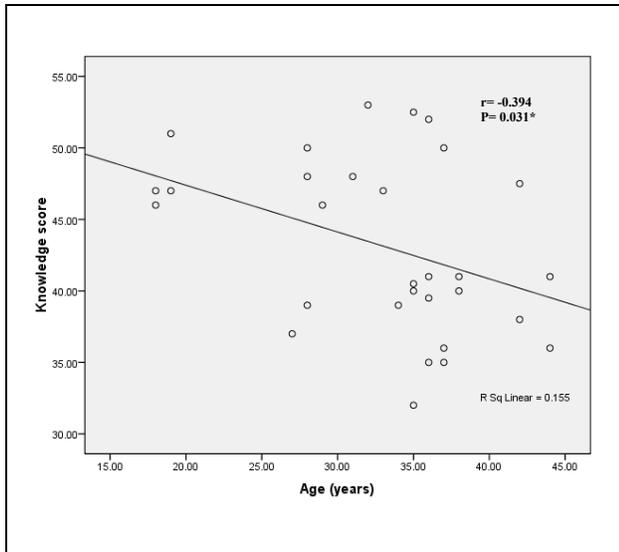


Fig. (5): Correlation between age and score of oncology nurse's knowledge among study group

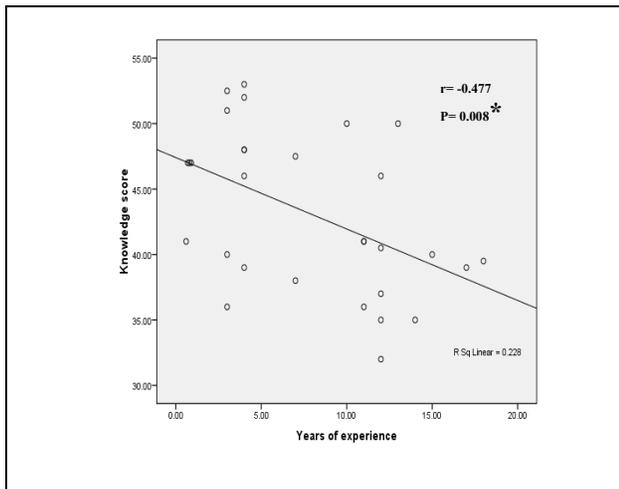


Fig. (6): Correlation between years of experience and score of knowledge

4. Discussion:

The discussion will cover the main result findings as follow:

Sociodemographic characteristics of nurses:

Based on the results of the present study, the majority of the nurses their ages ranged from 20-40 years, married, female, and have diploma of nursing, more than half of them, their experiences more than 5 years. More than half of them have no in service training courses related to cancer and chemotherapy.

Rasha (2011); in the same line with the current study findings conducted a study in neurosurgery department of Assiut University Hospital, entitled developing postoperative care standards for patients who had drainage of chronic subdural hematoma which revealed that the majority of nurses were aged from 20 - 40 years. The majority of nurses were female and

nursing diploma was the highest proportion, less than half of them have an experience more than ten years and all of them have no in service training courses related to chronic subdural hematoma.

Opinion of Experts regarding the basic competencies required for cancer patients undergoing chemotherapy:

The competencies which were agreed by almost all experts were nine competencies. These competencies included "chemotherapy clinic is ready to receive patients, all infection control measures are properly followed in all procedure throughout chemotherapy administration, caring is provided for each patient before chemotherapy administration, caring is provided for each patient during chemotherapy administration, caring is provided for each patient after chemotherapy administration, patient education is carried out pre, intra, and post chemotherapy administration, continuous monitoring, recording are followed during all phases of chemotherapy administration, all staff is follow professionalism, and all staff is follow ethics and patients right during chemotherapy administration".

The results of this study revealed that all physician and nursing staff agrees about all competencies, this revealed that physician and nursing staff have the same ideas, and believes about needs of cancer patients undergoing chemotherapy.

Also the results revealed that percent of agreement of nursing staff more higher than physician in two competencies" patient education is carried out pre, intra, and post chemotherapy administration and all staff is follow ethics and patients right during chemotherapy administration" this can be justified by in nursing curriculum the nurses studied the importance of education to the patients and also studied the code of ethics in nursing.

Nurses knowledge regarding cancer and chemotherapy:

The present study show statistically significant difference in causes of cancer on pre test, immediate, after 1 month, and After 3 month, also there is statistically significant difference in side effects for cancer treatment on pre test and immediate test. This result supported by Abd-Allah (2000) who documented that the inservice training program has a beneficial effect in improving the nurse's knowledge and skills. They also recommended that educational programs should be organized according to the needs of nurses with continuous evaluation.

