Online Versus Traditional Educational program on Oncology Nurses' Attitude and Satisfaction

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Abstract

Background: Oncology nurse is the key person in providing care of cancer patient, and the oncology nurses with specialized knowledge, skills and attitude with online innovative approaches of educational program play a major role in ensuring safe various stages during chemotherapy handling. **Aim**:This study aims to evaluate online educational program versus traditional educational program on oncology nurses' attitude and their satisfaction. **Design**: A quasi experimental design was utilized. **Setting**: it was conducted at the inpatient and outpatient oncology Center, bone marrow transplantation (BMT) unit, fifth and sixth medical oncology departments at third floor that affiliated to Ain Shams University Hospital, Cairo, Egypt. **Subjects**: A convenient sample of all available oncology nurses included 80 nurses were divided into two groups (traditional and online group).**Data collection Tools: I)** Nurses' attitude questionnaire.**II)** Nurses' satisfaction questionnaire. **Results**: The study revealed that after program implementation there was a significant improvement in nurses' regarding their attitude and satisfaction about safe handling of chemotherapy. Also, after the program implementation there was the online group performance more significant than traditional program. **Conclusion**: Implementation of the online educational program had positive effect on improving oncology nurses' attitude and their satisfaction. **Recommendations**: Further research are recommended to assess the online education programs and factors that affecting on safe handling and hazards prevention of chemotherapy.

Key words: Attitude, Oncology nurse, Online educational program, Satisfaction, Traditional educational program.

Introduction

Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body (National Cancer Institute, 2019). Cancer is the second leading cause of death globally and is responsible for an estimated 9.6 million deaths in 2018, globally; about 1 in 6 deaths is due to cancer. Approximately 70% of deaths from cancer occur in low and middle-income countries **(World Health Organization, 2021)**.

Chemotherapeutic drugs (CDs) are the most widespread worldwide modality used in cancer treatment, and other autoimmune diseases **(Samir et al., 2016)**. These drugs are administering systemically and are working by interrupting the cell cycle and killing rapidly dividing, CDs are not able to differentiate between cancerous and non-cancerous cells for that, they tend to make overall damage and have increase therapy complications **(DeMacedo, 2016)**.

Exposure to CDs among oncology nurses working in oncology department has been increasing due to the widespread use of these agents. The chemotherapeutic drugs exposure may lead to acute and chronic health effects such as skin rashes, adverse reproductive outcomes (including infertility, spontaneous abortions, and congenital malformations), possibly leukemia and other cancers **(Boiano, et al., 2015)**. Route of exposures to chemotherapeutic drugs may occur through inhalation, skin contact, ingestion, or injection. Inappropriate hygienic behaviors such as eating, drinking or smoking during preparation or in preparation area, administration, and disposal of chemotherapeutic drugs are wrong behaviors that increase the risk of exposure **(El shamy, 2015)**.

As we know the oncology nurse is the key person in providing care of cancer patient, and the oncology nurses with specialized

knowledge and skills play a major role in ensuring safe various stages during handling (i.e., transport, unpacking, storage, handling, administration, and disposal) and care of patients receiving chemotherapeutic drugs **(Goodin, 2018)**. Little negligence or mistake may lead to adverse unpleasant effects for patients, staff and environment, there is a need to provide specialized knowledge and training to oncology nurses who providing care to patients receiving chemotherapy regarding safe handling of chemotherapeutic drugs in order to ensure safety for both patients' life and for their own safety of the jobs **(Mohmed, 2015)**.

Nurses play an important role in improving health standards. Hence, they must be updated on theoretical and practical knowledge in this area, In-service training in fact serves to update the professional knowledge and professional skills of staff and improve best practices to carry out various tasks and responsibilities **(Chaghari, et al., 2017)**. According to these requirements there is a great need to conduct a comprehensive educational program and monitor nursing competency at specific intervals by each institution **(Al-Attar, 2015)**.

