Original Article

Intravenous Infiltration and Extravasations: Knowledge among Nurses in Pediatric Hospitals in Khartoum State

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Abstract

Background: Infiltration and extravasation are complications of intravenous administration therapies involving unintended leakage of solution into the surrounding tissue. Consequences range from local irritation to amputation. The aim of the study is to study nurses' knowledge about intravenous infiltration and extravasation.

Method: Descriptive cross-sectional, hospital based-study. A study conducted at four pediatric hospitals in Khartoum state. 165 nurses were included using simple random sampling of different working experience. Data was collected by face to face interview questionnaire; knowledge scored according to Likert scale three points, from one to three, 3 being good, 2 for fair and 1 for poor for each question has an answer with more than or equal to three values. The data was managed and analyzed by statistical packages of social sciences version 20.

Results: (25.5%) of participants defined intravenous infiltration correctly, most participants (76.4%) had a poor level of knowledge about identification of infiltration, only (1.8%) of participants knew term extravasation, and the majority of nurses (78.2%) had a poor level of knowledge that antibiotics causing extravasation. There was statistically significant with qualification (P value 0.001)

Conclusion: The study concluded that nurses had a poor level of knowledge on intravenous infiltration and extravasation. The study recommended (education, guideline and standards) for intravenous therapy should be adopted to ensure the best practices.

Key words: Intravenous infiltration, extravasation, knowledge

Introduction

Intravenous infiltration and extravasation are the most common intravenous therapy complications. Infiltration is the leakage of a non vesicant solution into the surrounding tissue and extravasation is inadvertent leakage of a vesicant solution into surrounding tissue .Vesicant refers to any medication or fluid with the potential for causing blisters, severe tissue injury or necrosis[(1)]. Lack of the knowledge in these vesicants might increase the risk of extravasations [(2)].The nurse should routinely assess all vascular access sites for signs and symptoms of infiltration and extravasation based on patient population, type of therapy, type of device, and risk factors. The nurse should determine possible causes of infiltration and extravasation, which include mechanical, pharmacologic, obstructive, and inflammatory factors. It is important for the nurse to be able to recognize the early signs and symptoms of infiltration and extravasation [(3)] .Extravasation can be caused by physiochemical factors, including pH and osmolarity of some drugs, mechanical factors, occurring either during initial cannula insertion Children may be more susceptible to peripheral intravenous infiltration and extravasation because of developmental and physiological factors, such as

communication skills, activity level, and fragile vein [4].The Infusion Nurses Society (INS) developed an infiltration scale that measured edema in inches and graded numerically from zero to four[5] . A grading scale is recommended for assessing and determining the extent, standardizing the description of the infiltration, documenting the severity of the problem, and evaluating the degree and prevalence of infiltration[1] .

It is important to assess the ability of nurses to create positive change in the knowledge and practice. Number of researches regarding intravenous infiltration and extravasation among children from Sudan are limited. It is estimated that 78% of pediatric peripheral intravenous (PIV) lines become infiltrated and 11% of neonatal intensive care unit patients have IV extravasations [5]. The outcome from an infiltrate event can range from edema in an extremity to full-thickness skin loss, muscle or tendon necrosis, and in some cases, even amputation, these problems not only increased prolonged hospitalization and increased medical costs but also resulted in permanent damage and limitations of physical functions in pediatric patients [6].This study aimed to assess nurses` knowledge regarding intravenous infiltration and extravasation.

Methodology

A Descriptive cross- sectional, hospital based- study was conducted at the main pediatric governmental hospitals in Khartoum state (Ahmed Gasim pediatric hospital, Mohammed Elamin Hamid pediatric hospital,Gafaar Ibnuof pediatric referral hospital and ALbluck pediatric hospital **)** 165 nurses enrolled in the study by using a simple random sampling technique, regard less of qualifications and years of experiences, the sample size was calculated based on total population. Variables under study were, recognition of infiltration and extravasation, pharmacological factors contributing to the risk for extravasation, noncytotoxic medication associated with extravasation and the consequence of IV infiltration and extravasation. Data was gathered through face to face interviews questionnaire which composed of two sections: demographic data and knowledge of nurses based on Infusion Therapy Standards of Practice. Knowledge scored according to Likert scale three points, from one to three, 3 being good, 2 for fair and 1 for poor for each question has an answer with more than or equal to three values. Data was analyzed by a computerized program (SPSS) version 20 and presented in the form of simple frequency table and cross table to explore the relationship between variables. P value = 0.05 was considered statistically significant. Ethical approval was obtained from ethical committees and administrative authorities of hospitals.

