

Effect of Educational Guidelines on Nurses' Performance regarding Prevention of Port-A- Catheter complications among Patients Undergoing Chemotherapy

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Abstract: A port-A-catheter is an implanted device, which allows easy access to a patient's veins. A port-A-catheter is surgically inserted completely under the skin and consists of two parts – the portal and the catheter. Using of an implanted port brings risks associated with a minor surgical procedure and vascular access. Potential complications include internal bleeding, collapsed lung, fluid buildup around the lungs, nerve damage, blood clot formation, and accidental cutting or puncturing of blood vessels. **Aims:** To evaluate the effect of educational guidelines on nurses' performance regarding prevention of port-A- catheter complications among patients undergoing chemotherapy **Subjects and Methods:** Design: A quasi experimental design was used. Setting: oncology department at the Alexandria Main university hospital, Egypt. Sample: A convenience sample of 30 nurses and purposive samples of 60 patients Undergoing Chemotherapy (30 patients were selected as control group pre-educational guidelines and 30 patients were selected as study group post- educational guidelines). Tools for data collection: An interview structured Questionnaire, observational checklists for nurses caring for patient with port-A-catheter and Patient assessment Questionnaire. **Results:** There was a statistically significance differences between pre & post educational guidelines regarding knowledge and practice of the studied nurses regarding care for patient with port-A-catheter. Patients study group who received the port-A- catheter care post educational guidelines had less complications as compared with patients control group who received the port-A- catheter care pre educational guidelines, but this decrease was not statistically significant difference. **Conclusions:** The educational guidelines were helpful on the improvement of the nurses' knowledge and practices for prevention of port-A-catheter related complications among patients Undergoing Chemotherapy. **Recommendations:** Periodic educational programs regarding port-A-catheter care for nurses caring for patients undergoing chemotherapy.

Keywords: Educational guidelines, port-A-catheter, complications, chemotherapy.

1. INTRODUCTION

Effective and reliable venous access is one of the cornerstones of modern medical therapy in oncology⁽¹⁾. Implantable port catheter devices are commonly used for patients undergoing long-term administration of chemotherapy. Moreover, The management of a patient with cancer demands stable venous access that is used for a wide range of underlying diseases, including chemotherapy, blood product and antibiotic administration, and fluid resuscitation⁽²⁾. The recent advent of more intensive methods of chemotherapy and parenteral treatment has delicate the need for implantable devices

that promote reliable central venous access over the long term. Totally implantable ports are accepted as a safe and effective method to facilitating long-term intravenous therapy^(3,4).

Port catheters are preferred in oncology patients for the prevention of recurrent venous intervention, long lasting and conservation of daily living activities. It is a medical devices consisting of a reservoir compartment (port) and a catheter implanted into a surgically created pocket on the chest wall or upper arm^(5,6). A port can be implanted in an inpatient or outpatient setting or in a day surgery unit. The port is fixed subcutaneously and the catheter connects the port to a central vein. A needle is inserted through the septum of the "PORT" to access the reservoir. Placement of a port catheter might be done under local anesthesia and patients usually would be discharged within hours after operation. The implantable ports catheter are used to deliver chemotherapy to cancer patients. The main advantages of it are the protection of venous capital, the easier venous access, lower risk of extravasation of chemotherapeutic agents and the capability to inject irritants agents that can cause, in other conditions, skin necrosis^(5, 7-9). Other advantage of port -A- catheter is that the puncturing needle can be removed after each infusion and the skin covering the port reservoir aids as a natural protection against infection. Open, tunneled central venous catheter systems, such as Hickman or Borviak catheters, have a higher infection rate, because one end of the catheter remains outside the body^(4,10).

In spite of all catheter advantages, there are some complication of port -A- catheter patients as infectious complications of the port, included exit site infection, tunnel or catheter related infection, pocket infection, blood stream infection, overlying-skin necrosis that may lead to overlying subcutaneous tissue loss and subsequently, infection. Other complication as mechanical port accidents and fracture that may led to move hose port to other tissues such as pulmonary and carotid vessels and damage them, intraluminal thrombosis and subsequent port obstruction, tubal avulsion and drug extravasation⁽¹¹⁻¹³⁾. When the experience level of nurses and physicians using the port catheter is increased, the risk of port catheter complication and its improper usage may decrease. Nurses who care for patient taking chemotherapy through port catheter must have sufficient amount of knowledge to manage and prevent complication⁽¹⁴⁾.

The treatment, follow-up care, and rehabilitation of cancer patients are interdisciplinary work. Optimum treatment and complication avoidance require a collaborative effort of all of the involved specialists not just the physician implanting the port system, but also the oncologists, nutritionists and specially nurses. Continuing education, also, plays a role in improving outcomes⁽⁴⁾. All individuals treating cancer patients with port systems must assume responsibility for the particular care of the system. Nurses are basic elements of oncology team. Nurses are mainly responsible for ensuring that patients receive chemotherapy safely and providing the effective self-care support required allowing patients to cope with their treatments⁽¹⁵⁾. Nursing care and management of catheters is complex, and many controversial practice issues challenge nursing specialists. Once a port system has been implanted, it should be used in a way to minimize functional disturbances and complications⁽¹⁶⁾. It is crucial that nurses be trained in the appropriate use of port systems⁽⁴⁾. Pires and Vasques (2014) entitled "nurse's knowledge regarding the handling of the totally-implanted venous access device" mentioned that their knowledge regarding the implanted port is insufficient and concluded that it is essential for nurses who care for port -A- catheter to have technical-scientific knowledge and training for its use, through standardized way. Furthermore, continuous education must be done regularly, to keep the nurses up-to-date regarding the port -A- catheter care⁽¹⁷⁾.

