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Assessment of Nurses' Performance in Caring for Cancer Patients in Kirkuk City: a Cross Sectional Study

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Abstract: Cancer is considered one of the major issues in the twenty-first century. It's one of the leading causes of death and a barrier to life expectancy, globally. Its burden expected to increase worldwide from 2020 and throughout the first half of the 21st century. Nurses as one of the medical team are considered at the frontline in mitigating this increasing, through their contributions in patients care with their diversity of care roles and responsibilities in cancer care. This study aimed to assess oncology nurses level of performance in cancer care in Kirkuk City. a descriptive (cross sectional) design conducted at Oncology and Hematology Center in Kirkuk City, Iraq. An observational checklist used to collect data of 81 nurse in the time line between February 15th, 2025 to March 27th,2025. nurses showed an overall weak adherence to cancer care protocols in general(PGMS=24.28%), where nurses scored low levels in both the " Supportive and psychological nursing care" and "Nursing care throughout chemotherapy treatments" with a Percentile Grand/Global Mean of Score (PGMS) of 8.80%,and 8.82% respectively; while they showed a moderate level in regard to "Nursing care prior to handling chemotherapeutic agents", (PGMS=56.02%). No relationship accounted between Nurses' performance level and the studied respondent's socio-demographics(age, educational background, and years of experience), since no significant a contingency coefficients are accounted at P>0.05, except in regard of gender variable (CC = 0.249) at the value of P < 0.05,showing a better advantage for male over females. The findings indicates a weak adherence to the protocols regarding cancer patient care, indicating the need for further focus on the provision of continuous trainings. Furthermore, the findings of the study allow us to make the assumption that nurses' age , educational qualification, and experience doesn't necessarily have to play a significant role in the evaluation of nurse competence and quality of nursing care provided in all of the environments.

Keywords: Nurses' Performance, Cancer Care, Oncology Nursing, Kirkuk City, Cross-Sectional

Introduction

The Cancer represents one of the major global health challenges, considered as a leading cause of death and a barrier to growing life expectancy in every country worldwide, with 18.1 million new cases and 9.6 million deaths reported in 2018 only(Bray et al., 2021; Leal, 2021), and an estimated 19.3 million new cases and 10 million deaths in 2020 alone (World Health Organization [WHO], 2020). Estimates suggests that the increase by 2040 could rise to 47% increase from 2020, nearly 48 million cases (Sung et al., 2021). Iraq, has

also experienced a share of the burden of cancer cases in the past few years, especially with breast, lung and colorectal cancers(Ibraheem, Kamal, & AlShadood, 2022; Mohammed A., et al., 2023; Mohammed Ibraheem, N., Qahtan Alrawi, N., & Banoosh, A. K. A. 2021).The disease journey doesn't lack of challenges and complications that significantly affect patients' health outcome and quality of life, regardless of whether they arise from the disease process itself or the treatment process, encompassing all the dimensions (physical, psychological, and social dimensions), (Kędra & Wiśniewski, 2018). Nurses' role appears evident in this context, as oncology nursing field plays a fundamental role throughout the treatment course of cancer patients. Their role becomes marked in early recognition of the signs and symptoms and side effects, which further helps in improving the outcomes of the cancer patients(Li P., et al, 2018). Oncology nurses are not only responsible for clinical care, their role extends to include a holistic care involving the provision of physical, psychological, social, and spiritual aspects for patients throughout their journey with the disease (Aljohani et al., 2024). Studies have shown a positive correlation between nurse competence and patient safety scores (Kalsoom et al., 2022; Zaitoun et al., 2023). Further, high quality care provided has been linked to decrease of anxiety and depression, significantly in shortening hospital stay, improve postoperative inflammation, and enhance the overall quality of life compared to typical nursing care(Wang, M.,2022).

In order to meet that level of quality of care provided, nurses required to be well known with their responsibilities, oncology nurses need to be familiar with the treatments and medications associated with cancer care in order to ensure safe administration, monitor for adverse effects, educate patients effectively, and contribute to multidisciplinary decision-making practices that enhances treatment outcomes. Moreover, educating patients and family members about treatments and self-care, and provide emotional support to patients and their families are involved as core competencies required. Their responsibilities also extends to include coordinating with other healthcare professionals, including oncologists and social workers in order to coordinate patient care. In addition, they must be aware of the latest research advancements in the field of cancer care and treatments, which is an important part to remain knowledgeable on up-to-date related care standards(AAMCN, 2025; Oldland et al., 2020). Nursing supportive care for patients and their families extends to professional psychosocial and spiritual care throughout the disease trajectory, and as one of the primary caregivers, often they become one of the most trusted persons for patients, therefore, their responsibility further focuses onto working on detecting the concerns and requirements, use communication skills properly, provide the information needed, guide in decision making, support patient's right in involvement in a treatment and care plan consistent with their value and preference in order to support more sense of self-control and less psychological distress(Lu Y., 2022). In the context of Kirkuk city, previous studies exploring nurses' knowledge regarding cancer showed a good level of knowledge in regard breast cancer and its treatments (Baez, Y. K., 2014), while Abdullah, D.A., & Rasheed, O.H., in 2018, explored the knowledge of nurses in regard to administration of chemotherapy at Kirkuk oncology and hematology center. Their findings indicated that nurses knowledge levels are inadequate in regard chemotherapy administration. Furthermore, nurse and patient communication strategies has shown to be classified as dissatisfying by patients, indicating a weak capability by nurses in this