As regards nurse's knowledge about chemotherapy the results revealed that there is statistically significant difference in majority of items on pre and immediate standards application. Also there is statistically significant difference in two items (Methods of avoidance diarrhea and Sexual problem

related to chemotherapy) on pre, immediate, after 1 month, and After 3 month of standards application.

By time after 3 months post-test, the percentage were slightly reduced as the majority of nurses were having satisfactory and good levels in all items of knowledge. This indicates that the improvement in knowledge was partially lost 3 months after implementation of teaching protocol. This result might be explained by the fact that, knowledge retention is usually affected by time.

The current study revealed a great improvement in knowledge score after application of standards. The score of knowledge high in nurses there age less than 20 years; this age might have good readiness for learning new things, also score of knowledge high in single than married; this may be the single have less responsibilities and more capacity of learning, also score of knowledge high in nursing technical and bachelor, nurses whom year of experience ranged from 1-5 years and in group who attended training course in chemotherapy. This means that training course has a good effect in nurse's knowledge. These results are in agreement with those of Meyer and Elliott (1999) who noted that nurses' knowledge scores were higher among younger and newly graduated nurses who attending training program.

Nurse's performance regarding role of chemotherapy nurse:

As regards ensure that the chemotherapy clinic is ready to receive patients all of experts agree about this competency as for Prepare the chemotherapy clinic with the necessary equipment (needleless administration systems: use of a 3-way tap and luer lock syringes, Portable trolleys, disposable injection trays, dressing packs, medication cups, disposable gauze squares around the injection site, I V stand, Plastic-backed absorbent sheet under injection site, purple cytotoxic sharps waste containers for disposal of contaminated sharps, purple cytotoxic waste buckets for disposal of all contaminated waste, PPE (Personal protective equipment) mask, gown, protective gloves, protective eyewear, and closed footwear. This result was in line with Viele (2005) who stated that before chemotherapy drug administration necessary equipment must be present.

The present study revealed that only (disposable gauze squares around the injection site I V stand, purple cytotoxic sharps waste containers for disposal of contaminated sharps and purple cytotoxic waste buckets for disposal of all other contaminated waste) done correctly, this finding may be related to the facts that facilities in the oncology unit and outpatient clinic of oncology are limited.

Infection control tasks were accepted by all of experts to be one of the important competency for cancer patients undergoing chemotherapy such as a

follow principle of aseptic techniques pre, intra, and post chemotherapy administration, managing splashes of blood, handling laboratory specimen, environment hygiene, this result agree with Visovsky (2004) who stated that protective clothing such as gloves and disposable gowns for both reconstitution and handling. Goggles should be worn for reconstitution and masks where there is a possibility of inhalation.

As regards management of chemotherapy spill (prepare chemotherapy spill kit and supplies, if chemotherapy spill on hard surface, if chemotherapy spill on linen, if chemotherapy spill on personal of patient), The current study show that the level of nurse's performance improved immediately in most items, but after, one and three months of standard application the improvement decrease slightly and the supplies were a barrier to carry out the steps such as (obtain drug spill kit and Place all contaminated materials in double bagged waste disposal bags, in this respect Berg (1997) who stated that spills and breaking of vials containing chemotherapeutic agents should be cleaned up immediately by personnel trained in the clean up procedure.

In relation to ensure that caring is provided for each patient before chemotherapy administration the majority of experts agree about this competency drug preparation, Preparation area and equipment this result was in line with Cope (2006) who stated that two registered nurses must check all cytotoxic agents (at least one registered nurse must be accredited to administer cytotoxic agents). Also Fischbach & Dunning (2006) illustrated that prepare all equipment required prior to approaching the patient area with a cytotoxic agent and this is in line with the researcher results.

In relation to ensure that caring is provided for each patient during chemotherapy administration the majority of nursing staff and all of physician agree about this competency, as for safe handling during oral, IV infusions, IV injections administration. Delaney (2006) stated that health care professionals administering cytotoxic drugs are first required to be competent in intravenous drugs before they can begin cytotoxic training. Also Viele (2005) reported that tablets must be handled in a manner which avoids skin contact and liberation of powdered agent into the air.

As regards ensure that caring is provided for each patient after chemotherapy administration all experts agree about this competency, this results in line with Miaskowski & Viele (1999) who stated that upon completing the chemotherapy, flush the tubing of intravenous line with 5-10 cc of normal saline. Also Cox (2003) illustrated that dispose of equipment in the appropriate chemotherapy disposal container must be done after chemotherapy administration.