Significance & justification

Although interventions performed through port -A- catheter in oncology department provide many advantages for the patient and health professionals. They may cause problems such as bleeding, thrombosis Tube cutting and infection unless they are performed and monitored properly⁽¹¹⁾. Therefore, to achieve a successful management of port-A- catheter, prevent complications, and extend the life of catheters, nurses should have adequate knowledge on the field and should refer to evidence-based recommendations and guidelines in their practices⁽⁴⁾. Nurses who are competent and knowledgeable in the main aspects of port-A-catheter care and maintenance are able to ensure that specific patient's needs are met and optimum health outcomes achieved. However, nurses who work in oncology need a higher level of knowledge and skill to manage port-a-catheter. Although studies assessing the knowledge level and practice of nurses on the administration of chemotherapy are available in Egypt and worldwide, the number of studies addressing effect of educational guidelines on the level of oncology nurses knowledge and practice on chemotherapy applications with port-A- catheter in Egypt is limited⁽³⁾. Therefore, this study aims to evaluate the effect of educational guidelines on nurses' performance regarding prevention of port-A- catheter complications among patients undergoing chemotherapy.

Aim:

The aim of this study was to evaluate the effect of educational guidelines on nurses' performance regarding prevention of port-A- catheter complications among patients undergoing chemotherapy.

Hypothesis:

- The knowledge and practice of nurses caring for patients undergoing chemotherapy with port-A- catheter will be improved after educational guidelines.
- patients who will receive the port-A- catheter care post educational guidelines (study group) will have less port-A- catheter related complications as compared with those patients who will receive the port-A- catheter care pre educational guidelines (control group).

2. SUBJECTS AND METHODS**Research design**

A quasi experimental study design was utilized to accomplish this study.

Settings

The study was conducted oncology department at the Alexandria Main university hospital, Egypt.

Subjects

- 1- A convenience sample of nurses was taken from the previously mentioned study settings. The total number was 30 nurses were included in the study. Nurses were included in this study were with different age, educational levels and years of experience and who caring for patients undergoing chemotherapy and willing to participate in the study.
- 2- Purposive samples of 60 patients with port-A-catheter were taken from the previously mentioned study settings. The first sample was 30 patients (control group) taken pre- educational guidelines. The second sample was 30 patients (**study group**) taken post- educational guidelines. Patients were included in this study were from both gender and with different age.

Tools for data collection

Three different tools were used to collect data pertinent for this study. They included the following:

1- Self-administered structured questionnaire:

It was written in English language and comprises three parts. **The first part** was concerned with demographic characteristics of studied nurses such as age, gender, qualification, years of experience, and attendance of related training courses. **The second part:** It was developed by the researchers based on the related literature ^(16, 18-20). It was used to assess nurses' knowledge regarding prevention of port-A-catheter related complications. It contains three main parts ; the first part was regarding **basic knowledge** in relation to Porto-A-catheter such as ; definition ,indications , types ,sites and complications .The second part was regarding the **nursing role** in caring for Port-A-catheter .Finally regarding **patient's education** such as inspection of port site ,acceptable activities ,medications ,follow up ,identification band and providing of written instruction.

Scoring systems

The total score of knowledge was 100 degree. The score one was given for each correct answer and zero for incorrect answer. These scores were converted into a percent score. The total nurses' knowledge was considered satisfactory if the percent score was 75% or more, and unsatisfactory if less than 75%.

2 – Performance observational checklist:

The observational checklist was developed and constructed by the researchers based on the related literature ^(19, 21-24). An observational checklist was designed to assess nurses' practices regarding the care for patients with port-A-catheter and prevention of related complications among patients undergoing chemotherapy. It includes main three parts; **the first part was regarding practical steps before port site care** such as, equipment's preparation ,explain procedure ,hand hygiene

,palpate Porto and standard precautions as masking for patient and nurse ,open kite and wearing sterile gloves. The Second part was **regarding practical steps during site care** such as, flushing, scrubbing, assessing blood return and covering the site with dressing. Finally, the third part was regarding practical **steps after site care** such as, labelling, re access site and change dressing according policy, dispose of equipment, documentation and hand hygiene.

The scoring system

The total score of practice was 100 degree. The item observed to be done correctly were scored (1) and the item not done or incorrectly done was scored (0). These scores were converted into a percent score. The practice was considered adequate if the percent score was 75% or more of the sum of the total practice score, and inadequate if less than 75 %.