area(Dia'a, A. L., & Ibrahim, R. H.,2016). In order to ensure the improvement of quality care provided, ongoing assessments and education is required in regard the essential competencies needed in the field and that's to ensure optimal proficiency held by nurses and optimal patient outcome (Janssens et al. (2024). In light of the vital role nurses fulfill in this context, assessing nurses' competencies becomes crucial for standing on the current weakness areas in competency, to be further targeted by targeted training programs and continuous education in order to improve the nursing staffs capabilities and patient outcome. Therefore, the present study evaluates nurses adherence to the basic competencies required in cancer care.

Methodology

Design and Setting

A descriptive, cross sectional study was conducted at Oncology and Hematology Center in Kirkuk City.

Sample

A purposive(non-probability) sample of 81 nurses was included from Oncology and Hematology Center, the only specialized institution providing cancer care in Kirkuk city at the time of the study conduction.

Inclusion Criteria

Nurses of both sexes(males and females) ,working across both day and night shifts at Kirkuk Oncology and Hematology Center and holding at least a diploma degree in nursing.

Exclusion Criteria

Nurses who aren't willing to participate, those on leave during the data collection period, and individuals holding managerial roles that are not directly involved in nursing care.

Methods of Data Collection

A self-structured checklist was developed basing on previous literature review(Barbour-Taylor et al., 2024; Lee, 2025; Mitsu, 2018; Vera, 2024; Vorvick et al., 2024; Wagner, 2023). The tool consists of two sections, the first one includes the socio-demographic data of the participants, while the second part(observational checklist), is deliberated to assess the nursing staff performance level in regard to cancer care in three main areas: (A) Nursing care before handling chemotherapeutic agents, (B) The nursing care done when patient is receiving chemotherapy, and(C) Supportive and psychological nursing care rendered by the oncology nurse for patient with cancer.

The Content Validity of the Tool and Reliability

In order to check validity, the instrument presented to a panel of eleven experts in different fields. The experts divided into eight members from Nursing College, University of Kirkuk, and a three consultants from Kirkuk Oncology and Hematology Center, Ministry of Health. Results of the reviewing revealed an overall approval. Minor changes were made according to the experts suggestions, such as simple rewrite of certain items. While

regarding the reliability, a sample of ten nurses were involved. Results showed that the reliability coefficient for studying of observed responding was verified.

Data Analysis

- The Statistical Package for Social Science (SPSS) version 22.0 was used for data analysis.
- descriptive and inferential data analysis (Mean, Standard Deviation, Frequency, Percentage, Relative Sufficiency (RS%), Percentile Grand/Global Mean of Score (PGMS), Percentile Pooled Standard Deviation (PPSD), Percentile Pooled Standard Error (PPSE), Minimum, and Maximum values of PGMS, Contingency Coefficients test) were employed. Reliability Coefficient used for the Pilot study by using Al-Naqeeb Formula (Al–Naqeeb, 2007(.
- The observation encompasses the following scale: (seen = 1), (not seen and a gap in performance = 0). The "gap in performance" was given zero in scoring to narrow the focus and determine whether the procedure was applied correctly or not applied at all. This binary structure is essential, particularly since cancer care should be provided in full accordance with the procedural standards.

Ethical Consideration

Official approvals were obtained from the relevant authorities, including the Committee of the College of Nursing at the University of Kirkuk, and the Directorate of Health in Kirkuk, and the Kirkuk Center for Oncology and Hematology.

Result and Discussion

Table 1. Socio-Demographical Characteristics (N=81)

Socio-Demographical Characteristics variables	Groups	No.	%
Age Groups	20 _	40	49.4
Yrs.	25 _	21	26.0
	30 _	8	9.9
	35 _	4	4.9
	40 _	4	4.9
	45 _ 50	4	4.9
Gender	Male	38	46.9
	Female	43	53.1
Educational Level	Diploma degree	76	93.8
	Bachelor's degree	5	6.2
Years of experience as a nurse	1 _ 5	63	77.8
	6 _ 10	6	7.4
	11 _ 15	6	7.4
	16 _ 20	5	6.2
	≥ 21	1	1.2
Years of experience in cancer	1 _ 5	73	90.1
care	6 _ 10	7	8.6
	11 _ 15	1	1.2
position in the ward	Nurse (care giver)	80	98.8
	Nurse (preparation therapy)	1	1.2
shift	Morning	39	48.1
	Night	42	51.9

Table 1A, shows that more than two-thirds of the nurses are under thirty years old(75.4%). The sample is nearly evenly split between male and female participants (46.9% and 53.1%, respectively), with the majority holding a diploma in nursing (93.8%). About three-quarters have less than six years of experience in nursing (77.8%), and most have less than six years of experience in cancer care (90.1%). Most participants serve as caregiver nurses (98.8%). The distribution is nearly equal between morning (48.1%) and evening (51.9%) shifts.