The educational program is defined as a series of planned educational activities that enhance nursing practice, and also considered to be an important means to provide oncology nurses with theoretical and technical information needed to acquire skills and competencies necessary to continually improve nursing practice **(Booth, et al., 2016)**. It helps them to accept responsibility for their professional development, the educational program is designed to assist health worker to maintain and improve their competencies and to acquire new knowledge **(World health Organization, 2021)**.

Nursing has adopted online learning as an appropriate alternative to traditional learning environments, because of several factors such as shift work exhaustion, low motivation, lack of replacement staff and interfere of continuing education programs with their working, e-learning is considered inexpensive and effective solution. The e-learning program is appropriate for oncology nurses to resolve the problems resulting from nurses' inability to be present at traditional courses because of shift schedules **(Bahrambeygi, et al., 2018)**.

Satisfaction defined as a pleasant feeling that you get when you receive something you wanted, or when you have done something, you wanted to do **(Cambridge dictionary, 2019)**. Nurses' satisfaction is the nurses' positive feeling response to the work conditions that meet his or her desired needs as the result of their evaluation of the value or equity in their work experience, and its level of approval when comparing method of learning perceived performance with his or her expectations, while satisfaction is sometimes equated with performance **(Liu et al., 2016)**. Online learning also provides students the opportunity to preview and practice, and nurses have high satisfaction with online learning **(Bahrambeygi, et al., 2018)**.

Significance of the study:

Cancer rates will be an estimated 1.8 million new cancer cases diagnosed and 606,520 cancer deaths in the United States in 2020 **(American Cancer Society's, 2020)**. Cancer rates are expected to increase three times the current status by 2050 in Egypt, (70%) of these patients receiving chemotherapy drugs for management cancer **(National Cancer Control Plan, 2018)**. Previous studies on educational program for oncology nurses about chemotherapy precautions showed that education in evidenced based care and handling give oncology nurses the opportunity to improve their ability to use theoretical knowledge in clinical problem **(Samir et al., 2016)**.

So that, this study an attempt to strength the evidence of the efficiency of online education in increasing the needed knowledge, skills and attitude necessary for optimal safe oncology nurses' performance and their satisfaction level.

Aim of the study:

This study aims to evaluate the effect of online educational program versus traditional educational program on oncology nurses' attitude and their satisfaction through the following:

1.Assessing of nurses' attitude and their satisfaction.

2.Planning and implementing online educational program versus traditional educational program for nurses.

3.Evaluating effect of online educational program versus traditional educational program on oncology nurses' attitude and their satisfaction.

Research Hypothesis:

The current study hypothesized that:

The implementation of online educational program will improve attitude of oncology nurses and their satisfaction more than traditional educational program.

Subject and Methods

Subjects and methods for this study were portrayed under the four main designs as follow:

1.Technical design.

2.Operational design.

3.Administrative design.

4.Statistical design.

1. Technical design

The technical design includes research design, setting, subjects and tools for data collection.

Research Design:

A quasi experimental design was utilized for the conduction of this study.

Subject: A convenient sample of all available oncology nurses included 80 nurses at the previously mentioned settings that affiliated to Ain Shams University Hospital were divided into two groups (traditional program group and online program group who should have access to the internet, enough internet literacy as receive e-mail messages).

Setting: oncology Center affiliated to Ain Shams University Hospital, Cairo, Egypt.

Tool (I): Nurses' attitude questionnaire:

- It was developed by the researcher based on recent literature review: **Alehashem & Baniasadi, (2018); Zayed et al., (2019)**. It was written in Arabic language & it was used to assess nurses' attitudes towards the importance of safe handling of CDs.

- It consists of two parts

- **Part 1:-** It was used to assess demographic data of studied oncology nurses.

- **Part 2:-** (14 questions) as safe handling of CDs makes me sure that I am not at risk, using of personal protective equipment PPE in handling of CDs is essential, I should pay attention to precautions in guidelines,..etc.

