INJNS (37)1 (2024) 85-94

Iraqi National Journal of Nursing Specialties

Journal homepage: https://injns.uobaghdad.edu.iq/index.php/INJNS

Nurses' Practices in Ensuring Child Safety in Hemodialysis Centers

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ARTICLE INFO

Article History

Received: 08/04/2024

Accepted: 11/06/2024

Published: 30/06/2024

Keywords:

Pediatric hemodialysis,

Nurses' practice,

Children safety,

Quality improvement

ABSTRACT

Objective(s): This study's objective is to evaluate nurses' practice of patients' safety in pediatric hemodialysis centers and find which sociodemographic data are affecting on their practices.

Methods: A descriptive study has been applied to 48 nurses working at the hemodialysis centers at two Teaching Hospital in Salah Al-Din Governorate. The study was conducted on September 1st, 2023, to March 5th, 2024, utilizing non-probable sampling technique. A valid observational checklist by CDC used, consists of eight nursing responsibilities to evaluate nurses-based practice for patients` safety. The checklist was filled using a trichotomous scale with three evaluations: never (1 – 1.66), sometimes (1.67–2.33), and always (2.34–3). Data was entered and analyzed by SPSS program version 24.

Results: Most participants nurses were female, the majority of them were between the ages of 25 and 30 years with 70.8%. Their work experience was about 1-3 years in nursing and the hemodialysis department with 45 % of total nurses. The findings of the current study revealed that nurses had a moderate practice of children safety with an overall mean score of (1.8762). The study showed that there was a statistical relationship between the nurses' practices and their nursing qualification.

Conclusion: The study concluded nurses` practices for keeping children safety were inadequate. This inadequate level may lead to medical errors, complication, and financial burden for the family and health institutes.

Recommendations: It is recommended that the hospitals implement specialized training programs relevant to patients' safety to enhance nurses' awareness of children safety and improve quality of nursing care for pediatric patients.

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ممارسات الممرضيين في ضمان سلامة الأطفال في مراكز غسيل الكلى

المستخلص

الأهداف: هذ الدراسة تهدف إلى تقويم ممارسات الممرضين لسلامة المرضى في مراكز الانفاذ الدموي للأطفال، وايجاد أي من معلوماتهم الديموغرافية لها تأثيرا على ممارساتهم.

المنهجية: اجريت دراسة وصفية بين 48 ممرضاً في مراكز الانفاذ الدموي في مستشفيين تعليمي في محافظة صلاح الدين. أجريت الدراسة في الاول من ايلول 2023 إلى الخامس من اذار 2024. باستخدام اسلوب العينة غير الاحتمالية. استخدمت قائمة تحقق الممارسات ذات مصداقية من قبل مركز السيطرة والوقاية من الامراض CDC . مكون من ثماني واجبات تمريضية لتقويم الممارسات المعتمدة في سلامة المريض. ملئت قائمة تحقق الممارسات باستخدام مقياس ثلاثي من ثلاث ملاحظات : ابدا (1-1.66) ، احيانا (1.67-2.33) ، و دائما (2.34-3) . تم ادخال و تحليل البيانات باستخدام برنامج SPSS الاصدار 24.

النتائج: أكثر الممرضين المشاركين كانوا إناث، تراوحت أعمار غالبيتهم بين 25 و30 سنة، بنسبة 70.8%. كانت خبرتهم العملية حوالي 1-3 سنوات في التمريض وقسم الانفاذ الكلوي بنسبة 45% من مجموع الممرضين. أظهرت نتائج الدراسة الحالية أن الممرضين لديهم ممارسة معتدلة في سلامة الأطفال بمتوسط حسابي (1.8762). وأظهرت الدراسة أن هناك علاقة ذات دلالة إحصائية بين ممارسات الممرضين ومؤهلهم التمريضي.

الاستنتاجات: استنتجت الدراسة ان ممارسات الممرضين في المحافظة على سلامة الاطفال غير كافية. وهذه المستوى غير الكافي يمكن ان يؤدي الى الاخطاء الطبية، مضاعفات ، و عبء مادي على العائلة و المؤسسات الصحية.

التوصيات: أوصت الدراسة بتنفيذ برامج تدريبية مختصة بسلامة المرضى لرفع وعي الممرضين في سلامة الأطفال وتحسين جودة العناية التمريضية المقدمة للأطفال المرضى.

