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Safe handling of cytotoxic drugs practices for nurses working with patients in middle euphrates oncology teaching hospitals

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***Abstract*---**Background: The expanding use of chemotherapy medications has resulted in an increase in chemotherapeutics exposures amongst nurses who work in oncology departments. Chemotherapy drugs agents may have toxicological consequences in humans, such as carcinogenic effects, teratogenic effects, and mutagenicity (Sarita Devi, 2019). Objectives of the study: to assess nurses practices for safe preparation and administration of cytotoxic drugs in the oncology teaching hospitals. Methodology: descriptive–observational study design carried out to assess the nurses practices regarding safe of the preparation and administration of cytotoxic drugs .purposeful sample from (125) nurses who provide direct care for patient receiving chemotherapy drugs were selected. Result: Represent that most of the sample shows fair practice regarding preparation of chemotherapy (cytotoxic) that considered as key element of handling of cytotoxic medications in a safe manner, also that the majority of the nurses who participate in the study related to practical level of the study sample related to chemotherapy administration fair. Conclusion: Regarding the nurses practices with respect to the safe handling of cytotoxic drugs during their daily caring in the oncology units the statistical results recorded moderate level of practices. No significant relationships found between the nurses practices and their demographical characteristics related to (gender, educational status, residency and marital status) except their age. Recommendation: A special manual focused on the policy, practices of safe handling of cytotoxic drugs should be prepared and distributed to the oncology departments which provide direct care to the patients to improve the nurses competence related to safety measure.

Keywords---safe handling, cytotoxic drugs, oncology.

Introduction

Cancer is the uncontrolled growth and proliferation of cells in the body that may damage nearly any tissue. Global estimates from the year 2000 signalize that 564,000 patients with cancer were recorded per year. Includes 398,000 men and 166,000 women. Hepatic cancer continued as 5th commonest cancers in males and the 8th in females, where the males are usually 2-4 times higher than females (Bosch et al., 2004).

The most prevalent malignancies in men are lung and stomach cancers, whereas the most common cancers in women are breast and cervical cancer. Cancer kills 7.6 million people globally, accounting for 13percent of all fatalities (WHO, 2007). In Iraq, specifically the Middle Euphrates, (18587) new cases of cancer were recorded in 2020 in Najaf Governorate and (24,444) in 2021 (Najaf Health Department statistics).(610) cases of various cancers were recorded for the year 2020 in Al-Diwaniyah Governorate, and (730) cases were recorded for the year 2021(Statistics of the Diwaniyah Health Department).

In the holy governorate of Karbala, (3400) cases of cancer were recorded for the three years 2019, 2020 and 2021 (Statistics of the Holy Karbala Health Department). All units in the hospital are responsible for the safe management of cytotoxic medications, and a multi - disciplinary approach must be followed. In terms of cytotoxic reconstituted and administration, the goods and equipment used will have a significant influence on everyday practice. The pharmacy plays a critical role in the selection of these items and/or technologies (ISOPP,2007). As generally, it is apparent that safe handling procedures do not end at the pharmacy's door. Any method used in the pharmacy during the manufacturing of cytotoxic medications that might lead to contamination outside the pharmacy must be prohibited.

Nurses may be subjected to a diluted product of a commercial cytotoxic substance. Nurses will come into touch with the pure concentrated cytotoxic medicine if bags or syringes made in the pharmacy are contaminated on the exterior surfaces. When nurses break tablets or open capsule, the same thing happens. Nurses potentially come into touch with diluted drugs produced in the pharmacy while connecting or disconnecting the bag or syringe from the administration equipment. The disconnecting operation poses a risk to nursing workers, hence it's best to employ a containment container for administration. An IV bag holding a cytotoxic medication must not have tubing removed. Disconnect tubing from other parts of the system until it has been completely cleansed with a non-toxic solution. If at all feasible, keep the IV bag and tubing intact. Before leave the medication administration location, wash your hands with water and soap (ISOPP ,2007).