3- Patient's assessment sheet:

It was written in a simple English language, it was developed by the researchers based on the related literature^(9, 13, 25). It comprises two parts. **The first part** was concerned with demographic characteristics of studied patients as, age, gender, education, marital status .Also it included clinical characteristics of studied patients as duration of Porto-A-catheter and allergy.

The second part was concerned with port-A-catheter related complications as, site infection ,venous thrombosis ,tube cutting ,bleeding ,fluid buildup around the lungs ,blood clot formation , accidental cutting or puncturing of blood vessels , collapsed lung , nerve damage , leakage of blood from the port to underneath the skin .

Educational guidelines:

Educational guidelines were designed by the researchers based on the needs of the studied nurses to improve the nurses' knowledge and practice regarding the care for the patients with port-A-catheter for prevention of its related complications based on the related literature^(16, 18, 20, 22-24). It was written in English language. The guidelines were revised by a group of five experts in Medical Surgical Nursing department at faculty of Nursing. It included three parts. **The first part:** it included basic knowledge regarding port-A-catheter and port-A-catheter related complications. **The second part:** it included knowledge regarding Instructions that should be given to the patient by nurse as, Alert signs and symptoms and when the patient should seek immediate care or call 911. Also this part included inspection of port site, acceptable activities, medications, follow up, identification band and providing of written instruction .**The third part:** it included how to care for port-A-catheter as steps before, during and after care of port site.

Validity:

The researcher developed the study tools after extensive reviewing of relevant literature. The content of the tools revised by three experts in Medical Surgical Nursing department at faculty of Nursing to test content validity, completeness, and clarity of items. Comments and suggestions were considered and the tools were modified accordingly.

Reliability

The reliability of the developed tools were tested by using Cronbach's alpha test (0.88).

Pilot study:

The pilot study was conducted on 5 nurses to test the feasibility, clarity, and applicability of the study tools. Based on the result of the pilot study, modifications and omissions of some details were done and then the final forms were developed. The nurses who included in the pilot study were excluded from the study sample.

Procedures of the study:

This study was conducted through four phases: assessment, planning, implementation and evaluation. Data collection was done pre- and post- educational guidelines. Data collection started from January 2019 to May 2019.

Assessment phase: This phase aimed to assess the studied nurses' characteristics and nurse's knowledge & practice during the actual nursing care for patients with port-A-catheter. Also, this phase aimed to assess the studied patients' demographic and clinical characteristics and port-A-catheter related complications.

Planning and preparatory phase:

Based on the assessment phase, the guidelines content and media in the form of visual materials were developed by the researchers. Guidelines were revised by a group of five expertise in medical surgical nursing department at faculty of nursing for the content validity. Based on the opinion of experts some modifications were done and then the final forms were developed.

- **Implementation phase:** The observation checklist was filled out by the researchers who were available 2 days per week alternatively in the study setting while the nurses were involved in patient care in morning and afternoon shift. The questionnaire format was filled in the clinical area by the studied nurses in the existence of the researchers. The assessment was done on the first four weeks for total study sample. The total numbers of nurses were 30, distributed into five main groups and then implementation of the educational guidelines was done for each group separately based on their needs. The duration of each session took approximately 30 to 45 minutes, sessions started according to nurses' available time. English language was used to outfit the nurses' level of understanding. Methods of teaching used were real situations, group discussion and demonstration. An instructional media was used; it included the guidelines handout and audiovisual materials.
- **Evaluation phase:** the evaluation phase was emphasized on estimating the effect of the educational guidelines on nurses' knowledge and practice for prevention of pot-A-catheter related complications among patients undergoing chemotherapy in order to compare between the results pre, and post educational guidelines to determine the level of improvement in nurses' knowledge and practices. Also, the evaluation phase was emphasized on approximating the effect of the educational guidelines on pot-A-catheter related complications among patients undergoing chemotherapy that was assessed four weeks after implementation of the educational guidelines.

Administrative design and ethical consideration:

An official permission was obtained from the Director of Alexandria Main university hospital and the heads of the departments in which the study was conducted. The aim of the research was explained to the participants. Verbal consent was obtained from each nurse to participate in the study, after clarifying the procedures of the study. Participants were informed about their right to refuse participation and to withdraw at any time without any consequences. Confidentiality of data was ensured.

Statistical design: data entry and analysis were done using the Statistical Package for Social Science (SPSS) version 17. Data were presented in the tables and charts using actual numbers and percentages. Appropriate statistical methods were applied percentage, chi-square (X^2) and correlation coefficient (r). Regarding P value, it was considered that: non-significant (NS) if $P > 0.05$, Significant (S) if $P < 0.05$, Highly Significant (HS) if $P < 0.01$.

3. RESULTS

Table 1 shows number and percentage distribution of demographic characteristics among nurses under study. It was noticed that half of the nurses (50%) were in the age group from $30 \leq 40$ year old. Regarding gender it was found that near two third of the nurses (66.66%) were female and the majority of nurses were had diploma degree. Concerning years of experience, it noticed that more than half of the nurses (53.33%) had from $5 \leq 10$ experience. In addition, near three quarter of nurses (73.33) had received training courses or lectures regarding pot-A-catheter.

