



Article

Nurses' Knowledge and Practices Toward Parenteral Infusion at Kirkuk city Teaching Hospitals

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Abstract: Parenteral infusion errors are recognized worldwide, endangering both patients and healthcare providers due to the potential of blood borne adverse effects. Nonetheless, dangerous intravenous (IV) injection practices have proliferated globally, highlighting nurses' responsibility in the safe and effective delivery of intravenous (IV) therapy avoid significant errors, risks, and consequences. Evaluate nurses' knowledge and practices in relation to parenteral infusion therapy. A quantitative design, descriptive study had been employed in the present study using the test-retest strategy for the sample under study during the period from 8th October, 2024 to 15th joun, 2025. the sample include (95) nurses who were accountable for administering intravenous treatment and working in Intensive Care Units at Kirkuk city teaching hospitals. Two tools are used in this study: Tool 1: nurses' knowledge related to parenteral infusion therapy.; through a structured questionnaire. Tool 2: Nurses' practices observational checklist related to parenteral infusion therapy. Most nurses were female, and most of them were between the ages of 25 and 30. The study reveals that only one third (33 (34.7%)) of nurses have a job training in parenteral infusion therapy. Global Overall Knowledge was (65.44%), Global Overall Practices was (53.45%), and Global Overall Knowledge & Practices was (59.22%). The current research found that the nurses' knowledge and performance about parenteral infusion treatment were at a moderate level.

Keywords: Parenteral Infusion, Nurses, Knowledge, Practice

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1. Introduction

The term "parenteral" is derived from the Greek phrase "para enteron," which translates as "bypassing the intestines". Nonetheless, prevalent usage more accurately correlates the phrase with "injectable." Approximately 40% of the medications prescribed in hospitals are delivered via injection. In certain institutional contexts, the proportion of injectables exceeds 40%. Injectable products are sterile and may necessitate specialized handling and administration. It is estimated that more than one billion disposable plastic syringes are utilized each year in American hospitals. As the complexity of medications supplied via the parenteral route increases, substantial advancements in parenteral administration procedures have emerged in recent years and persist in evolving. Furthermore, the advancement of site-specific, effective, safe, and reproducible administration strategies has resulted in the creation of sophisticated stand-alone drug delivery systems. Certain advancements have tackled substantial safety and efficacy issues; yet, research in drug delivery devices remains a dynamic area of investigation [1].

Parenteral infusion lines or venipuncture are extensively utilized in order to treat millions of patients worldwide. The primary applications of these catheters are the administration of medications, liquids, blood products, and intravenous nutritional supplements. Approximately 70% of patients require a minimum of one PI catheter following hospital admission, with almost 200 million catheters utilized annually in the United States. This method is not totally secure and presents certain challenges. Phlebitis is a complication that may affect 50% of patients overall and up to 75% of those with infectious disorders; however, in patients without diabetes, burns, or emergency catheterization, the prevalence is roughly 20% [2].

The three principal indications for intravenous fluid delivery are replacement, maintenance, and resuscitation. Replacement solutions are used to address current or developing deficits that can't be filled up by oral intake alone; maintenance solutions are recommended for patients who are unable or are restricted from drinking water to fulfill their standard daily needs for fluids and minerals; and resuscitation fluids are used to correct blood volume deficiencies or acute hypovolemia [3].

Colloids and crystalloids are classifications of fluids frequently administered intravenously. In instances of severe hypotension, a substantial volume of crystalloid solutions must be administered, which may result in peripheral edema, elevated central venous pressure, and pulmonary edema in individuals with cardiovascular conditions [4].

Blood transfusions may be necessary in numerous circumstances, such as refilling hemorrhage during surgical procedures or injury, or correcting for the body's insufficient production of blood or its components, among others. Transfusion types, categorized by blood components, encompass transfusions of Cryoprecipitate, plasma or Fresh Frozen Plasma (FFP), red blood cells, platelets, and whole blood. Different purposes are served by each of these elements and their infusions [5].

While transfusions can preserve life, errors in the procedure can be fatal. Blood samples may be autologous, obtained from the patient for use during or after surgery, or allogenic, donated by others. The need for blood in clinical settings is constant, necessitating the rectification and minimization of transfusion errors [6, 7].