Because of their usefulness in the cancer treatment and other disorders, cytotoxic treatments have been routinely employed in clinical settings for a decade. These systemic therapies may have both short and long effects across the body,

depending on the dosages and combination of medications administered. Nausea, vomiting, stomatitis, diarrhea, anorexia, bone marrow depression, alopecia, risk of infertility, lethargy, renal toxicity, and heart toxicity are some of the most prevalent adverse effects. (American Society of Clinical Oncology,2017).

Routes in which the cytotoxic drugs administered are intravenous, oral, intramuscular, subcutaneous, or may be injected locally into the fluid around the spine or into body cavity such as bladder. Chemotherapy creams may be used for some skin cancers (Cancer Council Victoria, 2014).

Objectives of the study:

The objectives of the study directed to:
1-Assess nurses practices for safe preparation and administration of cytotoxic drugs in the oncology teaching hospitals.

Methodology
Study design:

Descriptive – observational study design is choice to specific phenomena of interest related to assessing safe handling practices for nurses who working in oncology units , from the period between 11/Oct.2021 to 1 Apr. 2022.
Setting:

The study has been conducted in oncology center in the following teaching hospitals in in Middle Euphrates Oncology Teaching Hospitals(Al.Dewanya, Al.Hussenei,Margan medical city, Al.Imam Sadeq and **"**Middle Euphrates cancer center in Al-Najaf AL-Ashraf city":

Sample of the study

Purposive sample of (125) nurse who work in the oncology unit were studied to participate in the study

Data collection checklist

In order to assess the practices of safe handling for cytotoxic drugs for nurses who work in the oncology center, special checklist prepared after comprehensive reviewing of related literature. Standard infection control measures practices adopted from (guideline of chemotherapy) after modification to make it suitable for oncology unit nurse. This checklist divided to three parts as: three points Likert scale level used as a pattern of rating (always ,sometimes and never) in order to assess the level of the nurses practices related to safe handling of cytotoxic drugs in the oncology unites. The adopted scoring system which used is: (always =3, sometimes =2 and for never=1).

Pilot study

A preliminary study conducted between 15 of Jun to 20 of Jun 2022, to determine the reliability of the checklist. (10) nurses who work in the Al.Diwanya oncology

center included in this study, after obtaining their agreement to participate in the study, each participant expose to three observation from three observer at the same time. Those (10) nurses alienated from the original sample. Statistical reliability estimated as (r:0.98).

Ethical consideration

Ethical consideration in quantitative research is one of the most important elements, this type of researches commonly use of human subjects. Ordinarily the consent may be obtained verbally (oral or written), count on the nature of the study, this kind of an ethical grade may protect confidentiality and dignity of the study subjects. for this reason formal consent form applied for each participant after explaining the research objectives in order to obtain their formal agreement.

Results

Table (1)
Distribution of the study sample related to their demographical characteristics

Variables		frequency	Percentage %
Age	20-30	105	84.0
	31-40	9	7.2
	41-50	11	8.8
Total		125	100%
Gender	Male	38	30.4
	Female	87	69.6
Total		125	100%
Level of Education	Secondary	45	36.0
	Diploma	52	41.6
	College and postgraduate	28	22.4
Total		125	100%
Marital Status	Single	59	47.2
	Married	63	50.4
	Separated	3	2.4
Total		125	100%
Residency	Urban	31	24.8
	Rural	94	75.2
Total		125	100%

Table (2):
Distribution of the study sample related to their employment characteristics

variables		frequency	Percentage %
Years of Experience	1 to 10 years	81	64.8
	11-20	14	11.2
	21-30	30	24.0
	5 years or less	50	40.0
	6-10	33	26.4

Years of Experience in Oncology	11-15	12	9.6
	16-20	30	26.4
Formal training in safe handling of chemotherapeutic drugs	yes	96	76.8
	no	29	23.3
	Total	125	100%

Table (3):
Practices of the study samples related to preparation of chemotherapy (cytotoxic)