- **Scoring system**

- The nurse's response for each statement with three choices as follows: always = 3, sometimes = 2, never=1. The score was calculated by multiply the highest score (3) by the numbers of questions (14) to yield the final composite score (42 grades), and then the grades (42) multiply by satisfactory percentage (85%) to obtain the total scores of satisfactory attitude level as below.

- The total scores were as a follow:

- < 85% was considered an Unsatisfactory level (negative attitudes < 36 grades).

- ≥ 85% was considered a Satisfactory level (positive attitudes ≥ 36 grades).

Tool (II): Nurses' satisfaction questionnaire:

- This questionnaire developed by the researcher after he had reviewed the related literatures: **Fieger,. (2012)**. To assess the overall nurses' satisfaction regarding the traditional face-to-face education program and online education program and compare that between them, and it was written in Arabic language. It consisted of four sections and 24 items:

1.Scientific content of education program.

2.Educational environment.

3.Researcher (trainer).

4.Overall satisfaction.

- Scoring system

- The nurse's response for each statement with three choices as follows: full satisfaction= 3, moderate = 2, low=1. The score was calculated by multiply the highest score (3) by the numbers of questions (24) to yield the final composite score (72 grades), and then the grades (72) multiply by satisfactory percentage (85%) to obtain the total scores of satisfactory level. So, the total grades for the scale were calculated as the following:

- High satisfaction: ≥ 61.

- Moderate satisfaction: 60 – 41.

- Low satisfaction: < 41

- **2. Operational design**

- It included preparatory phase, validity and reliability, pilot study and field work.

- Preparatory phase:

- It included the reviewing of current and past, national and international related literature.

- Permission for data and implementation of education program in the Oncology setting affiliated to Ain Shams University Hospital in Cairo were obtained from the hospital administrative personal.

- **Validity and reliability tools**

- **validity**

- ools of data collection in this study were tested and evaluated for their face and content validity by seven experts; five experts from medical surgical nursing at faculty of nursing, Ain Shams University; and two medical consultants of the Oncology Departments at Ain Shams University Hospitals. 85% or more of experts were in agreement with the proposed tools. Required modifications were done.

- **Reliability testing** of the proposed tools was done statistically by using (Cronbach`s alpha test) to assure the internal consistency.

- Cronbach`s alpha for attitude scale was 0.791

- Cronbach`s alpha for satisfaction scale was 0.872

Pilot Study:

- Testing of the selected tools was carried out before starting in data collection to determine the feasibility of the study tools. It was conducted on 10 % of oncology nurses to test process, applicability of the study tools and time required to fill the tools. After analyzed the results of the pilot study no modifications were made to the tools. The oncology nurses who selected for piolet study were included from the study subjects.

Ethical Considerations:

- The ethical research considerations in this study was included the following:

- The research approval of the protocol was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing, Ain Shams University before starting the study.

- The researcher clarified the aim and the objective of the study to the oncology nurses included in the study.

- The researcher assured maintaining anonymity and confidentiality of subjects' data.

- The oncology nurses informed that they are allowed to choose to participate or not in the study and that they have the right to withdraw from the study at any time.

- **Field work:**

- Field work was included assessment and planning phase, implementation phase and evaluation phase.

A- The assessment and planning phase:

- The researcher meeting and discussion were held with the oncology' nurses to let them be aware of the aims, the nature of education program, as well as to get better cooperation during implementation phase of the program.

- Assessment of nurse's attitude was made for this assessment to shed light and give more insight about the current nurse's knowledge and practice deficit and their attitude, as it was based on the results obtained from questionnaire and the observational checklist, as well as, literature review.

- The education program was developed by the researcher; detected needs, requirement, deficiencies were translated to aim and objectives of the program. Moreover, teaching materials were prepared (e.g. lectures, discussion, demonstration and re-demonstration, real object, PowerPoint presentation, booklet that helped in covering theoretical an practical information).

B- Implementation phase

- Data collection and application of the education program lasted over a period of eight months, started from beginning of June 2021 to end of January 2022. Data was collected for both traditional and online group five days/week in the morning and afternoon shifts.