Results:

Table 1. participants demographic dat n=165

Demographic	Frequency	Percentage
Age groups		
20-30 years	11	6.70%
31-40 years	92	55.80%
41-50 years	39	23.60%
> 50 years	23	13.90%
Nurses qualifications		
Ordinary nurse	57	34.50%
Diploma	71	43.00%
Bachelor	31	18.80%
Master	6	3.60%
Gender		
Male	30	18.20%
Female	135	81.80%
Years of Experience		
1-5 years	11	6.70%
6-10 years	31	18.80%
11-15 years	86	52.10%
> 15 years	37	22.40%
Total	165	100%

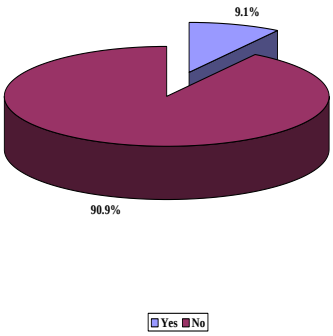

Figure 1. Previous training in complication of intravenous therapy (n=165)

Table (2): nurses` level of knowledge regarding IV infiltration and extravasation N=165

Variables	knowledge level					
	Poor		Fair		Good	
	N	%	N	%	N	%
Correct definition of IV infiltration	100	60.6	23	13.9	42	25.5
Signs of IV infiltration	126	76.4	17	10.3	22	13.3
Correct definition of extravasation	3	1.8	8	4.8	154	93.3
Signs of extravasation	149	90.3	9	5.5	7	4.2
Pharmacological factors risk for extravasation	153	92.7	10	6.1	2	1.2
Antibiotics associated with extravasation	129	78.2	30	18.2	6	3.6
Electrolyte solutions associated with extravasation	137	83.0	18	10.9	10	6.1
Consequence of IV infiltration and extravasation	150	90.9	11	6.7	4	2.4

Table 3. The association between qualification and knowledge about definition of extravasation n=165

Qualification		Level of knowledge			Total
		Good	Fair	Poor	
Ordinary nurse	Number	0	0	57	57
	%	0%	0%	100%	100%
Diploma	Number	0	1	70	71
	%	0%	1.4	98.6	100%
BSC	Number	1	3	27	31
	%	3.3%	9.7%	87%	100%
Msc	Number	2	4	0	6
	%	33.4%	66.6%	0%	100%
Total	Number	3	8	154	165
	%	1.8%	4.9%	93.3%	100%

Significant P value 0.001

Discussion

The study revealed that, quarter (43%) of the nurses carrying a Diploma degree in nursing and only 3.6% had master degree, probably this because most of MSC holders work at the higher education ministry as lecturers or emigrated. Only (9%) of nurses received a training course about intravenous therapy and its complications, although they have an important role in maintaining IV therapy using their knowledge—about infiltration signs and extravasation, this not similar to study with Lavery he reported that it is important to educate and train nurses associated with IV therapy which is necessary skills for nurses to anticipate problems and take actions to prevent adverse events occurring .[7] The majority of nurses (76.4%) did not know the signs of infiltration, this disagree with the study done by Dougherty [2]. Regarding the definition of extravasation only (1.8%) of nurses defined extravasation correctly, most of the nurses (93.3%) did not know the term extravasation this disagree to study by Sisan 54% of nurses knew the correct definition for extravasation and infiltration.[8] The nurses failed to define the term extravasation, this finding may be related to lack of education. (4.2%) of nurses only had a good level about the information that redness followed by blistering and necrosis signs of extravasation. In Sudan many of children with black skin color which is difficult to recognize extravasation early, this is supported by Treadwell that children and neonates with darker skin are more likely to suffer from extravasation. [9] Moreover (83.0%) nurses had a poor level of knowledge about electrolytes associated with extravasation. Doellman reported that Calcium Chloride leads to ischemia[10]. There was an inconsistency of nurses` knowledge regarding non cytotoxic medications associated with extravasation ,their good level of knowledge about ‑antibiotics causing extravasation was (3.6%), this finding due to lack of in service workshops and training courses , in addition poor level of knowledge in (90.9%) of the nurses about consequences of infiltration and extravasation this not in context to

study done by Park reported that the injury associated with extravasation in worst situations may require amputation, so the nurse must be vigilant for early signs of infiltration and extravasation .The current study showed differences in level of knowledge to nurses qualification p-value 0.001.

Conclusion: The study revealed that IV infiltration and extravasation knowledge among nurses at pediatric hospitals in Khartoum State was poor, and poor knowledge is significantly associated with the qualification of nurses. The study recommends that education, guidelines and standards for intravenous therapy should be adopted to ensure the best practice.

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