Table 2. Training courses (N=81)

Training Courses			Groups	No.	%
Course's Contents	*Received trainings regarding cancer care?*		*Yes*	*50*	*61.7*
			No	*31*	*38.3*
	Number of received training courses		*One*	*17*	*34*
			Two	*22*	*44*
			Three	*11*	*22*
	Chemotherapy administration	*.1*	*No*	*27*	*54*
			Yes	*23*	*46*
	Breast cancer	*.2*	*No*	*41*	*82*
			Yes	*9*	*18*
	Cancer in general	*.3*	*No*	*36*	*72*
			Yes	*14*	*28*
	Personal Protective Equipment(PPE)	*.4*	*No*	*48*	*96*
			Yes	*2*	*4*
	Electrocardiogram	*.5*	*No*	*37*	*74*
			Yes	*15*	*30*
	Central Venous Catheter	*.6*	*No*	*49*	*98*
			Yes	*1*	*2*
	Medical waste treatment	*.7*	*No*	*49*	*98*
			Yes	*1*	*2*
	Administrative topics and computer science	*.8*	*No*	*43*	*86*
			Yes	*7*	*14*

Table 2, shows that most of the participants have attended training courses(61.7%), and the majority of them have completed two courses (44%).The most frequently attended training was on chemotherapy administration (46%).

Table 3. Nursing Care before Handling Chemotherapeutic Agents (N=81)

Items		*Responses*	*No.*		*%*		*MS*	*SD*	*RS %(*)*
Wear disposable latex gloves	*.1*	*Not Seen*	*15*	*75*	*18.5*	*92.6*	*0.07*	*0.26*	*7.41 L*
		Gap in Performance	*60*		*74.1*				
		Seen	*6*		*7.4*				
Mask to cover nose and mouth	*.2*	*Not Seen*	*38*	*40*	*46.9*	*49.4*	*0.51*	*0.50*	*51.0 M*
		Gap in Performance	*2*		*2.5*				
		Seen	*41*		*50.6*				
Wear eye protectors	*.3*	*Not Seen*	*80*	*80*	*98.8*	*98.8*	*0.01*	*0.11*	*1.23 L*
		Gap in Performance	*0*		*0.00*				
		Seen	*1*		*1.2*				
Avoid spills of drugs	*.4*	*Not Seen*	*1*	*4*	*1.2*	*4.9*	*0.95*	*0.22*	*95.0 H*
		Gap in Performance	*3*		*3.7*				

Items		*Responses*	*No.*		*%*		*MS*	*SD*	*RS %(*)*
		Seen	*77*		*95.1*				
Aerosolization when drawing up from a vial	*.5*	*Not Seen*	*1*	*2*	*1.2*	*2.5*	*0.98*	*0.16*	*98.0 H*
		Gap in Performance	*1*		*1.2*				
		Seen	*79*		*97.5*				
Expel excess drugs from syringes into air	*.6*	*Not Seen*	*0*	*2*	*0.00*	*2.5*	*0.98*	*0.16*	*98.0 H*
		Gap in Performance	*2*		*2.5*				
		Seen	*79*		*97.5*				
Dispose of needles, syringes and other sharps directly in special containers	*.7*	*Not Seen*	*0*	*66*	*0.00*	*81.5*	*0.19*	*0.39*	*19.0 L*
		Gap in Performance	*66*		*81.5*				
		Seen	*15*		*18.5*				
Always be familiar with the drugs	*.8*	*Not Seen*	*3*	*16*	*3.7*	*19.8*	*0.80*	*0.40*	*80.0 H*
		Gap in Performance	*13*		*16*				
		Seen	*65*		*80.2*				

(*) Evaluate Score: Low (L) (00.00 – 33.33); Moderate (M) (33.34 – 66.66); High (H) (66.67– 100). Scoring Scales: Not Seen, Gap In Performance(0); Seen(1).

Table 3 presents data on nurses' performance in providing nursing care prior to handling chemotherapeutic agents. The findings indicate that half of the participants demonstrate a high level of performance in items 4, 5, 6, and 8, with relative sufficiency (RS) scores ranging from 80% to 98%. In contrast, the remaining half exhibit moderate to low performance levels. Specifically, item 2 reflects a moderate performance level with an RS of 51%, while items 1, 3, and 7 fall within the low-performance category, with RS scores ranging from 1.23% to 51%, and as low as 19%.