- Meeting and discussion were held by the researcher and oncology nurses to let them be aware of the aims, the nature of education program, as well as to get better cooperation during this phase of the program.

- The total numbers of sessions were (10) sessions with same content for both traditional and online group divided as follow:

- 4 sessions for theoretical part.

- 6 sessions for practical part

- they were booklet, Real object video, real situation, PowerPoint presentation.

- The tools were administered to the study subject three times (1) before program

implementation (pre-test); (2) post program implementation; and (3) follow up after the program to assess the effect of training program.

C- Evaluation phase

- The evaluation phase was done to determine the effect of this education program by comparing the results of pre & post implementation of program by using the same data collection tools which were done to online and tradition group of oncology nurses.

3. Administrative design:

- Formal letter was issued and approval to carry out this study was obtained from the dean of the Faculty of Nursing and directors of Ain Shams University Hospital. Consent was obtained for data collection after explaining the purpose of the study.

4- Statistical design:

- The collected data were organized, analyzed using appropriate statistical significance tests. The data were collected, coded and entered into computer. The data were analyzed by program using the statistical package for social science (SPSS).

- The tests used to summarize data and scores used to compare scores of numerical data were; range, mean, standard deviation, Chi square, P-Value, t-test. Also, Cronbach`s alpha used to test reliability of tools, and factor analysis to test its validity. Also, a test of significance was used and regarding the significance of the results, the observed differences and associations were considered as follow:

- Non- significant P>0.05
- Significant P<0.05
- Highly significant P<0.01

Results

Table 1 Table (1) showed that, the mean age of the traditional group and online group were 25±0.22 and 25±0.26 respectively. As shown in this table, the (80%) of study traditional group were females, and as regards the study online group, the (75%) of them were females. As regards their educational level, (82.5%) of the traditional group and (85%) of the online group were Bachelor degree. In relation to marital status, (55%) of the study traditional group were singles, and (60%) of online group were also singles. Regarding years of experience, (55%) of the traditional group and (60%) of the online group were less than 5 years. Also, (85%) of the traditional group and (87.5%) of the online group didn't attend any chemotherapy courses before. As well, no one of the study traditional and online groups attended to online courses. Concerning computer skills classification, (60%) of study traditional group and (65%) of study online group have basic skills. Finally, there were no statistically significant differences between two groups regarding their socio demographic characteristics.

Figure 1 displayed that, 40 % of study traditional group and 39% of study online group had a satisfactory level of attitude with no statistically significant differences pre-educational program implementation between two groups (P> 0.05). While, there were 92% of study traditional group in compare to 94% of study online group had a satisfactory level of attitude post-educational program implementation, also 85% of study traditional group in compare to 86% of study online group had a satisfactory level of attitude with no statistically significant differences during follow up time after program implementation between two groups (P> 0.05).

Table (2) showed that, 89% of study traditional group in compare to 90% of study online group had a satisfaction level with insignificant statistical differences between oncology nurses in the two studied group regarding to their satisfaction level about scientific content (P> 0.05).

Table (3) illustrated that 83% of study traditional group in compare to 92% of study online group had a satisfaction level with highly statistically significant differences between the two studied groups regarding to their satisfaction level about educational environment (P< 0.001).

Table (4) showed that, 91% of study traditional group in compare to 95% of study online group had a satisfaction level with insignificant statistical differences between the two studied groups regarding to their satisfaction level about researcher (trainer) (P>0.05).

Table (1): Demographic characteristics of the two studied groups (traditional face-to-face education program group) and (online education program group).