Risks associated with blood transfusions include graft-versus-host disease, red cell alloimmunization, allergic reactions, delayed transfusion reactions, non-hemolytic febrile reactions, lung damage from transfusions, and the spread of bacteria, viruses, and parasites. Strict donor selection and improved screening methods reduce transfusion-related diseases [8].

Since parenteral nutrition is regarded as a high-alert drug, its usage necessitates safety-focused procedures, systems, and policies to reduce patient risk [9]. Parenteral feeding in adult ICUs enhances immune function, reduces complications, and improves clinical outcomes [10].

2. Materials and Methods

Study design:

This study employed a quantitative design, descriptive study.

Study setting:

This study was conducted in intensive care units at Kirkuk city teaching hospitals.

Sample and Period of the study:

A random purposive sample was chosen from nurses working in ICU at Kirkuk City Teaching Hospitals from the period between 8th October,2024 to 15th joun,2025 at Kirkuk City Teaching Hospitals.

Instrument:

To evaluate nurses' knowledge and practices toward parenteral infusion in Kirkuk city teaching hospitals, the researcher constructs a comprehensive questionnaire interview form for the purpose of data collection, it consists of 3 parts:

1. Self-administered questionnaire sheet related to (demographic characteristics and professional background of nurses participate in the study).
2. Self-administered questionnaire sheet related to (nurses' knowledge toward parenteral infusion).
3. An observational check list for nurses' practices regarding nursing intervention related to parenteral infusion.

Validity and reliability of the tools:

To examine the content of the questionnaire pertaining to parenteral infusion, a panel of ten experts with over five years of experience in their respective fields evaluates the validity of the research instruments knowledge test and practice. After consulting with each expert, some elements were added and others were removed. These experts were asked to evaluate the instruments, clarity, relevance, and appropriateness. The final version was accepted by all experts.

Pilot study:

This preliminary investigation, which was carried out from January 14 to January 24, 2025, included selecting a convenient sample of ten nurses to examine their knowledge and practices about parenteral infusion in intensive care units.

The pilot study's objectives were:

1. To assess the instrument structure's content adequacy and clarity throughout the subjects' understanding and identify any changes that are required.
2. To calculate the typical amount of time required for each nurse to gather data.
3. To determine the most effective method for determining the kind of challenges they might have to face.

Ethical considerations:

The researcher obtained official permission to conduct the study by submitting a detailed description, including the study objectives and project, to the Ministry of Health in Iraq (Planning Department, Health Research Division) after receiving approval from the College of Nursing Council. Subsequently, permission was submitted to the Director of Kirkuk Health Office, which includes Azadi and Kirkuk Teaching Hospitals in Kirkuk, to ensure their approval and cooperation. The approval facilitated entering the hospitals and interviewing nurses to obtain the necessary data after obtaining their permission to participate in the study.

Data analysis:

Excel software and the statistical analysis system SPSS (Statistical Package for Social Sciences) version 22.0 are used to analyze data.

3. Results

The distribution of the "Socio-Demographical Characteristics variables-(SDCv.)" of nurses in the sample is shown in Table 1 regarding of studied subject: "Evaluation of nurses' knowledge and practices toward parenteral infusion in intensive care units at Kirkuk city teaching hospitals", which including distribution of the observed frequencies, and a percentages for estimating the proportional relating to studied sampling population's SDCv., in addition to a significant comparisons for the purpose of showing whether the observed frequencies of SDCv. are randomly or has restrictedly distribution.

Table 1. Distribution of the sample under study based on SDCv Significant comparisons, observed frequencies, and percentages (N=95).