Table (1): Number and percentage distribution of demographic characteristics among nurses under study (n= 30).

Items	(N=30)	%
Age group (years):		
20 ≤ 30	10	33.33
30 ≤ 40	15	50
40 ≤ 50	5	16.66
Mean ± SD	32.7±4.5	
Gender:		
Female	20	66.66
Male	10	33.33

Qualification:		
Bachelor degree	3	10
Diploma	24	80
Technical Institute	3	10
Years of experience:		
< 5	10	33.33
5 ≤ 10	16	53.33
≥10	4	13.33
Received training courses or lectures:		
Yes	8	26.66
No	22	73.33

Table 2 illustrates nurses' knowledge regarding theoretical background related to Port-A-catheter pre- & post educational guidelines. Regarding nurses knowledge pre educational guidelines, around half of nurses had satisfactory knowledge regarding definition, types, composition, sites and nursing role (56.66%, 53.33%, 53.33%, 50% and 56.66%) respectively. While post educational guidelines the majority of nurses (83.33%) had satisfactory level of knowledge regarding definition, types and indication of **Port-A-catheter**. In addition, about three quarter of nurses (70%) and (76.66%) had satisfactory level of knowledge regarding sites of A-catheter and nursing role respectively and most of nurses (90%) had satisfactory level of knowledge regarding composition of **Port-A-catheter** post educational guidelines. Moreover, there were statistically significant difference between nurses' knowledge pre- & post educational guidelines regarding theoretical background of Port-A-catheter with p value ≤ 0.05.

Table 2: nurses' knowledge regarding theoretical background related to Port-A-catheter pre- & post educational guidelines.

Items	Satisfactory Nurses' knowledge				χ^2	P value
	Pre (n=30)		post (n=30)			
	No.	%	No.	%		
Definition	17	56.66	25	83.33	5.08	0.02421*
Types	16	53.33	25	83.33	6.24	0.01250*
Composition	16	53.33	27	90	9.93	0.00162*
Indications	8	26.66	25	83.33	19.46	0.00001*
Sites	15	50	21	70	2.50	0.11385*
Knowledge-regarding Nursing role	17	56.66	23	76.66	2.70	0.10035*

Table (3) shows nurses' knowledge regarding Patient education related to Port-A-catheter pre- & post educational guidelines. Concerning nurses knowledge pre educational guidelines, around third of nurses (33.33%, 26.66%, and 26.66%) had satisfactory knowledge regarding acceptable activities, wearing ID, signs, and symptoms of infection respectively while post educational guidelines more than three quarter of nurses (76.66%) had satisfactory level of knowledge regarding the previous items. In addition, more than half had satisfactory level of knowledge regarding time of seeking immediate health care pre educational guidelines while majority of nurses (80%) had satisfactory level of knowledge post educational guidelines. Moreover, less than quarter of the nurses (20%) had satisfactory level of knowledge regarding inspection for port site and written instruction pre educational guidelines while 66.66% and 76.66% of the nurses had satisfactory level of knowledge regarding previous items post educational guidelines respectively.

Finally, there were statistically significant difference between nurse's knowledge pre & post educational guideline regarding all items of patient education with p ≤ 0.05 except medication and alert sign and symptoms.

Table (3): nurses' knowledge regarding Patient education related to Port-A-catheter pre- & post educational guidelines.

Items	Satisfactory nurses' knowledge				χ^2	P value
	Pre (n=30)		post (n=30)			
	No.	%	No.	%		
Inspection for port site	6	20.00	20	66.66	13.30	0.00026*
acceptable activities	10	33.33	23	76.66	11.38	0.00074*
medications	19	63.33	19	63.33	0.00	1.00000
follow up	6	20.00	23	76.66	19.29	0.00001*
written instruction	14	46.66	23	76.66	5.71	0.01686*
Alert signs and symptoms	18	60.00	18	60.00	0.00	1.00000
Wearing ID	8	26.66	23	76.66	15.02	0.00011*
Time of Seeking immediate health care	16	53.33	24	80.00	4.80	0.02846*
Question should answered	16	53.33	22	73.33	2.58	0.10797
signs and symptoms of infection	8	26.66	23	76.66	15.02	0.00011*

Table (4) illustrates nurses' knowledge regarding complications related to Port-A-catheter pre- & post educational guidelines, less than quarter of the nurses (20%) had satisfactory level of knowledge regarding Port-A-catheter complication as Tube cutting and collapsed lung pre educational guidelines while, More than three quarter of nurses, (76.66%) had satisfactory level of knowledge regarding same pervious items post educational guidelines. In addition, one third (33.33%) of nurses had satisfactory level of knowledge regarding Port-A-catheter complication as site infection, Bleeding, blood clot formation and nerve damage while, majority of nurses (80%) had satisfactory level of knowledge regarding same items post educational guideline. Moreover, this table illustrates that there were statistically significant difference between nurses knowledge pre & post educational guideline regarding Port-A-catheter complication with $p \leq 0.05$.