Items	Traditional group (n=40)		Online group (n=40)		T-test	P-value	Sig.
	Mean ± SD		Mean ± SD				
Age:	25±0.22		25±0.26		0.3	0.6	NS
	N	%	N	%	$\chi 2$	P-value	Sig.
Sex: Male	8	20%	10	25%	0.428	0.261	NS
Female	32	80%	30	75%			
Educational level: Diploma degree	6	15%	4	10%	0.611	0.423	NS
Bachelor degree	33	82.5%	34	85%			
Master degree	1	2.5%	2	5%			
Marital status Single	22	55%	24	60%	0.154	0.291	NS
Married	18	45%	16	40%			
Years of experience: < 5	22	55%	24	60%	0.803	0.333	NS
5< 11	10	25%	12	30%			
11< 15	6	15%	4	10%			
≥ 15	2	5%	0	0%			
Chemotherapy courses attendance: Yes	6	15%	5	12.5%	0.368	0.947	NS
No	34	85%	35	87.5%			
Type of chemotherapy course attended: Online	0	0%	0	0%	0.231	0.368	NS
Face to face	6	15%	5	12.5%			
Computer skills classification: Basic skills	24	60%	26	65%	0.543	0.461	NS
Good skills	10	25%	11	27.5%			
Advance skills	3	7.5%	1	2.5%			
o skills	3	7.5%	2	5%			

P< 0.05 not significant

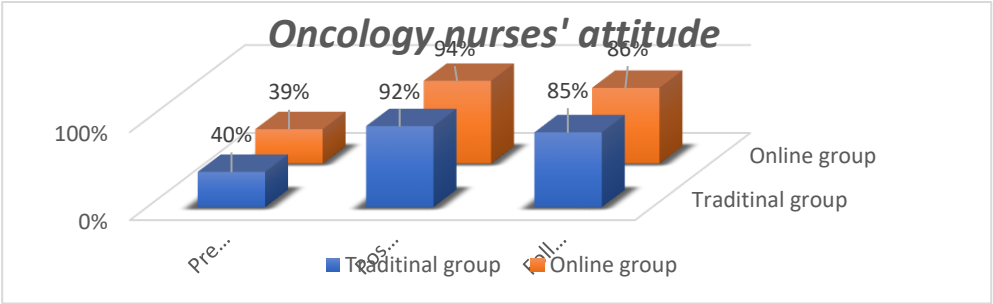

Figure (1): Pre/post & follow up test scores as regards Oncology nurses' attitudes regarding the importance of chemotherapy safe handling for the two study groups (Tradition & Online).

Table (2): Oncology nurses' satisfaction level about scientific content regarding educational methods (traditional face-to-face education program and online education program).

Item	Traditional group (n=40)		Online group (n=40)		χ2	P-value	Sig.
	N	%	N	%			
	Satisfactory		Satisfactory				
Scientific content							
The educational program presented various strategies and scientific methods that suitable the different categories of participants in the program	35	87.5%	36	90%	0.174	0.677	NS
The educational program presented the educational and training material in a clear and understandable manner	34	85%	35	87.5%	0.184	0.668	NS
The educational program provided educational content that is current, accurate and reliable	36	90%	36	90%	0.000	1.000	NS
The contents of the educational program were organized, coherent and unrepetitive	35	87.5%	34	85%	0.047	0.829	NS
The educational program provided a variety of educational activities to suit different learning styles	34	85%	36	90%	0.219	0.640	NS
The educational program provided a great deal of attractiveness in the presentation of educational and training content of texts, images and graphics	35	87.5%	35	87.5%	0.000	1.000	NS
The educational program encouraged the participants to actively participate in the learning process	35	87.5%	36	90%	0.174	0.677	NS
The educational program contributed to the development of various aspects of learning among the participants	37	92.5%	36	90%	0.250	0.617	NS
The educational and training material covered the topics of the educational program	38	95%	38	95%	0.000	1.000	NS
The educational program facilitates individual and collaborative learning with peers	38	95%	34	85%	2.174	0.140	NS
The educational program helped the participants acquire new knowledge and skills	38	95%	38	95%	0.000	1.000	NS
Total	35	89%	36	90%	0.293	0.749	NS

P> 0.05 not significant

Table (3) Oncology nurses' satisfaction level about educational environment regarding educational methods (traditional face-to-face education program and online education program).