Table 4. Nursing Care Done when Patient is Receiving Chemotherapy (N=81)

Items			Responses	No.		%		MS	SD	RS%
2.1 Identification of infection										
2.1.1 Inspect skin and mucus membranes daily especially:	((Mouth))		Not Seen	80	81	98.8	100	0.00	0.00	0.00 L
			Gap in Performance	1		1.2				
			Seen	0		0.00				
	((Axilla))		Not Seen	81	81	100	100	0.00	0.00	0.00 L
			Gap in Performance	0		0.00				
			Seen	0		0.00				
	((Perineum))		Not Seen	81	81	100	100	0.00	0.00	0.00 L
			Gap in Performance	0		0.00				
			Seen	0		0.00				
2.1.2 Auscultate Respiratory Rate			Not Seen	81	81	100	100	0	0.00	0.00 L
			Gap in Performance	0		0.00				
			Seen	0		0.00				
2.1.3 M	Temperature	.a	Not Seen	37	37	45.7	45.7	0.54	0.50	54.0

		Gap in Performance	0		0.00				M
		Seen	44		54.3				
	Pulse .b	Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
	Respiration .c	Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
2.1.4 Monitor neutrophil count :	A count of 500 to 1000/mm3 indicates moderate risk of infection .a	Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
	Account of less than 500/mm3 indicates sever risk of infection .b	Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
2.2 Assessment of fever:									
Assessment of fever and signs of infection:	If fever is ≤38 C comfort measure are provided .a	Not Seen	2	74	2.5	91.4	0.09	0.28	8.64 L
		Gap in Performance	72		88.9				
		Seen	7		8.60				
	If is ≥ 38 C the physician should be notified .b	Not Seen	2	75	2.5	92.6	0.07	0.26	7.41 L
		Gap in Performance	73		90.1				
		Seen	6		7.40				
2.3 Nursing care for stomatitis :									
2.3.1 Observe dry mouth		Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
2.3.2 Observe bleeding gum		Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
2.3.3 Provide mouth care every 4 to 6 hours with normal saline		Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
2.3.4 Avoid lemon or glycerin swabs		Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				
2.3.5 Apply topical viscous anesthetic as lidocaine before meals as ordered		Not Seen	81	81	100	100	0	0.00	0.00 L
		Gap in Performance	0		0.00				
		Seen	0		0.00				

2.3.6 Consult dietitian to provide blend of food at medium temperature	Not Seen	81	81	100	100	0	0.00	0.00 L
	Gap in Performance	0		0.00				
	Seen	0		0.00				

(*) Evaluate Score: Low (L) (00.00 – 33.33); Moderate (M) (33.34 – 66.66); High (H) (66.67– 100). Scoring Scales: Not Seen, Gap In Performance(0); Seen(1).

Table 4, sample's performance in nursing care during chemotherapy. Among the evaluated items, only "Monitor Regularly the Body Temperature" reflects a moderate level of performance (54%). while, all the remain show low performance levels, ranging from 0.00% to 8.64%. Within the "Assessment of Fever" subdomain, performance remains low, with scores of 8.64% and 7.41%. Additionally, all items under the "Nursing Care for Stomatitis" subdomain register a low performance level of 0.00%.

Table 5. Supportive and Psychological Nursing Care Rendered by the Oncology Nurse for Patients with Cancer(N=81)

Items	Responses	No.		%		MS	SD	RS%
.1 Explain the expected outcome and side effects for chemotherapy	Not Seen	57	79	70.4	97.5	0.02	0.16	2.47 L
	Gap in Performance	22		27.2				
	Seen	2		2.5				
.2 Encourage verbalization and identification of fears	Not Seen	33	67	40.7	82.7	0.17	0.38	17.0 L
	Gap in Performance	34		42				
	Seen	14		17.3				
.3 Help patient to explore ways to cope with fear	Not Seen	38	67	46.9	82.7	0.17	0.38	17.0 L
	Gap in Performance	29		35.8				
	Seen	14		17.3				
.4 Assess spiritual needs	Not Seen	58	78	71.6	96.3	0.04	0.19	3.70 L
	Gap in Performance	20		24.7				
	Seen	3		3.7				
.5 Offer support by active listening	Not Seen	22	72	27.2	88.9	0.11	0.32	11.0 L
	Gap in Performance	50		61.7				
	Seen	9		11.1				
.6 Offer hope in some form, and being there for patient and relatives	Not Seen	23	71	28.4	87.7	0.12	0.33	12.0 L
	Gap in Performance	48		59.3				
	Seen	10		12.3				

(*) Evaluate Score: Low (L) (00.00 – 33.33); Moderate (M) (33.34 – 66.66); High (H) (66.67– 100). Scoring Scales: Not Seen, Gap In Performance(0); Seen(1).

Regarding nurses' performance in supportive and psychological nursing care, the results of Table 3B reveal a generally low level across all assessed items, with scores ranging from 2.47% to 17%. The highest performance(17%) is observed in the items "Encourage verbalisation and identification of fears" and "Help the patient to explore ways to cope with anxiety" . For the remaining items, performance levels do not exceed 12%.