No.	Items	Always Do		Sometimes Do		Never Do		Mean ±SD	Level
		F	%	F	%	F	%		
1	Receipt of medicines from the pharmacy in closed containers	13	10.4	52	41.6	60	48.0	1.62±0.668	Poor Practice
2	It separates other drugs from chemotherapy drugs	29	23.2	50	40.0	40.0	36.8	1.86±0.766	Fair Practice
3	Gather the tools needed to prepare the medicine	69	55.2	44	35.2	12	9.6	2.46±0.666	Good Practice
4	Choose the appropriate gloves for preparing the chemotherapy drug	19	15.2	48	38.4	58	46.4	1.69±0.723	Fair Practice
5	Wearing gloves while preparing medication	57	45.6	53	42.4	15	12.0	2.34±0.683	Fair Practice
6	Wear a gown when preparing the medication	63	50.4	62	49.6	0	0	2.50±0.502	Good Practice
7	Use eye protection goggles	0	0	0	0	125	100.0	1.00±0.000	Poor Practice
8	Take off gloves after every medication	14	11.2	46	36.8	65	52.0	1.59±0.685	Poor Practice
9	Wear mask throughout the preparation process	0	0	0	0	125	100.0	1.00±0.000	Poor Practice

10	Wipe bottles and ampoules with an alcohol swab after removing the outer cap	0	0	0	0	125	100.0	1.00±0.000	Poor Practice
11	Review the prescription of medicines after preparation	44	35.2	69	55.2	12	9.6	2.26±0.621	Fair Practice
12	Separate chemotherapy waste from other waste	10	8.0	56	44.8	59	47.2	1.61±0.634	Poor Practice
13	Uses a container designated for chemotherapy waste collection	62	49.6	45	36.0	18	14.4	2.35±0.721	Fair Practice
Total								1.79±0.512	Fair Practice

MS (Poor Practice =1-1.6, Fair Practice = 1.7-2.3, Good Practice = 2.4-3)

Table (4)
Practices of study sample related to administration of cytotoxic drugs (intravenous infusion)

No.	Items	Always Do		Sometimes Do		Never Do		Mean ±SD	Level
		F	%	F	%	F	%		
1	Hand washing	23	18.4	41	32.8	61	48.8	1.70±0.764	Fair practice
2	wearing a medical gown	50	40.0	44	35.2	31	24.8	2.15±0.794	Fair practice
3	wear a face mask	0	0	0	0	125	100.0	1.00±0.000	Poor Practice
4	wearing gloves	80	64.0	45	36.0	0	0	2.64±0.482	Fair practice
5	Removing the cap from the intravenous tubing and connecting it to the venous cannula	92	73.6	27	21.6	6	4.8	2.69±0.560	Fair practice
6	Cover the infusion tube and the medicine container with a cap when the drug is photosensitive	38	30.4	69	55.2	18	14.4	2.16±0.653	Fair practice
7	Use a clean bandage to protect the patient's skin from	1	.8	47	37.6	77	61.6	1.39±0.506	Poor Practice

	infusion drops								
8	Verify the tightness of the intravenous cannula cover after the drug infusion has finished	29	23.2	68	54.4	28	22.4	2.01±0.678	Fair practice
9	Assessment of the patient's condition while administering the drug	21	16.8	60	48.0	44	35.2	1.82±0.700	Fair practice
10	Use of yellow waste bags for disposal (gloves, bra, intravenous infusion equipment)	48	38.4	56	44.8	21	16.8	2.22±0.714	Poor Practice
11	Use a yellow plastic container (sharps) to collect syringes, packages and needles	12	9.6	71	56.8	42	33.6	1.76±0.614	Fair practice
Total								1.957±0.587	Fair Practice

MS (Poor Practice =1-1.6, Fair Practice = 1.7-2.3, Good Practice = 2.4-3)

Table (5.):
Practices of study sample related to administration of cytotoxic drugs (intramuscular injection)

