Evaluate the Impact of Short Training Program on Nurse's Knowledge Regarding Intravenous Lines Management

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Abstract

Intravenous therapy is one of the major duties of nurses. In managing intravenous infusion, nurses must have enough knowledge about what is requested, why it is illustrated, its intended effect on the patient, and any conceivable adverse effects that may occur. They also must get it the principle for intravenous fluid organization and the type of intravenous solution requested. Education and training are two components of nursing staff advancement that occurs after an employee's orientation. Thereby, this study aimed to evaluate the effect of going for intravenous infusion therapy program on nurses' knowledge and skill at Heevi teaching Hospital. a quasi-experimental research design was applied. This study was carried on a probability (random) sample of (15) nurses in Heevi teaching hospital who deliver direct care for patients throughout the study time period. Data were gathered using three tools; socio-demographic data & nurses' knowledge about intravenous infusion therapy questionnaire sheet. According to the current study, two months following the program's adoption, nurses' overall mean knowledge scores increased with a statistically significant difference. After four months of program implementation, this heightened level marginally declined, but it remained greater than before the program. The nurses' understanding has improved significantly after the nursing training about intravenous infusion therapy was implemented.

Keywords: *intravenous therapy program, nurses´ knowledge, nurses.*

1. INTRODUCTION

Intravenous fluid remedy is one of the maximum famous ordinary nursing care procedures, having been used for over a hundred and eighty years worldwide1. It involves the transport of intravenous (IV) fluids to nearly all hospitalized sufferers for the renovation of physical fluids and electrolytes, in addition to as diluents for medications2. Intravenous (IV) fluid therapy is one of the most conventional managements given in hospitals each year. Despite this, there is often need of training for nurses in regulating and managing this therapy. This makes nurses contemplate IV fluids as a schedule therapy and often being unaware of its benefits, significance and associated risks3. Nurses are required to elevate their knowledge and performance with respect to IV fluid therapy to manage its conceivable complications and progress patient safety any nurse administering intravenous fluids and drugs must be competent in all viewpoints of intravenous therapy4. Assessment and training should include both theoretical as well as practical components with respect to intravenous fluid therapy, drug administration, local and systemic complications, infection control issues, use of hardware and risk management 5.

Intravenous therapy and care of vascular gadgets play a important role in the conveyance of present day health care treatment. Intravenous (IV) therapy has become a main component of patient care in hospital and nursing homes. It is endorsed for nearly every individual who is admitted to the hospital and is utilized to support patient with acute and chronic issues 6. As nurses play a important role in quality of care, they must learn with adjusted and progressed technique, to meet the specific need of each patient 7.

Intravenous (IV) fluid therapy is a key area of overseeing acutely sick hospitalized patients. However, blunders in fluid endorsing are common and contribute to patient morbidity and mortality through unseemly prescribing. Prescribing IV fluids includes difficult decision-making on the indication, ideal fluid type, volume and rate. Studies have shown that junior prescribers reliably illustrate poor knowledge associated with a large variety in their practice 8.

2. Objectives of the study:

1- To evaluate the effect of short training program on nurse's knowledge regarding intravenous lines administration at Heevi teaching hospital in Duhok city.

2- To find out the relationship between nurses' knowledge and the demographic variables that include age, gender, level of education, years of services.

3. Hypothesis:

Following the implementation of the intravenous infusion therapy training program, nurses' knowledge will improve.

4. Subjects and methods:

The following four primary designs were used to explain the study's subjects and methodology: technical, administrative, operational, ethical consideration and statistical analysis.

4.1. Technical design:

4.1.1. Design of the study:

Quasi experimental study design was carried out in Heevi teaching hospital in order to evaluate the impact of short training program on nurse's knowledge regarding intravenous lines administration.

4.1.2. Setting of the study: The present study carried out in Heevi teaching hospital at Duhok city during the period from 16th December 2021 to 15th March 2022.

4.1.3. The sample of the study:

The study included (15) nurses, they were working in different wards in the hospital who provided direct care to patients throughout the study period, they willing to participate willingly in the study, and agreed to grant consents.