Table 6. Descriptive Statistics of Nurses' performance in Caring for Patients with Cancer

Domains	No.	PGMS	PPSD	PPSE	Min.	Max.
1 Nursing care before handling chemotherapeutic agents	81	56.02 M	13.42	1.49	12.5	100
2 The nursing care done when patient is receiving chemotherapy	81	8.80 L	9.97	1.11	0.00	37.5
3 Supportive and psychological nursing care rendered by the oncology nurse for patient with cancer	81	8.02 L	18.15	2.02	0.00	75.0
Nurses' Competencies in Caring for Cancer Patient (performance)	81	24.28 L	8.88	0.99	8.33	50.0

(*) Evaluate Score: Low (L) (00.00 – 33.33); Moderate (M) (33.34 – 66.66); High (H) (66.67– 100)

Table 6. shows an overall low level of performance in caring for cancer patients(PGMS: 24.28%), similarly, a low level in both the domains of nursing care done when patient is receiving chemotherapy and Supportive and psychological care(PGMS: 8.80% and 8.02%), respectively. While nursing performance shows a moderate level in " Nursing care before handling chemotherapeutic agents", accounting at 56.02%.

Figure 1. Bar Charts illustrated graphically distribution of the studied sampling population with respect to Grand/Global mean of score for the studied nurses' staff concerning of studied Nurses' Performance domains.

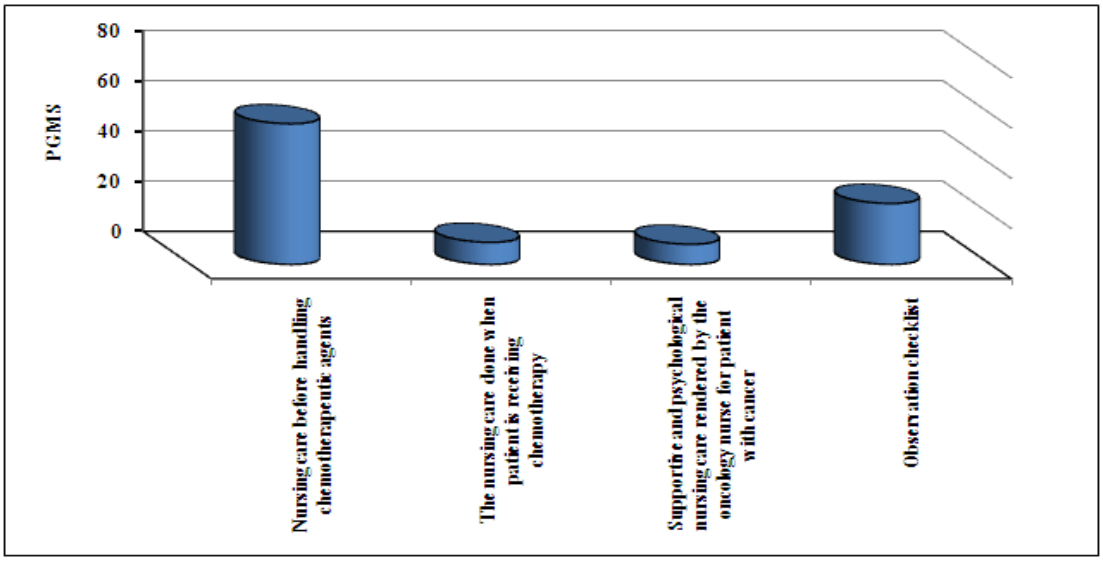

Figure 1. Studied Sampling Population Performance in Caring for Patients with Cancer

Table 7. Relationships between Nurses' Performance Levels in Caring for Cancer Patients with the Studied Respondent's Socio-Demographical Characteristics Variables

Socio-Demographical Characteristics variables	Groups	Observational checklist(performance)				
		≤ Md		> Md		C.S. P-value
		No.	%	No.	%	
Gender	Male	22	38.6	16	66.7	CC = 0.249
	Female	35	61.4	8	33.3	P=0.021 S
Age Groups Yrs.	20 _	31	54.4	9	37.5	CC = 0.275
	25 _	15	26.3	6	25.0	P=0.251
	30 _	6	10.5	2	8.3	NS
	35 _	1	1.8	3	12.5	
	40 _	2	3.5	2	8.3	
	45 _ 50	2	3.5	2	8.3	
Educational Qualification	Diploma	55	96.5	21	87.5	CC = 0.168
	Bachelor	2	3.5	3	12.5	P=0.125 NS
Years of experience as a nurse	1 _ 5	48	84.2	15	62.5	CC = 0.294
	6 _ 10	4	7.0	2	8.3	P=0.106
	11 _ 15	2	3.5	4	16.7	NS
	16 _ 20	3	5.3	2	8.3	
	21 and above	0	0.00	1	4.2	
Years of experience in cancer care	1 _ 5	53	93.0	20	83.3	CC = 0.193
	6 _ 10	4	7.0	3	12.5	P=0.208
	11 _ 15	0	0.00	1	4.2	NS

(*)HS: Highly Sig. at P<0.01; S: Sig. at P<0.05; NS: Non Sig. at P>0.05; Testing are based on a contingency coefficient test.

Table 7 results show a weak relationships between the re-distribution of scores in the domains of "Evaluation of Nurses' Performance in Caring for Cancer Patients" with respondents' socio-demographic characteristics, since no statistically significant relationships were accounted at P > 0.05, except for gender at the level P<0.05.