Table (4): nurses' knowledge regarding complications related to Port-A-catheter pre- & post educational guidelines.

Items	Satisfactory nurses' knowledge				χ^2	P value
	Pre (n=30)		post (n=30)			
	No.	%	No.	%		
site infection	10	33.33	24	80.00	13.30	0.00026*
Venous thrombosis	16	53.33	25	83.33	6.24	0.01250*
Tube cutting	6	20.00	23	76.66	19.29	0.00001*
Bleeding	10	33.33	24	80.00	13.30	0.00026*
accidental cutting or puncturing of blood vessels	11	36.66	23	76.6	9.77	0.00177*
fluid buildup around the lungs	10	33.33	20	66.66	6.67	0.00982*
blood clot formation	10	33.33	24	80.00	13.30	0.00026*
collapsed lung	6	20.00	23	76.66	19.29	0.00001*
nerve damage	10	33.33	24	80.00	13.30	0.00026*
leakage of blood from the port to underneath the skin	11	36.66	23	76.66	9.77	0.00177*

Table 5 reveals difference between nurses' practices regarding port-A-catheter pre- & post- educational guidelines. Concerning nurse's practice before **port site care**, it was noticed that near quarter of nurses (23.33) had adequate practice regarding equipment's preparation and standard precautions pre educational guidelines while, highest majority of nurses (86.66%) had adequate practice regarding pervious items post educational guidelines. In relation to, nurse's practice during **port site care**, it was found that one third of the nurses (33.3%) had adequate practice regarding assessing blood return pre educational guidelines while, majority of nurses (83.33%) had adequate practice regarding pervious item post educational guidelines. Moreover, regarding nurse's practice after **port site care**, it was revealed that less than quarter of nurses (20%) had adequate practice regarding re access site and changing dressing while near three quarter (70%) had adequate practice regarding pervious item post educational guidelines. Finally, there was statistical significant difference between nurse' practice pre & post educational guideline regarding Port-A-catheter care with ($p \leq 0.05$) regarding all items pre, during and after site sterilization except documentation and hand hygiene.

Table 5: Difference between nurses' practices regarding port-A-catheter pre- & post- educational guidelines.

Items	Nurses' practice				χ^2	P value
	Pre (n=30)		post (n=30)			
	No.	%	No.	%		
A- practical steps before port site care						
equipment's preparation	7	23.33	26	86.66	24.31	0.00000*
explain procedure	13	43.33	23	76.66	6.94	0.00841*
hand hygiene	16	53.33	25	83.33	6.24	0.01250*
palpate Porto	8	26.66	24	80.00	17.14	0.00003*
Standard precautions	7	23.33	26	86.66	24.31	0.00000*
B- practical steps during port site care						
Flushing	8	26.66	23	76.66	15.02	0.00011*
Scrubbing the site	16	53.3	27	90.00	9.93	0.00162*
assessing blood return	10	33.3	25	83.33	15.43	0.00009*
Covering the site with dressing.	14	46.6	24	80.00	7.18	0.00738*
C-practical steps after port site care						
labelling	16	53.33	25	83.33	6.24	0.01250*
Re access site and change dressing according policy	6	20.00	21	70.00	15.15	0.00010*
dispose equipment's	10	33.33	24	80.00	13.30	0.00026*
documentation	16	53.33	18	60.00	0.27	0.60233
hand hygiene	15	50	19	63.33	1.09	0.29737

Table 6 reveals nurses' total knowledge and practice regarding Port-A-catheter pre- & post- educational guidelines. It was noticed that one third of the nurses (33.33%) had satisfactory total knowledge pre educational guidelines while majority of them (80.00%) had satisfactory total knowledge post educational guidelines with highly statistical significant difference between pre and post educational guidelines implantation ($p = 0.00026^*$). Moreover, It was found that more than half of the nurses (53.3%) had adequate total practice pre educational guidelines while majority of them (83.3%) had adequate total practice post educational guidelines with highly statistical significant difference between pre and post educational guidelines implantation ($p = 0.01250^*$).

Table 6: nurses' total knowledge and practice regarding Port-A-catheter pre- & post- educational guidelines.

Items	Pre (n=30)		post (n=30)		χ^2	P value
	No.	%	No.	%		
Total knowledge	10	33.33	24	80.00	13.30	0.00026*
Total practice	16	53.3	25	83.3	6.24	0.01250*

Table (7) depicts the correlation between the studied nurses' knowledge and practice regarding Port-A-catheter pre- & post- educational guidelines. There was statistically significant positive correlation between total knowledge and practice pre and post educational guidelines implementation ($p= 0.00003^*$ and 0.00067^*) respectively

Table (7): Correlation between the studied nurses' knowledge and practice regarding Port-A-catheter pre- & post-educational guidelines.

Items (n=50)	Nurses' Practice (n=50)	
	R	p- value
Nurses' Knowledge		
Pre	0.685	0.00003*
Post	0.586	0.00067*

Table (8) Shows difference between patient's demographic and clinical characteristics of the study and control groups. There was no significant difference between control and study patients groups regarding demographics data as age, gender, marital status and education with ($p > 0.05$). In addition, there was no significant difference between control and study patients groups regarding clinical characteristics as duration of port -A -catheter, allergy with ($p > 0.05$).