4.1.4. Constructing of the instrument:

Study tool "questionnaire" was validated by a number of referees and based on literature review then developed by the researcher to ensure culture and language appropriateness. After the arrangement of all information, the tools of the study consisted of two parts: -

Part I: Demographic data sheet:

This part is concern with the determination of the demographic characteristics of nurses (Age, gender, level of education and years of service).

Part II: Construct questionnaire for knowledge:

This questionnaire consisting of (40 items) were designed to evaluate nurses' knowledge regarding intravenous lines management. This questionnaire divided into four main headings;

basic understanding of intravenous infusion therapy, Knowledge about types of intravenous fluids, knowledge of how to deliver intravenous infusion treatment, understanding the risks associated with intravenous infusion management. Each item in the final draft has (2) options (correct answer which is equal to 1 and incorrect or missed answer = zero)

The rating scale for nurses´ knowledge was distributed as follow:

Rating scale	Score	Percentage (%)
Poor	<20	<50 %
Fair	20 -30	50 -75 %
Good	>30 -40	>75%

Regarding the knowledge part, data was gathered through direct interview (face to face) which had been completed by all sample of the study for 30 minutes by using the knowledge questionnaire.

4.2. Administrative arrangement

Prior to the data collection, a formal administrative approval was obtained from Duhok Directorate of the Education, Planning Department to conduct the present study.

4.3. Operational design:

4.3.1- Pilot study:

A pilot study was conducted in order to assess the study tool's clarity, feasibility, and application. In this study, ten head nurses were asked to participate in the questionnaire sheet's pilot testing. They were also excluded from the total study subjects because it offered an estimate of the time required to complete the questionnaire sheet.

4.3.2- Reliability test:

The knowledge questionnaire was administrated to (10) nurses, after a period of (20) days, the same questionnaire was administrated to the same group to find out the correlation between the scores of pre and post test. Pearson's Coefficient Correlation was used. The results were (r=0.86, for the knowledge questionnaire at (p. <0.01).

4.3.3. Data collection:

The data was collected in Heevi teaching during the period from 16th December 2021 to 15th March 2022 in sequence: -

* Regarding the knowledge part, data was gathered through direct interview (face to face) which had been completed by all sample of the study for 30 minutes in pre and post educational programe by using the knowledge questionnaire.

4.3.4. Implementation of Educational program:

4.3.4.1. Implementation phase

The educational intervention was carried out in Heevi teaching Hospital in Duhok city. It concentrated on four major topics and it was implemented through four sessions. Each session presented important information related to knowledge of intravenous fluids.

The format of the educational program was based on sub group's education, the size of each group consists of three nurses and every sub group nurses receive all four education sessions reciprocally in five days per week through four weeks, the program was carried out and completed within one months.

4.3.4.2. Evaluation phase:

This phase concentrated on figuring out the impact of the training program by way of using the same knowledge questionnaire which used

in pre and posttests after two and four months from implementing the program.

4.4. Ethical consideration:

Ethical considerations were the main principle in data collection. Permission is taken from nurses before starting interview by signing the informed consent prepared by researcher. Before collection of data the researcher clarified the objectives of this study for nurses, the request for contribution in this study. Moreover, the local ethical approval was obtained from the Ethical Committee of Directorate General of Health Directorate of Planning Scientific Research Division to conduct the study.

4.5. Statistical analysis:

After collection of the data, it was analyzed using the statistical package of social science "SPSS 19" software. Results were presented as frequencies, percentage, chi square, paired t-test to test the statistical significance of some variables. The p value of < 0.05 indicate a significant result while, P value > 0.05 indicates a non-significant result.

5. Results:

This part of study represents our findings regarding the effect of short training program on nurse's knowledge and skills regarding intravenous lines administration at Heevi teaching hospital in Duhok city.