Discussion

Analysis of Socio-Demographic Characteristics

Regarding socio-demographic characteristics, the findings reveal that more than two-thirds of the nurses are under thirty years of age, accounting for 75.4%. Approximately three-quarters of the sample (77.8%) have less than six years of total nursing experience, and a similar proportion (90.1%), have less than six years of experience in cancer care. These results indicate a predominantly young workforce composed mainly of nurses in the early stages of their professional careers. These findings align with the study conducted in 2023 by Hussain, B., & Abdulkareem, A., they assessed nurses' knowledge, attitudes, and practices in handling anti-neoplastic drugs at Hiwa Hematology/Oncology Hospital in Sulaimaniyah, Iraq. Regarding socio-demographic characteristic, most of the involved participants in their assessment were in their twenties and thirties of age, accounting 59.3% of the total. While in terms of the experience, our findings mimics the findings of the study

conducted by Mohammed, et al., in 2021" Oncology Nursing Staff Knowledge and Practice Behaviors Toward Chemotherapy Impact on Peripheral Neuropathy", as the majority of nurses were with an experience (as a nurses and as an oncology nurses) between one to four years.

Concerning the educational qualifications, a largest portion of the participants were diploma graduated(93.8%). This large proportion of young staff in this field is expected to be affected by the continued recruitments efforts as the institution is in the expansion period, leading to increased demand for more staffs. The findings are aligned with those stated in the study by Iacorossi in 2020, in their study titled "Role and Skills of the Oncology Nurse: An Observational Study", the majority of the staff involved(54.3%) also were holding a diploma degree. This similarity between the two sittings proposes that diploma level of education remains to be the most dominant degree amongst oncology nurses throughout the various clinical sittings. This increased trends of diploma could be related to many factors and some of are the staffing policies, the large number of diploma graduates over others which further usually stem from the low costs and quick entry of this workforce, all this can be an attracting option for nurses searching for early employment.

Pertaining to gender, the number of males included were almost evenly with females numbers(males= 46.9%; females= 53.1%). With females slightly more than males, this proportion is partially aligned with the results reported by Hussain, B., & Abdulkareem, A. (2023), " Knowledge, Attitude, and Practice of Nurses About Handling AntiNeoplastic Drugs at Hiwa Hospital in Sulaimaniyah", where female participants represented a higher proportion(60.4%) compared to males (39.6%).

Relating to the position, the majority of respondents were caregivers, accounting for 98.8%, and minority served as either therapy preparation nurse(1.2%). They nearly evenly distributed on morning and night shifts, with 48.1% are working in the morning and 51.9% in the evening. The proportions are aligned with those in the study by Iacorossi et al. (2020), where 93.0% of their participants held the nursing positions and 7.0% served as nurse coordinators. This trend of distribution are likely related to institution policies and workforce requirements.

Moreover, more than half of the respondents(61.7%) have joined training courses, while 38.3% didn't undergo. Among those who involved in trainings, the largest proportion(44%) completed two, while 34.0% went to one course, and only 22% of all completed three courses; with chemotherapy administration course having the largest scale of attendance 46%, whereas remaining topics ranged between 2% and 30% attendance. Generally, although the attendance levels were slightly more than the half, this proportions propose that involvement in continuous education persists to be relatively weak involvement, as the majority reported attendance for one and two courses only(78%), with the focus directed toward the most cancer treatment relevant training. This may be attributed to factors such as, new employments, insufficient career encouragements, a perceived lack of practical relevance in addition to workloads. These results are consistent with those reported by Anisa et al., (2018) in their study “Nurse’s Spiritual Care Competencies to Patient with End Stage Breast Cancer”, that found that the largest proportions were attaining in trainings, with chemotherapy administration being the most common (29.2%).

Analysis of Nurses' Performance in Caring for Cancer Patients

Based on the results in Table1C, it is evident that the overall performance level of nurses in cancer care is generally low, reaching only a Percentile Grand/Global Mean of Score (PGMS) of 24.28%.