Item	Traditional group (n=40)		Online group (n=40)		χ2	P-value	Sig.
	N	%	N	%			
	Satisfactory		Satisfactory				
Educational environment							
The educational program allowed the freedom to choose the appropriate place and time to attend the program	16	40%	40	100%	16.877	<0.001**	HS
The program enabled effective communication between the participants and the trainer	38	95%	35	87.5%	0.508	0.476	NS
The educational program provided an educational environments' pace with the requirements of the technical era	34	85%	40	100%	7.895	<0.005*	S
The educational program provided the immediate feedback that was needed	40	97.5%	34	85%	7.895	<0.005*	S
The educational program supports interactions between members of the learning group	40	100%	34	85%	7.895	<0.005*	S
Total	33	83%	37	92%	8.214	<0.005*	S

P> 0.05 Not significant *P< 0.05 Statistically significant **P < 0.001 Highly statistically significant

Table (4) Oncology nurses' satisfaction level about researcher (trainer) regarding educational methods (traditional face-to-face education program and online education program).

Item	Traditional group (n=40)		Online group (n=40)		χ2	P-value	Sig.
	N	%	N	%			
	Satisfactory		Satisfactory				
researcher (trainer)							
Present the educational and training material and show it well	37	92.5%	37	92.5%	0.000	1.000	NS
Support effective communication with participants in the educational program	38	95%	37	92.5%	0.122	0.727	NS
Use diverse and effective educational and training strategies	39	97.5%	39	97.5%	0.000	1.000	NS
Make it easy to communicate with program participants at all times	34	85%	38	95%	1.084	0.298	NS

Discussion

part one: Demographic assessment for online and traditional educational program groups.

The present study revealed that, the mean age for traditional face-to-face education program group was 25±0.22, while the main age of online education program group was 25±0.26, with no statistically difference between them, also the majority sex of oncology nurses from two groups were female. As regard educational level, the majority of two groups had Bachler degree. This result in agreement with **Asefa et al, 2021**, who mentioned in a research study entitled; "Knowledge and Practices on the Safe Handling of Cytotoxic Drugs Among Oncology Nurses Working at Tertiary Teaching Hospitals in Addis Ababa, Ethiopia", that the age of oncology nurses had between (22 to 26) about two thirds of total studied oncology nurses. Also, two thirds of them were female and the majority of them had Bachler degree.

In related to Years of experience more than half of traditional and online education program group had experience less than 5 years; also, the majority of two studied groups didn't attend any course related to Chemotherapy safe handling. These results go in agreement with Hosen MS et al., 2019, in a research study intitled;" Evaluation of knowledge and practice of handling chemotherapy agents by nurses: a multi-center studies in Bangladesh" found about half of studied oncology nurses had experience less than 5 years, the majority of them did not obtain any course regarding chemotherapy agents handling.

These finding were also on agreement with Mishra et al., 2021, in a research study intitled;" Chemotherapy safe handling through educating nurses: A Pre-experimental study " in India, they clarified that the majority of studied group didn't attend any certification course in oncology nursing. Also, two thirds of them had experience between 1 to 5 years.

Regarding type of chemotherapy course attendance, the present study showed that, all studied oncology nurses from two groups didn't attend any online chemotherapy course. This finding was correspondent with Mun and Hwang. 2020, in a research study intitled;" Development and evaluation of a web-based learning course for clinical nurses: anticancer chemotherapy and nursing", who found that, the majority of nurses in experimental group and control group didn't have online chemotherapy learning experience.

As regards to computer skills classification of oncology nurses, the current study revealed that, more than half of traditional and online education program group had basic computer skills. This finding was consistent with Ahmad et al., 2018, in a review article entitled; " Nurses and internet health-related information: review on access and utility ", who stated that, one of the barriers for Internet and online education was lack of advanced Information and communication technology (ICT) skills made the most nurses practice basic computer information-seeking skills.