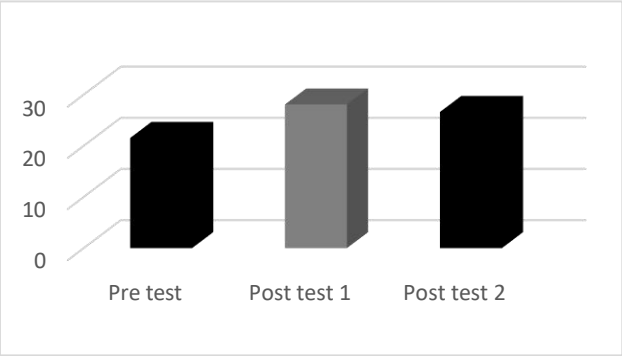
Table (1) Socio-demographic characteristics of (15) nurses

Variables	Characteristics	No.	%
Age	22-27 years	7	46.7
	28-33 years	4	26.7
	34 -39 years	2	13.3
	Above 40 years	2	13.3
	Total	30	100
Gender	Male	9	60
	Female	6	40
	Total	30	100
Level of education	Nursing high school	4	26.7
	Diploma	9	60
	Collage and above	2	13.3
	Total	30	100
Years of service	1-6 years	8	53.4
	7-12 years	5	33.3
	13-15 years	2	13.3
	Total	15	100

Table (1) shows the distribution of the socio demographic characteristics of 15 nurses, they were working in different wards in the Heevi teaching hospital in Duhok city. Concerning nurses age about (46.7 %) of the nurses were belonged the age group, 22 – 27 years old, (60 %) of them were male and (40 %) female. Also, it shows that (60 %) were graduated from institute and (26.7 %) from nursing high

school. In regard to their years of work (53.4 %) of nurses were had 1-6 years of work.

Figure (1): Total mean scores of nurses' knowledge pre, two, and four months after implementation of the program about intravenous infusion therapy (n =15)



(T1) test = Paired Samples T-test between pre-test and after two months post-test. (t = -3.69. P = 0.002)

(T2) test=Paired Samples T-test between pre-test and four months post-test. (t = -2.59. P = 0.021)

(T3) test = Paired Samples T-test between two- and four-months post-test. (t = 2.62. P = 0.02)

P = Significance

Figure (1) shows total mean scores of nurses' knowledge pre, two, and four months after implementation of the program about intravenous infusion therapy: there was a statistically significant increase in the mean scores of nurses' knowledge regarding intravenous infusion therapy after two and four months from implementing the program compared to before implementing the program, while there was a statistically significant decrease in the mean scores of nurses' knowledge regarding intravenous infusion therapy four month after implementing the program compared to two months after implementing the program.

Table (2) Mean scores of nurses' knowledge about intravenous infusion therapy pre, two months, and four months after implementation of the program (n=15).

knowledge	No. of items	Pre- test Mean ± SD	Post-test after two Mean ± SD	Post- test after 4 months Mean ± SD	Significance test		
					T1	T2	T3
Basic understanding of intravenous infusion management	8	3.20 ± 0.77	5.20 ±1.47	4.2 ± 1.32	T= (-4.099) P = 0.001	T (- 2.48) P = 0.026	T= (2.42) P= 0.03
knowledge about types of intravenous fluids	10	4.2 ± 0.774	5.4± 1.12	4.8 ± 0.56	T= (-3.15) P= 0.007	T= (2.55) P= 0.023	T=(2.36) P= 0.033
knowledge of how to deliver intravenous infusion treatment	8	3 ±1.07	5.2 ±1.47	4.2 ±1.32	T= (-3.91) P= 0.002	T= (-2.73) P= 0.016	T= (2.41) P= 0.03

understanding the risks associated with intravenous infusion management	14	5.87 ±1.18	8.2 ±1.47	7.4 ±1.45	T= (-6.72) P= 0.000	T= (-4.07) P= 0.001	T= (2.7) P=0.017

(T1) test = Paired Samples T-test between pre-test and after two months post-test. (T2)

test=Paired Samples T-test between pre-test and four months post-test.

(T3) test = Paired Samples T-test between two- and four-months post-test.

P = Significance

Table (2) Shows mean scores of nurses' knowledge about intravenous infusion therapy pre, two, and four months after implementation of the program: there was a statistically significant increase in the mean scores of nurses´ basic understanding of intravenous infusion therapy, knowledge about types of intravenous fluids, knowledge of how to deliver intravenous infusion treatment, understanding the risks associated with intravenous infusion management two and four months after program implementation compared to before program implementation, while there was a slightly significant decrease in nurses' knowledge four month after program implementation compared to two months after program implementation.