Socio-Demographical Characteristics variables	Groups	No.	%	C.S. (*) P-value
Gender	Male	28	29.5	P=0.000 (HS)
	Female	67	70.5	
	Total	95	100	
Age Groups/years.	20 _	19	20.0	$\chi^2=43.979$ P=0.000 (HS) Mean \pm SD 26.49 \pm 2.79
	25 _	62	65.3	
	30 _ 35	14	14.7	
	Total	95	100	
	Diplom	34	35.8	
Level of education	Bachelor	57	60.0	$\chi^2=44.611$ P=0.000 (HS)
	Master's Degree	4	4.20	
	Total	95	100	
	Single	67	70.5	
Marital status	Married	27	28.4	$\chi^2=69.811$ P=0.000 (HS)
	Widowed	1	1.10	
	Total	95	100	

(*) HS: Highly Sig. at P<0.01, S: Sig. at P<0.05; NS: Non Sig. at P>0.05; Testing based on One-Sample Chi-Square test, and Binomial test.

Table 2 shows distribution of the studied "Related variables -(Rv.)" of nurses staff sampled regarding of studied subject, such as: "Years of work in clinical units, Years of work in Intensive Care Unit, and Training in intravenous (IV) therapy or infusion management", which including distribution of the observed frequencies, and a percentages for estimating the proportional relating to studied sampling population's SDCv., in addition to a significant comparisons for the purpose of showing whether the observed frequencies of Rv. are randomly or has restrictedly distribution.

Table 2. Study sample distribution based on (Rv.) Perceptions, observed frequencies, and significant comparisons (N=95).

Related variables	Groups	No.	%	C.S. (*) P-value
Years of work in clinical units	1 _ 3	44	46.3	$\chi^2=7.979$ P=0.019 (S) Mean \pm SD 3.44 \pm 2.66
	4 _ 6	29	30.5	
	> 6	22	23.2	
	Total	95	100	
Years of work in Intensive Care Unit	1 _ 3	84	88.4	$\chi^2=130.126$ P=0.000 (HS) Mean \pm SD 2.12 \pm 1.60
	4 _ 6	8	8.4	
	> 6	3	3.2	
	Total	95	100	
Training in intravenous (IV) therapy or infusion management	Yes, formal certification	41	43.2	$\chi^2=6.400$ P=0.041 (S)
	Yes, on-the-job training	33	34.7	
	No training	21	22.1	
	Total	95	100	

(*) HS: Highly Sig. at P<0.01, S: Sig. at P<0.05; NS: Non Sig. at P>0.05; Testing based on One-Sample Chi-Square test, and Binomial test.

table 3 shows a summary statistics of an overall assessments in light of studied sub and main domains along all their items in which transformed by an admixed form, and includes the following estimates, such as: "Minimum, and Maximum of percentile readings for the studied sampled, Percentile Grand/Global Mean of Score-PGMS, Percentile Pooled Standard Deviation-PPSD", In addition, the three distinct categories' levels—Low,

Moderate, and High—were used to evaluate the sub and main domains under study. This was done in light of the PGMS results, which were [(0.00 – 33.33), (33.34 – 66.66), and (66.67 – 100)] intervals, respectively.

Table 3. Summary Statistics for Percentile readings of studied Main and Sub domains with an Overall Global assessment at test - retest periods with comparison's significant (N=95).

Main Domain	Nurses Knowledge and Practices	No.	Test Period				Retest Period				C.S. (*) P-value
			Mi ni.	Ma x.	PGMS	PPS D	Mi ni.	Ma x.	PGMS	PPS D	
Knowledge	1. About Blood transfusion	95	20.0	100	72.84 (H)	19.77	20.0	100	75.58 (H)	22.06	P=0.353 (NS)
	2. About Drug Infusions	95	0.0	100	70.53 (H)	23.49	0.0	100	73.47 (H)	21.92	P=0.541 (NS)
	3. About IV Fluid Infusion	95	10.0	90.0	64.84 (M)	17.74	30.0	100	69.68 (H)	17.59	P=0.041 (S)
	4. About Parenteral Nutrition	95	20.0	100	59.79 (M)	15.44	30.0	100	64.53 (M)	17.24	P=0.026 (S)
	Global Overall Knowledge	95	23.3	90.0	65.44 (M)	12.51	40.0	96.7	69.58 (H)	14.31	P=0.0098 (HS)
Practices	1. Equipment	95	50.0	91.7	59.74 (M)	10.78	50.0	91.7	59.91 (M)	10.41	P=0.011 (S)
	2. Preparations	95	50.0	91.7	59.74 (M)	10.78	50.0	91.7	59.91 (M)	10.41	P=0.904 (NS)
	3. Performance	95	23.7	73.7	47.56 (M)	10.52	21.1	73.7	48.89 (M)	10.26	P=0.000 (HS)
	4. Evaluation	95	33.3	100	67.02 (H)	19.14	33.3	100	68.77 (H)	18.71	P=0.000 (HS)
	Global Overall Practices	95	34.39	73.64	53.45 (M)	8.91	36.36	75.09	55.21 (M)	8.39	P=0.000 (HS)
Global Overall Knowledge & Practices		95	30.17	80.15	59.22 (M)	7.93	46.48	83.40	62.62 (M)	8.46	P=0.000 (HS)