More specifically, regarding the first domain "Nursing care before handling chemotherapeutic agents", as presented in Tables 1B and 1C, the findings indicate that nurses demonstrate a moderate overall performance level in this domain (PGMS of 56.02%). A closer look at the subdomains reveals high performance in specific areas, including "Avoid spills of drugs", "Aerosolisation when drawing up from a vial", "Expel excess drugs from syringes into air", and "Always be familiar with the drugs" with Relative Sufficiency (RS) scores ranging from 80.0% to 98.0%. This high outcome may be attributed to the institution's emphasis on targeted chemotherapy administration programs, attended by 46% of participants , which likely enhanced skills either directly or indirectly through peer influence impact on adherence to safety protocols. These results align with the study by Gasat et al., (2024) in the Philippines, which found that oncology nurses exhibit accurate and efficient skills in administering chemotherapeutic agents. Similarly, the findings correspond with those of Shamran & Ali, (2022), in Babylon, Iraq, where nurses showed moderate performance in the safe handling and preparation of cytotoxic drugs. On the other hand, nurses showed a moderate level(51.0%) in the area of proper wearing mask that covers the nose and mouth. However, weak performance levels were detected in the related subdomains" Wear disposable latex gloves", "Wear eye protectors", and "Dispose of needles, syringes, and other sharps directly in special containers", with RS scores of 7.41%, 1.23%, and 19.0%, respectively, this weak performance may stem from many factors including the nurses' underestimation of the seriousness of the followed risks, feeling discomfort doing them continuously especially goggles and gloves, continuous workload pressures, unsafe habits, insufficient active supervision with active institutional support. Limited contribution in the related educational trainings may furthermore lead to this deficiency; as merely 4% of nurses attained courses were joined the courses of PPE, with only 2% completed the courses of medical waste treatment (Table 2A). The outcomes reinforces the vital necessity for improved access to targeted, evidence-based educational programs, along with support and supervision enrichments and resource provision. The findings are consistent with those reported by Mohammed, H. A., et al. (2021), "Oncology Nursing Staff Knowledge and Practice Behaviors Toward Chemotherapy Impact on Peripheral Neuropathy", where they reported that oncology nurses have a modest levels of competency levels. Equivalent findings were reported by Walton et al., in 2019, United States, where nurses revealed weak compliance with PPE principles(double gloves wearing, chemotherapy gowns wearing, and face protection). Similarly, Adly, et al., (2020) in Egypt, their findings showed that more than half of the nurses in pediatric critical care units are having insufficient practices regarding safety measures standards.

Regarding the second domain "Nursing Care During Chemotherapy", Table 1C reveals that nurses exhibit a generally weak performance(PGMS: of 8.80%). Analysis of the three subdomains "Identification of Infection", "Assessment of Fever", and "Nursing Care for Stomatitis"(Table 2B), shows exceptionally shortages in performance levels(0.00%-54.0%), (7.41%- 8.64%), and (0.00%) respectively. The majority of the items" skin inspection,

monitoring of vital signs (pulse and respiration), neutrophil count evaluation, and stomatitis care" recorded zero percent performing; except in regard the temperature monitoring, where nurses recorded a moderate levels in performing the procedure(54.0%). Although, the procedures considered fundamental to nursing care, it still show weak adherence, and it could be related to the intersections between roles with other healthcare workforces, or a deficiency in clear detailed guidance, it may also be as a result of insuffecient accesses to targeted trainings, inadequate supervision, and poor documentation practices, besides that nurses experience practical and psychological pressure which moreover can lead to the reduce in motivation. Additionally, falling short with organizational tools that clarifies the roles can further aggravate misunderstanding among especially the new staff, all of which eventually can lead to performance gaps and issues. Our study findings align with those reported by Ayele , et al., in 2023 in Ethiopia, "Nurses' Knowledge and Care Practices for Infection Prevention in Chemotherapy-Induced Neutropenic Patients" , they have found a weak performance in infection prevention practices; moreover, a study by Sajwani et al., in 2024 "The Intersection of Oncology and Oral Health" aligns with our administered findings where their findings indicated significant gaps in regard to the oral care practices provided by oncology nurses. Likewise, a study conducted in Jordan by Sharour, in 2019), it found that the majority of oncology nurses were with inadequate skills in oral mucositis management. On the other hand, in Sulaimaniyah, Abdalla (2022) conducted a study on evaluating oncology nurses' knowledge and related practices on oral mucositis. The study stated that nurses are highly capable in this regard. Thu, both the studies are at the same country, the geographic distinction between Sulaimaniyah and Kirkuk may have an impact on nurses' exposure to specialized care practices opportunities, regional differences in the clinical and institutional protocols, and further resource availability.

In regard to the third domain "Supportive and Psychological Nursing Care Rendered by Oncology Nurses for Patients with Cancer", presented in both the Tables (1C and 3B), the findings revealed a general weak performances (PGMS= 8.02%). The entire domain has generally demonstrated weak levels of performance in all of the subdomains(47%-17.0%). This could be related to the limited skills of communication among staff, the shortage of continuous psychological and behavioral trainings and job related stress.The findings are consistent with those by McCaughan and Parahoo in 2000, Northern Ireland, they have found that nurses are finding themselves less competent in psychosocial care than the physical, where significant gaps were detected in the psychosocial support delivery. Similarly, the current findings are aligned with those by Vujanić, Prlić, & Lovrić (2020) in Croatia, "Nurses' Self-Assessment of Caring Behaviours in Nurse–Patient Interactions", they reported a tend by nurses toward prioritizing technical skills tasks accomplishment over psychological support provision.

Interpreting Performance Gaps across Nursing Care Domains: Complete VS Partial Neglect of Standards

While falling short of basic standards is not something to be proud of, but rather such findings can be a positive indicator revealing the ability to enhance such deficiencies

through the continuing focused educational trainings, while the areas with complete neglect is concerning most as it demands root-cause analysis and strategic intervention.