Second part: Oncology nurses' attitude towards the importance of safe handling of CDs pre and post implementation of educational program.

Regarding oncology nurses' attitude about the importance of chemotherapy safe handling, pre implementation of educational program, the current study showed that there was no statistically significant difference between the two studied groups regarding their attitude about chemotherapy safe handling pre implementation of traditional and online educational methods.

This result might be due to lack of education and training courses that held by the cancer center to aware them with the importance of safe handling of chemotherapy, hospital policy is not effective to improve cytotoxic drug handling.

In this respect, Orujlu S et al., 2016, reported in their study that titled; "Knowledge, attitude, and performance of oncology nurses handling antineoplastic drugs in hospitals of Urmia University, Iran", about 38% of oncology nurses had high level of attitude and there is a gap between nurses' chemotherapy knowledge and their behavior and attitude during work with antineoplastic drugs which is related to lack of Implementation good work practices that could reduce the occupational exposures of nurses, insufficient implementation of safety guidelines and

systematic training programs could demonstrate the organizational supports and reduce the concerns of nurses during preparation, administration and correct disposal with chemotherapy.

The results are consistent by research of VerStrate, 2015, that entitled; "Exploration of chemotherapy safe-handling practices and identification of knowledge deficits among oncology nurses in the ambulatory care setting", who reported in his study that although the toxicity of chemotherapy is well documented, the nurses' attitude that participated in the study mentioned a low overall use of safety precautions when dealing with chemotherapy.

Considering oncology nurses' attitude about the importance of chemotherapy safe handling, post implementation of educational program, the present study showed that, there were highly statistically significant difference between the two studied groups regarding their attitude about chemotherapy safe handling pre-post implementation of traditional and online educational methods in relation to chemotherapy personal protective equipment, chemotherapy preparation, administration and waste management of Chemotherapy.

This improvement in total attitude scores after implementation of program is due to the effectiveness of the education program sessions and training time on enhancing their positive attitude about chemotherapy safe handling.

These findings are in agreement with Bolbol SA et al., 2016, who conducted that there was significant improvement in studied nurses' attitude and practice after intervention regarding the use of personal protective equipment during handling patients' waste and cleaning up spills. The nurses use them poorly before intervention because they don't know that contact with patient waste and cleaning up spills can expose them to hazards of CDs.

In this respect, Alehashem & Baniasadi, 2018, stated in their research study which entitled; "Safe handling of anti-neoplastic drugs in the university hospitals: A descriptive survey study among oncology nurses", that there a significant difference was found between the attitude scores of trained and untrained nurses for working in oncology during handling chemotherapy. Time of training (before and after starting work) made differences in the attitude scores. This indicates that training programs could have effect on nurses' attitude. There was a significant difference between nurses trained in chemotherapy subject and in other subjects regarding the level of their attitude.

Concerning the implementation method between the online and traditional educational program regarding the oncology nurses' attitudes about the importance of chemotherapy safe handling, the current study showed that, there were no statistically significant differences between two studied methods traditional and online educational program (P> 0.05).

The result is in agreement with Mun and Hwang. 2020, in a research study intitled; "Development and evaluation of a web-based learning course for clinical nurses: anticancer chemotherapy and nursing", who reported that no statistically significant between two learning methods at the study's level of 0.05 between experimental group(e-learning) and traditional face-to-face learning group.

Third part: Oncology nurses' satisfaction level regarding the traditional face-to-face education program and online education program between two studied groups.

Regarding oncology nurses' total satisfaction level about the traditional face-to-face and online education program after implementation of program, the current study showed that, 89% of traditional face-to-face group in compare to 90% of online group had a satisfaction level with insignificant statistical differences between oncology nurses in the two studied group regarding to their satisfaction level about scientific content that provided, this result might be due to the updated and effective educational and training content that was identical for both groups.