(*) HS: High Sig. at P<0.01; NS: Non Sig. at P>0.05; Testing are based on a Wilcoxon Signed Ranks Test. PGMS: Percentile Grand/or Global Mean of Score; PPSD: Percentile Pooled Standard Deviation.

4. Discussion

The study was conducted with the aim of determining the level of knowledge and practice of nurses regarding parenteral infusion.

In the current study, most of the studied nurses were female; which may be ascribed to the greater portion of nurses in Iraq, who are females. This finding is in agreement with that of [11-14] who revealed the dominance of females among most of their studied samples.

In terms of participant age, the findings indicate that the majority of nurses (65.3%) are between the ages of 25 and 29. A research conducted in 2019 at Kirkuk City Teaching

Hospitals by Kumait Al-Jumaily and Khudur [15] supports this conclusion by showing that the majority of the nurses in the study were between the ages of 20 and 29. A research by [16] similarly supports our findings, which indicate that more than half of the participants are between the ages of 25 and 29. With a mean and SD of (25.48 ± 2.76) .

Only 33 (34.7%) of nurses have received on-the-job training in parenteral infusion treatment, and 41 (43.2%) of nurses have a formal IV therapy certificate, according to our survey. Abo Aita et al. [17] found that over half of the nurses had completed a training on how to care for patients receiving full parenteral feeding, which is consistent with this outcome. In line with the results of a [18] research, over two-thirds of the nurses in the study had taken parenteral infusion training courses.

The findings also revealed that, nurses' knowledge was moderate regarding parenteral infusion therapy. This moderate knowledge level may be related to lacking basic knowledge, inaccessibility of pre-service and in-service training programs, absent of continuous supervision and evaluation. On the same line with this finding, [19] reported that nurses' have inadequate knowledge on IV therapy and the mean percentage knowledge on IV therapy was 68.75%.

In regard to the practices of nurses regarding parenteral infusion, the current study shows that the percentile grand/global mean of score-PGMS of practices regarding test and retest periods of assessment (53.45%), which mean that the practices of nurses are at moderate level. The results are supported by a study by [20] that reveals that nurses practice was (54.3%), other study by [21] revealed that 54% of respondents practices correctly, and a study by [22] showed that 49.3% of nurses practice was good.

It was shown that there was a statistically significant positive link between nurses' knowledge and practice scores, indicating that nurses' performance is mostly determined by their knowledge. In agreement with the current study finding [14, 23, 24] noticed that; nurses' practices are precisely affected by their base of knowledge which is crucial to reach competent nursing practices in diverse clinical settings. Moreover, Enterprise in association with CIRA [25] declared that, not merely knowledge is the foundation stone in nursing practice; but also deficient of educating combined with their shortage, being the accountable staff supplying a major part of healthcare.

5. Conclusion

The results showed that nurses' practices of parenteral infusion at Kirkuk City teaching hospitals were at a moderate level, and their knowledge of parenteral infusion was at a moderate level (insufficient), which might compromise patient safety. In order to remain up to date with the constantly changing knowledge and practices in nursing science and to enhance the standard of patient care, the researcher recommended that nurses be encouraged to attend frequent scientific meetings, conferences, and training courses. The Training and Development Unit should intensify its efforts to increase training courses and educational programs on parenteral infusion and apply them in intensive care units to improve the competence of nurses working in these units. The researcher recommended more studies to be conducted in this filed and implement an educational program to find areas of weak knowledge and practices and then enhance quality of care and patient safety.

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