Table (8): Difference between patient's demographic and clinical characteristics of the two groups

Items	Control G (30)		study G (30)		χ^2	P value
	No	%	No	%		
Age (years):						
40-50	8	26.67	9	30	0.28	0.8717
50-60	17	56.66	15	50		
> 60	5	16.67	6	20		
Gender:						
Female	10	33.33	12	40	0.072	0.7880
Male	20	66.67	18	60		
Marital status:						
Married	22	73.3	23	76.7	0.089	0.766
Not married	8	26.7	7	23.3		
Education:						
Illiterate	7	23.3	8	26.7	0.119	0.989
Read and write	6	20	6	20		
Secondary	7	23.3	7	23.3		
University	10	33.3	9	30		
Clinical characteristics of the two groups						
Duration of Porto-A-catheter:						
Less than 2 months	5	16.67	6	20	0.39	0.9436
2 -6 months	12	40	13	43.33		
6-12 months	10	33.33	9	30		
>12 months	3	10	2	6.67		
Allergy:						
Yes	8	26.7	10	33.3	0.317	0.779
No	22	73.3	20	66.7		

Table (9) shows the Patients' Complications of the control and study groups pre and post educational guidelines. It was observed that around third 30% and 33.3% of control group had site and systemic infection while near quarter (23.3%) and (20%) of the study group had pervious complication post educational guidelines respectively. Moreover, near quarter (23.3) of control group had venous thrombosis, tube cutting and accidental cutting or puncturing of blood vessels while few (13.3) of the study group had the same pervious complication post educational guidelines. Furthermore, there is lower percentage in all patients complication in study group post educational guidelines than control group pre educational guidelines implementation but this decrease was not statistically significant difference with ($p > 0.05$)

Table (9): Patients' Complications of the control and study group's pre and post educational guidelines

Items	Pre-educational guidelines Control G.(30)		Post-educational guidelines study G.(30)		χ^2	P value
	No	%	No	%		
site infection						
present	9	30	7	23.3	0.341	0.559
not present	21	70	23	76.7		
Systemic infection						
present	10	33.3	6	20	1.36	0.243
not present	20	66.7	24	80		
Venous thrombosis						
present	7	23.3	4	13.3	0.096	0.975
not present	23	76.6	26	86.7		
Tube cutting						
present	7	23.3	4	13.3	0.096	0.975
not present	23	76.6	26	86.7		
Bleeding						
present	4	13.3	2	6.7	0.674	0.796
not present	26	86.7	28	93.3		
accidental cutting or puncturing of blood vessels						
present	7	23.3	4	13.3	0.096	0.975
not present	23	76.6	26	86.7		
blood clot formation						
present	5	16.7	3	10	0.576	0.5
not present	25	83.3	27	90		
leakage of blood from the port to underneath the skin						
present	3	10	2	6.7	0.218	0.606
not present	27	90	28	93.3		
nerve damage						
present	2	6.7	0	0	2.069	0.492
not present	28	93.3	30	100		
fluid buildup around the lungs						
present	4	13.3	2	6.7	0.674	0.796
not present	26	86.7	28	93.3		
collapsed lung						
present	4	13.3	3	10	0.16	1.00
not present	26	86.7	27	90		

4. DISCUSSION

Chemotherapy is one of the main cancer treatment modalities that provide cure, control, or palliation. Implantable port-A-catheter devices are common used to manage patients undergoing long-term administration of chemotherapy. Implantable ports are recognized as a safe and effective method of facilitating long-term intravenous therapy⁽³⁾. Nursing care and management of port -A- catheter is a complex issues and controversial practice to nursing practitioners⁽²⁶⁾. Nurses should be have competent knowledge and practice in the basic aspects of port-A-catheter care, maintenance to ensure that Patients needs are met, and optimal health outcomes achieved. In addition, nurses who work in oncology department require continuous updating of knowledge and skill to manage port-A-catheter⁽²⁷⁾. Therefore, this study aimed to evaluate the effect of educational guidelines on nurses' performance regarding prevention of port-A- catheter complications among patients undergoing chemotherapy.

Regarding demographic characteristics of nurses, the result of the present study revealed that half of the nurses were in the age group from $30 \leq 40$ year old. This result is in line with Arslan et al. (2014) who stated that around half of the studied nurse were ranged from 30 to 40 years old⁽²⁸⁾. While this result contradict with Deshmukh and Shinde (2012) who emphasize that near three quarter of the nurses were in the age group pf 21-30 years while only 30% were in the age group of 31-40⁽²⁹⁾.

Regarding gender near two third of the nurses of the present study were female. This might be due to nursing education for male begins recently. This result in agreement with Khalil et al. (2017) who mentioned that about two third of the studied nurses were female (67.0%)⁽³⁾.