Table (3) Total nurses' knowledge pre, two, and four months after implementation of the program about intravenous infusion therapy (n=15).

Score	Pre test		After two months post test		After four months post test		Significance test		
							X^2_1	X^2_2	X^2_3
	No	%	No	%	No	%			
Poor <50 %	10	66.67	3	20	3	20	X^2= 7.51 P = 0.023	X^2=7.53 P = 0.023	X^2=6.17 P = 0.046
Fair 50 -75 %	3	20	4	26.67	10	66.67			
Good >75%	2	13.33	8	53.33	2	13.33			

(X2 1) = Chi square (significance) between pre-test and after two months post-test.

(X2 2) =Chi square (significance)between pre-test and four months post-test.

(X2 3) = Chi square (significance)between two- and four-months post-test.

P = Significance

Table (3) shows total nurses' knowledge pre, two, and four months after implementation of the program about intravenous infusion therapy: most of studied nurses (53.33%) gained good knowledge score regarding intravenous infusion therapy after two months post implementing the program compared to (13.33 %) before implementing the protocol. This good knowledge score decreased to

(13.33%) after four months from implementing the program.

Table (4) Relationship between total nurses' knowledge score about intravenous infusion therapy and sociodemographic characteristics of nurses (n=15)

Variables	Base line n=15			After two 2 posttest n= 15			After 4 months posttest n= 15			Significance test		
	Knowledge			Knowledge			Knowledge					
	P	F	G	P	F	G	P	F	G	X^2_1	X^2_2	X^2_3
Age												
22-27 years	7	0	0	5	1	1	2	0	5	**X^2= 14.98 P = 0.02**	**X^2= 14.64 P = 0.023**	**X^2= 17.72 P = 0.007**
28-33 years	2	2	0	0	1	3	0	2	2			
34 -39 years	2	0	0	1	1	0	1	1	2			
Above 40 years	1	1	0	0	2	0	0	5	2			
Gender												
Male	4	3	2	2	2	5	1	6	2	**X^2= 4.26 P = 0. 12**	**X^2= 2.12 P = 0. 35**	**X^2= 1.14 P = 0.57**
Female	5	1	0	3	2	1	1	2	3			
Level of education												
Less than diploma	3	1	0	0	0	4	0	0	4	**X^2= 14.98 P = 0.02**	**X^2= 14.64 P = 0.023**	**X^2= 17.72 P = 0.007**
Diploma	6	1	2	3	2	4	4	1	4			
Collage and above	0	2	0	0	2	0	0	1	1			
Years of service												
(1-6) years	5	1	2	1	0	7	5	1	2	**X^2= 13.66 P = 0.008**	**X^2= 10.42 P = 0.034**	**X^2= 15.15 P = 0.004**
(7-12) years	2	3	0	1	3	1	2	3	0			
(13-15) years	2	0	0	1	1	0	2	0	0			

(X2 1) = Chi square (significance) between pre-test and after two months post-test.

(X2 2) =Chi square (significance)between pre-test and four months post-test.

(X2 3) = Chi square (significance)between two- and four-months post-test.

P = Significance

Table (4) Shows relationship between total nurses' knowledge score about intravenous infusion therapy and sociodemographic characteristics of nurses: there was statistically significant difference between total nurses' knowledge score about intravenous infusion therapy and age, educational level, as well as years of experience of studied nurses in pretest, after two and four-month post test.

6. Discussion:

Nurses' knowledge in administering intravenous infusion therapy for patients can minimize infusion-related complications and affect patient safety, health care costs, and duration of hospital stay 9.

Concerning socio-demographic characteristics of the nurses:

The present study showed that, the majority of studied nurses (46.7%) were within 22-27 years, this study finding is agreed with (Mohammed et al/., 2015)3 in their study about the Effect of implementation of infusion therapy protocol on nurses' knowledge and practice at specialized Medical Hospital in Egypt, they have mentioned that, nurse's ages ranged from 21-32 years with mean age 25.1 ± 2.873 years.