No	Items	Always Do		Sometimes Do		Never Do		Mean ±SD	Level
		F	%	F	%	F	%		
1	Sterilization of the injection area	61	48.8	46	36.8	18	14.4	2.34±0.720	Fair Practice
2	wear a face mask	00	00	00	00	125	100.0	1.00±0.000	Poor Practice
3	wear gown	54	43.2	70	56.0	1	0.8	2.42	Good Practice
4	wear gloves	58	46.4	67	53.6	00	00	2.46±0.666	Good Practice
5	Sterilization of the injection area	6	4.8	49	39.2	41	70	1.49±0.590	Poor Practice
Total								1.94±0.464	Fair Practice

MS (Poor Practice =1-1.6, Fair Practice = 1.7-2.3, Good Practice = 2.4-3)

Table (6)
Practices of study sample related to oral administration of cytotoxic drugs

No.	Items	Always Do		Sometimes Do		Never Do		Mean ±SD	Level
		F	%	F	%	F	%		
1	wear gloves	63	50.4	62	49.6	00	00	2.50±0.502	Poor Practice
2	Put the treatment in a cup designated for this purpose	6	4.8	00	00	119	95.2	1.10±0.429	Poor Practice
3	Avoid touching the medicine directly by hand	00	00	41	32.8	84	67.2	1.33±0.471	Poor Practice
Total								1.64±0.467	Poor Practice

MS (Poor Practice =1-1.6, Fair Practice = 1.7-2.3, Good Practice = 2.4-3)

Table (7)
Correlation between overall practices of the Nurses and their demographical characteristics

No.	Parameters	*r*	P value
1	Overall practice Gender	-0.293	0.001 NS
2	Overall practice Age	-0.205	0.022 NS
3	Overall practice Level of Education	- 0.009	0.917 S
4	Overall practice Marital Status	0.045	0.617 NS
5	overall practice Residency	0.033	0.718 NS

P. probability ≤ 0.05

Table (8)
Correlation between overall practices of the Nurses and their employment characteristics

No.		*r*	P
1	Overall practice Years of Experienced	*-.127*	*0.159*
2	Overall practice Years of Experience in oncology	*-.021*	*0.812*
3	Overall practice Formal training	*-.216*	*0.016*

P. probability ≤ 0.05

Discussion

During the data analysis path, the results in (tab.1) point out, that abouts (84.0%) of all participants were between (20-30) years old,87 (58.4%) were female .Regarding the educational level most of the sample (41.6%) were with high educational level (Institution).The results shows that most of the sample (50.4%) were married, Egyption study carried out by Nglaa,2018 which interested with Nurses' Performance Regarding Chemotherapy Administration in the Clinical setting Illustrated that (53.3%) of the studied nurses age was ≤30years with a mean 29.8±3.92, (86.7%) of them were female, (83.3 %) were married, (50.0%) diploma nursing holder.

Most of the nurses in these vital area were almost gone-to- middle adult age ,these areas need physical strength pulse proper educational preparation which clearly appears in the results . Table (2), regarding to the years of experience the results show that (64.8%) have (1 to 10) years of experience which almost all of them spent (5 or less) years in the oncology unit, This finding in the same line with Abd Al-Magid, Mohammed, Abd El latef& Mohammed, (2012) who found that more than half of nurses had more than five years of experience in the study that titled ''nursing care standards for cancer patients undergoing chemotherapy''.

Table (3), represent that most of the study sample shows fair practice regarding preparation of chemotherapy (cytotoxic)drugs which considered as key element of handling of cytotoxic medications in a safe manner, as regards the total nurses' practice, the present study showed that majority of the studied nurses had unsatisfactory level of practice regarding chemotherapy , This was similar to a study by Shahrasbi et al.,2014 which reported high level of use of PPE, concluded that adequate supply of hand rub solutions, and training program does not ensure adequate performance of hand antisepsis still this issue needs focus program to improve adherence.

Table (4).This table shows that majority of the healthcare providers who participate in the study administration (intravenous infusion)fair , in Egypt study carried by Nglaa,2018 Illustrated that, 20% of the studied nurses had satisfactory level of total practice regarding chemotherapy administration, while 80%ofthe studied nurses had unsatisfactory level of total practice regarding chemotherapy administration.