The study results showed that the majority of nurses were had diploma degree. This result in the same line with Deshmukh and Shinde (2012) who mentioned that the majority of nursing were having diploma in general nursing⁽²⁹⁾. While this result contradict with Khalil et al. (2017) who stated that about two third of the nurses were having baccalaureate degree⁽³⁾.

Concerning years of experience, it was noticed that more than half of the nurses of the present study had from five to ten years of experience. This result congruent with Khalil et al. (2017) who illustrated that concerning years of experience in nursing field, half of the study subjects (55.0%) were having 5-10 years of experience in the nursing field⁽³⁾. While in this context, Deshmukh and Shinde (2012) revealed that about 15% of the studied nurses were having experience from 5-10 years⁽²⁹⁾.

In addition, the present results declared that near three quarter of nurses had received training courses or lectures regarding pot-A-catheter. This findings are nearly similar with Khalil et al. (2017) who reported that near two third (62.0%) of the studied nurses attended previous training courses regarding port-A-catheter insertion and care⁽³⁾. As well as with Ozden and Caliskan (2012) who stated that around half of the studied nurses had received in service training about implantable port catheter⁽¹⁵⁾.

Regarding nurse's knowledge of theoretical background, around half of nurses had satisfactory knowledge regarding definition, types, sites of catheter and nursing role. While post-educational guidelines the majority of nurses had satisfactory level of knowledge regarding definition, types and indication of port-A-catheter and about three quarter had satisfactory level of knowledge regarding sites of catheter and nursing role. This indicated that level of knowledge regarding theoretical background improved after educational guidelines implementation. This result is in the same line with Khalil et al. (2017) who assess level of nurse's knowledge regarding port -A-catheter knowledge as definition, indication and insertion site and revealed that nurses had shortage in knowledge without training or education⁽³⁾. Likewise, Ozden and Caliskan (2012) reported that about 75.6% of the nurses did not type of port catheter and 82.2% did not know site of port catheter and concluded that the knowledge level of the nurses caring for port catheter is limited⁽¹⁵⁾. In addition, the present result congruent with Deshmukh and Shinde (2012) who reported that the mean score of knowledge regarding venous access device care was increased in the post-test after structured education⁽²⁹⁾.

Regarding nurses' knowledge of patient education related to Port-A-catheter care, around third only of the nurses had satisfactory knowledge regarding acceptable activities, wearing ID, signs, and symptoms of infection pre educational guidelines implementation while post educational guidelines more than three quarter of nurses had satisfactory level of knowledge regarding the pervious items. Similarly, Ciou and Chuang (2017) reported that only 32.3% of the nurses had

satisfactory knowledge regarding patient education pre educational training while knowledge improved after educational training implementation⁽³⁰⁾. Moreover, Khalil et al. (2017) mentioned that education about implantable port catheter care does not present in the curricula of all undergraduate nursing programs in Egypt, which result in decrease nurses level of knowledge⁽³⁾.

Concerning nurses' knowledge of Port-A-catheter complications. The present result revealed that less than quarter of the nurses had satisfactory level of knowledge regarding Port-A-catheter complication as Tube cutting and collapsed lung pre educational guidelines while, More than three quarter of nurses, had satisfactory level of knowledge regarding same pervious items post educational guidelines with statistically significant improvement in nurses knowledge pre & post educational guideline. This result congruent with Arslan et al. (2014) and Kapucu et al. (2019) who declared that educational guidelines and training programs on catheter care would be helpful to raise the nurse's knowledge regarding catheter care and complication. Moreover, nurses with inadequate level of knowledge regarding complication posed a risk to patents wellbeing^(28, 31). Therefore, to provide more comfort to patient and minimize potential complication, it is of utmost importance that all nurses who administer chemotherapy through port -A- catheter should have the educational guidelines⁽³²⁾. Similarly, Al kubati (2015) study health care workers knowledge and practice regarding prevention of catheter related complication at Alexandria main university hospital in Egypt and found that most health care workers had low level of knowledge regarding complication and recommended the need for educational guidelines to improve knowledge⁽³³⁾.

In relation to nurse's total knowledge, the present study concluded that only one third of the nurses had satisfactory total knowledge pre educational guidelines while majority of them had satisfactory total knowledge post educational guidelines with high statistical significant improvement in knowledge post-educational guidelines. These findings indicated nurses were in need for updating and refreshing their knowledge and that educational guideline was effective in enhancing the knowledge of nurses regarding port -A- catheter. The present result consistent with Ciou and Chuang (2017) who reported that about 42% of the nurses lacked knowledge regarding port -A- catheter pre educational training and the satisfactory rate of port nursing knowledge increased from 32.5% to 92.5% post educational training, indicating true improvement in knowledge of port -A-catheter for nursing staff⁽³⁰⁾. Likewise, Shrestha (2013) and Atia (2017) reported that structured education was best effective on improving knowledge of nurses regarding venous access catheter care^(34,35).