Regarding the gender of the nurses 60 % nurse were male, which is disagreed with (Hussein, I. et al. 2013)10 reported in their study the impact of A designed Eye Care Protocol on Nurses Knowledge, Practices and on Eye Health Status of Unconscious Mechanically Ventilated Patients at North Palestine Hospitals, that more than half of the studied sample (54.3%) was male.

Finding out of data analysis showed that the majority of educational level of (60 %) were from Diploma graduates, this agree with the studies which carried out (Amina et al., 2014) 11reported that the majority of the study (94%) had a diploma degree, while (Khalil, et al. 2013)12 stated that the majority of nurses (76.4%) graduated from nursing school.

Concerning nurses' years of experience (53.4 %) had 1-6 years of experience this finding in the same line, (Ahmed Sh. 2007)13 reported that 70.3% of nurses had less than five years of experience. Also, (Mohamed H. (2014)14 reported that 43.3% of the studied nurses had below 5 years of experience. In contrast, (Khalil, et al. 2013)12 reported that 60% of nurses had an experience more than 10 years.

Effect of going for intravenous infusion therapy program on nurses' knowledge:

Concerning nurses' knowledge about how to administer the intravenous infusion therapy, the present study showed that there was a significant increase in the mean score of nurses' knowledge about how to administer the intravenous infusion after two and four months of applying the program compared to before implementing the program. In the same line, Al Yousef (2014)15 reported that there was a significant advancement in knowledge of the nurses regarding measures of infection control when giving intravenous infusion.

Also, this finding goes with (Mohammed et al/., 2015)3 they specified that there was a significant increase in the mean score of nurses' knowledge about how to administer the intravenous infusion therapy immediately and one month after implementing the protocol compared to before implementing the protocol. From the researcher's point of view, perhaps the reason for this difference is due to the nursing staff not receiving educational programs in hospitals that would increase the knowledge aspect of the nursing staff.

Regarding total nurses' knowledge score, the present study showed that (53.33%) of the nurses had good level of knowledge about intravenous infusion therapy after two months of implementing the program which partially decreased to (13.33%) four months after protocol implementation compared to (13.33 %) before implementing the program.

This finding was upheld by Mohamed (2015)16 who detailed that 29.5% of the studied nurses

had satisfactory knowledge regarding pressure ulcer pretest, while the majority of participants (87.5%) had satisfactory knowledge regarding pressure ulcer after application of the program. This improvement was partially lost to 80% during follow up assessment. Also, Al Yousef (2014)15 stated that 12.1% of the studied nurses had a good knowledge score regarding infection control before guidelines implementation which improved to be 84.8% after guidelines implementation.

Comparable discoveries reported by Mahmoud (2009)17 who reported that 20% of the studied nurses had a good knowledge score before program implementation which improved to be 94% after program implementation. Also, Khalil (2013)12 reported that no one of the studied nurses (0%) had good knowledge score about blood, blood transfusion and complication before implementing the protocol which become 87.3% after protocol implementation.

The present study showed that there was no statistically significant difference between total nurses' knowledge and their gender group, this finding was supported by Mohamed (2015)16 who reported that there was no statistically significant difference between total nurses' knowledge and their gender group. The study also showed that there was statistically significant difference between total nurses' knowledge and their age, level of education and years of experience. This may be credited to transfer of appropriate knowledge from old to new nurses which leads to reduced errors during intravenous fluids. This result is in disagreement with Mohamed (2015)16 reported that there was no statistically significant difference between total nurses' knowledge and their age, level of education and years of experience. Also, Khalil (2013)12 showed that there was no significant difference between nurses' knowledge and their age group and years of experience in medical surgical nursing.

Conclusion:

*Nurses' knowledge and performance regarding intravenous infusion therapy need improvement. Nurses are potentially capable of improving their knowledge and performance after exposure to intravenous infusion therapy protocol.

* Implementing the intravenous infusion therapy protocol was effective and improved nurses´ knowledge and performance regarding intravenous infusion therapy.

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