In the first domain " Nursing care before handling chemotherapeutic agents" Table 1B:

In regard "wear disposable latex gloves, and disposal of sharps", both demonstrated a low performance rates, yet the procedures appear to be applied improperly rather than neglected entirely (74.1%, and 81.5%), respectively. For example: with wearing disposable gloves: gloves were often not changed between patients or were manipulated to ease task accomplishment. Moreover, in disposal of sharps: while tools were placed in designated containers, disposal was not directly, increasing the infection risk, that is confirmed by the increasing rates of sharps and needle stick injuries among nurses at Kirkuk hospitals(Mohammed, S. A., & Mahmood, N. A., 2025).

In contrast, the procedure "eye protectors" reflects a complete lack of implementation(98.8%). This is probably related to the fact that the preparation of chemotherapy is mostly the concern of pharmacists before nurses, except the nurse working in the preparation (1.2%). As a result, remaining nurses may overlook the further importance of wearing eye protectors, such as the fact that the patients involved often have compromised immune systems and are highly susceptible to various infections transmitted through multiple routes, which increases the risk on staff to get infected. Furthermore, there is a noticeable lack of institutional emphasis on the importance of this process.

Regarding "wearing a mask", shows a moderate performance, yet similarly suffers from improper performance(46.9%).

In the second domain: "Nursing care during chemotherapy"
Table 2B reveals a mixed picture:

In relation to "Assessment of Fever", and "Signs of Infection"', despite low performance scores, procedures are applied in practice (88.9%–90.1%), even though with gaps was appeared as: reliance on relatives in some cases for comfort measures without a complete scientific guidance, poor in scheduling and documentation of vital signs in certain times, frequent staff rotation affects proper continuity of care.

Conversely, other procedures in this domain "such as skin inspection, auscultation, pulse and respiration monitoring, neutrophil count evaluation, and stomatitis care" are almost entirely neglected (98.8%–100%). This may suggest lack of awareness, trainings or absence of clear protocols and supervision, pressure and poor interdisciplinary coordination.

In the third domain: "Supportive and Psychological Nursing Care", Table 3B: shows generally weak performance levels across all subdomains. However, a high rate of improper performance rather than complete absence, suggests growth potential were detected in regard to the subdomains "fear management, active listening, offering hope", improper performance ranges from 42% to 61.7%, indicating that care is often delivered basing on compassion and sympathy rather than professional, standardized approaches and defined steps in care delivery.

While, subdomains such as regarding patient and family education concerning cancer treatments, assisting with the coping with fear and in spiritual need assessment, nurses showed more of complete neglect over partial performance and it probably stem

from the reliance on patient ask rather than routinely application of the procedures to address needs before even ask.

In conclusion, despite the overall low performance in oncology care, nurses performance demonstrate hope for improvement in many areas through targeted continuous educational trainings and constant supervision and support, such as in: "Wearing gloves, safe disposal of sharps, assessment of fever and infection signs, encouraging verbalization of fears, offering support through active listening".

Conversely, specific areas with the overall neglect of procedures such as in:"Wearing eye protectors, inspecting skin and mucous membranes, auscultating respiratory rate, monitoring pulse and respiration, evaluating neutrophil count, provision of stomatitis care". These can raise concerns about blurred job descriptions, insufficient supervision, unclear role boundaries, limited support, and prioritization of tasks perceived as more essential in care over the remain.

The Association between Nurses' Performance and the Socio-Demographic Factors

The analysis of the findings in Table 2C, revealed a weak relationship between nurses' performance and socio-demographic variables such as age group, educational qualification, and years of experience (P-values > 0.05). This suggests that variations in demographic factors did not meaningfully influence nursing performance in caring for cancer patients within the study population, with respect to gender, where a significant difference was found at the value $P < 0.05$, where males have a better advantage over females. This could be related to psychological, cultural, or social factors, such as self-confidence or professional distribution within the practical environment.

The findings are consistent with the finding reported in "Nursing staff knowledge regarding safe chemotherapy administration at oncology center in Kirkuk City", by Abdullah, D. A. H., & Rasheed, O. H. (2018), where they similarly in their findings revealed no significant relationship between the age, educational levels with the nurses' knowledge in chemotherapy administration.

Our findings align with those of a previous study in Iraq, conducted by Al-Hasnawi, & Aljebory, (2023). The study "Relationship between nurses' performance and their demographic characteristics", revealed no significant relationship among the socio-demographic data(age, gender, education level, experience, shift, and marital status), with nurses' performance.

Conclusion

The study highlights significant performance gaps among oncology nurses at Kirkuk Oncology and Hematology Center across key domains of cancer care, where the performance level was low generally in cancer care. Despite that some procedures showed a partial compliance over complete neglect, giving hope for future enhancement, while others particularly in the domains chemotherapy handling and psychosocial support, certain areas showed critical lack of performance, highlighting serious issue . Moreover, demographic factors showed weak influence on performance, with exception for gender, giving advantage for male over female. Targeted education and trainings, clearer protocols,

and stronger institutional support are recommended to improve further enhancements in nursing competencies and ensure safe, holistic cancer care.

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