The present study revealed in pre standard application all study group done correctly two steps. In

immediate standard application the study group done correctly most steps except (wearing gown and mask, document type of pump (if IV infusion). After one month, and after three months of standard application all study group done correctly most steps except (wearing gown and mask, document type of pump (if IV infusion) this explained that facilities may affect completion of procedure.

As regards ensure that the patient education is carried out pre, intra, and post chemotherapy administration the majority of experts agree about this competency as identifies patient's learning needed based upon patient's assessment and complaint, provide clear explanation about any procedure, provide clear answer for any question that patient asked, and instruct the patient about how to deal with chemotherapy side effects and follow up. These results agree with Bedell (2003) who stated that information and patient education are fundamental for patient's experience of cancer treatment.

As regards ensure that continuous monitoring, recording are followed during all phases of chemotherapy administration all experts agree about this competency as documentation, these are congruent with Sonis (2004) who mentioned that documentation regarding the process of chemotherapy administration is critical and documentation should occurs on approved institutional forms and according to policies and procedures that govern practice within the specific agency.

The present study revealed on documentation of chemotherapy, on pre standard application the study group done correctly two steps (drug's name, dosages administered and Venous Access, Needle size, type, and location). On immediate standard application the study group done correctly all steps. After one month and after three months the results revealed improvement in skills level than pre standard application. Related to documentation of extravasations the results show that documentation not done there are no cases of extravasations occurred.

The current study showed inadequate level of total practice score in most items pre implementation of nursing care standards for cancer patients undergoing chemotherapy. Marquis and Huston (2009) reported that each organization and profession must set standards and objectives to guide individuals and practitioners in performing safe and effective care. Also not only must standards exist, but leader and managers also must see that subordinates know and understand the standards and employee must be aware that their performance will be measured in terms of their ability to meet the established standards.

In relation to all staff is follow professionalism, the majority of expertise agrees about this competency. Payne (2007) stated that professionalism like other

skills in medical education is learned through the formal, informal, and hidden curriculae. Also he added that within these curriculae students learn behaviors of respect, responsibility and accountability, knowledge and skills, excellence in scholarship, honor and integrity, altruism, leadership, caring, compassion and communication,

As regards all staff is follow ethics and patient's right during chemotherapy administration, the majority of expertise agrees about this competency. This results is in opposition with Fairchild (1993) and American Nurses Association code of ethics for nurses who stated that professional nursing responsibility consists of following elements, the professional nurse's obligation to protect patient's right to safety, the professional nurse's role as the patient advocate, protecting the patient from incompetent, unethical, or illegal actions and the professional nurse's obligation to maintain the highest level of competency in nursing practice through continuing education activities.

Conclusion:

Based on the results of the present study, it can be concluded that, majority of physicians and head nurses whose works in medical and nursing field agreed about all nursing competencies required for cancer patients undergoing chemotherapy. As regards nurse's knowledge and practice at outpatient clinic and oncology unit at Assiut university hospital about cancer and chemotherapy are inadequate; it improved after application of standards of care.

Recommendations:

For nurses:

- Nurses should be encouraged to attend specific meetings as workshop and seminars held for cancer treatment to be acquainted with the most recent advances and skills in the field.
- Clinical meetings should be planned periodically in order to present to all nurses new advances in this field.
- Periodic monitoring of nurse's knowledge and practice to evaluate the level of nurses who administered chemotherapy.

For patients:

- Cancer patients are critical patients and they need for qualified nursing staff for caring with them.
- Teaching materials about chemotherapy should be available to cancer patient.

For administration:

- Standards of care can reduce the risk of errors, increase efficiency, and provide a framework for best practice so it must be presents in all units.
- Adequate supplies and facilities should be available in the unit.
- Orientation program for all newly nurses and in services training programme for experienced nurses

about nursing care standards for cancer patients undergoing chemotherapy.

- Availability of manual procedures for nurses to be aware of handling any problems that may be arises.
- Special education and training are essential in order to develop a safe practice for administering chemotherapy.
- Teaching unit should be developed at Assiut University Hospital to provide continuous care for cancer patients undergoing chemotherapy.

For further and research:

- Replication of the study on larger random sample acquired from different geographical areas in Egypt to figure out the main aspect of this problem, so further research studies are highly recommendation to gather in depth knowledge about nursing care standard for cancer patients undergoing chemotherapy.
- It is recommended that similar studies should be replicated on longitudinal bases till one year as a minimum time period for follow up.

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