Table (5). This table is regarding Practical level of the study sample related to chemotherapy administration (intramuscular injection). and the results represent fair practice, but when we discuss each item of the table separately there are (3) important items regarding the safe handling . (2) items records a good practice which focused upon the PPE, this study goes parallel with a study published in Grand Valley State University, carried out by Cheryl A,2015, who assess the knowledge and practices of the healthcare workers, the result of the study shows that nearly (51%) of the study sample were with poor practice regarding drug administration.

The researcher point of view related to safe handling of chemotherapy drugs during its administration standard actually have two integrated direction ,the first

–one is depend on the knowledge and practices related to fundamentals of medication administration steps, while the other direction is focused up on safe steps to prevent harm for patient and nurses who deal directly with those harmful drugs uch as ensure to use PPE properly ,using drops to protect skin from drug drops ,disposing waste products ,for this reason the nurses who involved to chemotherapy drugs administration as routine daily work need to receive specific knowledge to proper handling to maintain their selves and patients from risks.

Table (6). This table revealed that (100%) of the nurse who work in the oncology units recorded poor level of practice related to Practical level of the study sample related to oral administration of chemotherapy drugs. In a study conducted by Yaakub in Nairobi in 2016 on knowledge and practice on proper handling of cytotoxics among healthcare workers at Kenyatta National Hospital, it was discovered that nearly a 1/4 of the respondents expressed touching cytotoxic tablet with their hands when administering cytotoxic. This might be due to a lack of understanding of how to handle oral chemotherapy, as demonstrated in a comparable study in which only 25percent of participants were aware of the particular handling technique.

Table (7) shows that there is no significant relationships between the nurse practices with respect to safe handling of cytotoxic drugs and their demographical characteristics related to (gender, educational level, marital status and residency) in P value ≤ 0.05, while significant relationship founded between nurse practices and their age, and table (8) represent that there is no relationship between the nurses practices and the study sample years of experience in the field, while significant relationship found between the practice and formal training were distributed in P value ≤ 0.05, According to a research conducted by Desta Naglaa Elsayed Mahdy in Egypt in 2018, with regards to the obstacles or variables influencing the use of safety procedures when handling cytotoxic medications. Despite the fact that nurse are the person who is accountable for preparing and administrating these drug, the study found that nearly half of the nurses surveyed believe that there is insufficient in-service training and education regarding proper handling of cytotoxic agents provided by the cancer center's administrative staff, they all claimed that no standard rules for cytotoxic safe handling procedures are accessible at work. More than 3/4 of nurses said they were ignorant of proper cytotoxic medication handling procedures. While Yaakub (2016) found no statistically significant relationship relationship between demographic demographic factors and practice in Nairobi, the results of a fishers exact test relating the practice score to different demographic characteristics revealed no statistically significant relationship between demographic factors and practicing.

One of the reasons for these results from the requirements for the safe treatment of cytotoxic drugs is knowledge and training of specialists, to achieve these results, it is necessary to intensify educational and training programs within the planning and gradation of health and nursing staff, in addition to the current conditions that have passed through the world as a result of the Corona epidemic, which negatively affected the provision of protective equipment Personality, while the need to measure performance for long and repeated periods to reach an

acceptable level aims to improve the level of nurses' practices and thus reduce complications for the patient and the nurse.

Conclusion

Most of the study sample who agree to participate in the study were female, married, between (20-30) years of age, diploma holder and rural area resident. The majority of the study sample were nurses who have an experience in the oncology unit with ≤ 5 years.

Regarding the nurses practices with respect to the safe preparation and administration of cytotoxic drugs during their daily caring in the oncology units the statistical results recorded moderate level of practices. No significant relationships found between the nurses practices and their demographical characteristics related to (gender, educational status, residency and marital status) except their age. Significant relationship found between the nurses practices and the training courses, while no relationship found between their years of experience and practices.

Recommendation

1.a special manual focused on the policy, practices of safe handling of cytotoxic drugs should be prepared and distributed to the oncology departments which provide direct care to the patients to improve the nurses competence related to safety measures.
3- Further study may be carried out to assess the impact of cytotoxic drugs on the nurses health status.

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