Concerning nurses' practices regarding port-A-catheter pre- & post- educational guidelines. This result found that near quarter of nurses had adequate practice regarding equipment's preparation and standard precautions pre educational guidelines while; highest majority of nurses had adequate practice regarding pervious items post-educational guidelines. In addition, less than quarter of nurses had adequate practice regarding re access site and changing dressing while near three quarter had adequate practice regarding pervious item post educational guidelines. This result is similar to Ciou and Chuang (2017) who stated that nursing practice toward site dressing and standard precaution was improper before educational training but improved after educational training. Moreover, concluded that after educational training nurses practice toward port -A- catheter improved⁽³⁰⁾. In addition, , Kapucu et al (2019) emphasized that nurses practice level regarding port catheter care was more within nurses who had educational guidelines than others⁽³¹⁾.

Regarding nurse's total practice, the present results declared that more than half of the nurses had adequate total practice pre educational guidelines while, majority of them had adequate total practice post educational guidelines with high statistical significant difference between pre and post-educational guidelines implantation. This finding indicates that educational guidelines was effective intervention that affected nurse's knowledge, which in turn improved their practice. In the same line, Matsubara and De Domenico (2015) stated that nurses participating in educational training have more knowledge and practical skills than their counterparts⁽³²⁾. Similarly, Deshmukh and Shinde (2012) mentioned that structured education is effective in increasing and improving the practice scores of staff nurses regarding venous access catheter care⁽²⁹⁾. Moreover, Ciou and Chuang (2017) in Taiwan and Atia (2017) in Egypt who emphasized that there was increase in staff nurses adequate practice scores in the post test after structured education than that of the pre-test and the differences was statistically significant^(30, 35).

Furthermore, the present study revealed that there was statistically significant positive correlation between total knowledge and practice pre and post-educational guidelines implementation. This finding suggests strong statistical relation between improvement of nurse's knowledge and practices and implementation of educational guidelines and

reflect the nurses need for continuous education to keep them updated in their knowledge and practice. This result congruent with Deshmukh and Shinde (2012) and Atia (2017) who emphasized that there is positive correlation between nurses knowledge and practice which indicates that the educational guidelines was effective intervention that affected nurse's knowledge and in turn improve nurses practice toward port -A- catheter care ^(29,35).

Regarding patients complication this study findings revealed that around third of control group had site and systemic infection while near quarter of the study group had the pervious complication post educational guidelines. In this respect, Yesilbalkan et al. (2009) , Teichgräber et al. (2011) and Shim et al. (2014) mentioned that infection is the most common port complication, as a port is foreign material implanted in the body and accessed commonly from the outside, it can easily get infected. When this occurs, bacteria grow rapidly in the bloodstream, causing serious contamination and fever ^(36, 4, 37). Moreover, Esfahani et al. (2015) reported that infection complication occurred in 30.6% of patients ⁽¹¹⁾. Furthermore, the present result partially consistent with Aloush and Alsaraireh (2018) who mentioned that rate of catheter related infection decreased by nurse's compliance with guidelines but also could be affected by nurse –patient ratio ⁽³⁸⁾.

Finally, the present result illustrated that there was a lower percentage in all patients' complication in study group post educational guidelines than control group pre educational guidelines implementation but this decrease was not statistically significant difference. This finding means that implementation of the educational guidelines increase nurses compliance with port-A- catheter care and lead to substantial decrease in patient's complication. In this context Atia (2017) reported that incidence of complication related to care of catheter decreased after implementation of educational modules ⁽³⁵⁾. In addition, Odabas et al. (2014) studied the effect of long-term port -catheter care frequency on the rate of port- catheter related complications and concluded that the rate of complication was slightly higher in the infrequent port catheter care group but not statistically significant⁽³⁹⁾. Likewise, Pires and Vasques (2014), Linnemann (2014) and Alkan et al. (2017) emphasized that nurses actively caring for portal catheter should be routinely updated, especially about complications to improve patient's outcome ^(17, 40, 26).

Nurses are backbone of oncology team, so nurses should be continuously educated to incorporate new developments in their practice. As a nurse accountable for identifying patients who would benefits from port-A- catheter, conducting teaching, a accessing the port, administering medication, complete site care and prevent complications. Therefore, continuing education is essential to provide optimum care to patients with port-A- catheter

5. CONCLUSIONS

The present study concluded that the educational guidelines were effective on the improvement of the nurses' knowledge and practices for prevention of port-A-catheter related complications among patients Undergoing Chemotherapy. This means that the educational guidelines developed related to port-A-catheter care was found to be helpful in improving the knowledge and of nurses to great extent. This increase in knowledge would result in better practice among nurses, which would result in decrease of patient's complications.

6. RECOMMENDATION

- Continuous educational sessions should be done to improve oncology nurses' clinical practices and knowledge for Port-a-cath.
- Periodic educational programs regarding port-A-catheter care for nurses caring for patients undergoing chemotherapy.
- Simple illustrated booklets about port-A-catheter care and complications management should be available through instructive teaching, practical workshops, simulations, video skill demonstrations, and responsibility with the use of a checklist system.
- Adding this issue to nursing curriculum will give more awareness to the nurses at the beginning of their carrier.
- Further research should be done on a larger sample to validate these findings and to determine if nurses' knowledge of port-a-catheters is adequate to maintain safety and optimum patient care.

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