The previous study result, was in agreement with Wu et al., 2018, in a review article that entitled; "A systematic review of online learning programs for nurse preceptors", who stated that, the available evidence suggested that the satisfaction of online learning for teaching clinical skills is no less

effective than the satisfaction of traditional learner.

On other hand, das Graças et al., 2016, who carried out the research study entitled; "Virtual Learning Environment in Continuing Education for Nursing in Oncology: An Experimental Study", who mentioned that Distance education has proven to be an effective alternative for training nurses, especially when they have more complex knowledge, more experience in the area and institutional time. Distance Education may be a possibility for the training of nurses for work in oncology. The performance of both groups was statistically significant (p 0.005).

Regarding oncology nurses' total satisfaction level about the traditional face-to-face and online education program after implementation of program, the current study showed that, 83% of traditional face-to-face group in compare to 92% of online group had a satisfaction level with significant statistical differences between oncology nurses in the two studied group regarding to their satisfaction level about educational environment of the program.

The result might be due to oncology nurses have a possibility to visit their e-mail several times and repeated visit to the e-mail may have provided additional reinforcement of learning, performance may have been improved because online learners can manage their learning, they can use other sources on web for expanding their information, assigning time to each educational section as desired and enabling to choose the place and time for education, immediate feedback, and interactions between members of the learning group. In contrast, these advantages are not there in oncology nurses who receiving traditional teaching method.

The results are consistent by the research of Seada and Mostafa, 2017, that entitled; "Students' Satisfaction and Barriers of E–Learning Course among Nursing Students, Mansoura University", who stated that in the study more than half of studied sample reported that they able to repeat any part of the education sessions without limits and satisfied from a new learning method by internet which save time, place and increased self-responsibility and self-confident. Also, more than half of the same studied sample motivated to improve interaction with colleagues

Regarding oncology nurses' total satisfaction level about the traditional face-to-face and online education program after implementation of program, the current study showed that, 91% of traditional face-to-face group in compare to 95% of online group had a satisfaction level with insignificant statistical differences between oncology nurses in the two studied groups regarding to their satisfaction level about researcher (trainer) who Presented the program.

The result might be due to assume the researcher role is a pivotal component to guide the education program through effective presentation the educational and training material, support the effective communication, used several ways to contact oncology nurses and used motivation training strategies towards achieving goals.

In this respect, Martin et al., 2018, reported in their study that titled; "Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses", it is important for the learner to have several ways to contact the instructor including email, video chat, telephone, or web conferencing, but expectations of presence prove challenging for online education, using evidence-based strategies to assume the role of facilitator and remain active in the course are fundamental to student learning.

Conclusion

The results of this study concluded that:

Implementation of the online and traditional educational program had positive effect on improving oncology nurses' attitude and their satisfaction. Concerning the implementation of online educational program method, there was no statistically significant difference between two studied methods traditional and online educational program regarding the oncology nurses' attitudes about the importance of chemotherapy safe handling. Concerning the total online education satisfaction post program implementation was highly statistically significant, but the total traditional face to face education satisfaction post program implementation was only statistically significant.

Recommendations

Based upon the findings of the present study, the following suggestions are recommended:

Increase oncology nurses' awareness about policies and procedures guidelines related to CDs safe handling.

Implementing online educational and training program for oncology nurses in chemotherapy clinic about chemotherapy safe handling guidelines.

Oncology orientation program for all newly employed oncology nurses and soft copy should be available for them to facilitate review that periodically.

Development written and soft copy of procedure manual regarding safe handling of CDs that should be available in each oncology word and on the internet hospital site as a reference, and should be up to date periodically to suite new trends of safe handling CDs.

Periodically and continuously, evaluation of oncology nurses' performance should be done by using the electronic means to improve quality of care.

Soft and hard copies of booklet and posters are recommended to be available and give the oncology nurses the reinforcement of their knowledge.

Further researches are recommended to assess the online education programs and factors that affecting on safe handling and hazards prevention of CDs.

Replication of the present study on a large sample representing different hospital settings in Egypt in order to generalize the results.

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