الكلمات المفتاحية: الانفاذ الدموي للأطفال، ممارسة الممرضين، سلامة المرضى، تقليل الأخطاء، تحسين الجودة.

Introduction:

Chronic kidney disease (CKD) is a common illness that affects people of all age groups, but it is more often seen in older persons [(1)]. CKD is a major public health challenge, with a global prevalence of 15-74.7 cases per million children [(2)]. Preventing CKD in children, slowing its progression, and managing complications are essential, especially in challenged health systems in low- and middle-income countries [(2)]. The prevalence of late stages of CKD in the population of the United Kingdom is estimated to be between 5.4% - 8.5% [(3)]. On the other hand, the prevalence of late stages estimated to be about 5.8% of all hospital admissions for children in Iraq. [(4)]. Renal replacement treatment has been steadily rising in recent years, primarily as a result of population aging [(5)]. Dialysis is an essential part of the therapy for most patients diagnosed with end-stage renal disease [(6)]. Nurses overseeing patients with kidney injury play a crucial role in understanding and managing dialytic therapies, especially those involving a biological component. Kidney injury is prevalent in community and critical care settings, with varying causes and management approaches [(7)].

Pediatric hemodialysis follows similar principles of care to adult hemodialysis, but requires adjustments to meet the specific needs of children. The duration and frequency of hemodialysis sessions may vary based on the individual requirements of each patients [(5)].

Nursing responsibilities in the hemodialysis care are crucial, since its significantly impact the well-being of patients undergoing hemodialysis. Nurses play essential role as frontline healthcare providers, beginning with patient assessment and the management of vascular access. During dialysis sessions, medical professionals monitor closely patients' vital signs, fluid balance, and electrolyte levels to guarantee the safe elimination of waste products and excess fluids from the bloodstream [(8)].

Nurses` practice and competences hemodialysis facilities play a significant role in maintaining the safety of patients and delivering high-quality treatment. The literatures emphasize important methods to improve safety culture, including training in

technology, proactive identification of risks, investigation of fundamental causes, application of checklists, and fostering good communication [4]. Nurses care quality influenced by factors such as experience, training, evidence base, and knowledge. Moreover, the literatures refer to notable correlation between these factors and the enhancement of care quality [9] .

Patient safety is paramount in pediatric hemodialysis, where even minor errors can have significant consequences. It is reveal that over 20% of complications in this vulnerable population stem from nursing practices, often linked to inadequate adherence to established hemodialysis guidelines. Strict compliance with these guidelines throughout treatment is crucial for ensuring patient safety and delivering high-quality care [10].

Understanding patient safety goes beyond simply avoiding harm. It's about actively preventing medical errors, promoting safe practices, and ultimately improving patient outcomes. This encompasses all aspects of healthcare, from diagnosing a condition to providing treatment and rehabilitation. Everyone involved in the healthcare system, from doctors and nurses to pharmacists and technicians, need to ensure patient safety, including children at hemodialysis [8].

Evaluating the patient safety culture among nurses uncovers different reductions driven by sociodemographic and professional factors, emphasizing the need for intervention to tackle problematic areas and improve the overall safety culture in pediatric institutions [10]. This study aims to evaluate nurses' practices related to children safety in pediatric hemodialysis centers, and identify if any sociodemographic factors influencing these practices. Limited research exists specifically on pediatric hemodialysis nursing, which presents a critical gap in their practices for caring of children with chronic renal failure, that requires specialized skills compared to adults. By investigating the current practices and the potential gaps among nurses, this study seeks to inform the development of targeted interventions to improve patient safety in this setting.

Methods

Study Design Setting

Descriptive research was undertaken, to investigate nurses` practices for applying pediatric safety measures at hemodialysis. The study started from September 1st, 2023 to March 5th, 2024. This research was conducted in Salah Al-Din Governorate, Iraq. Known two hemodialysis centers located at Tikrit Teaching Hospital and Balad General Hospital were chosen, because they are known to have established hemodialysis services. Both of these hospitals are under authority of the Iraqi Ministry of Health and Salah Al-Din Health Directorate.

Sample and Sampling

The target nurses who working in the two hemodialysis centers were 54 nurses. To ensure a representative sample size, the nonprobability sampling method was employed by a web-based calculator, Raosoft, and considered factors like confidence level, margin of error, and estimated population size. This resulted in a minimum sample size of 48 nurses, which provides a sufficient level of accuracy for our study.

Instrument of the Study

The Centers for Disease Control and Prevention CDC (2016) provided valid checklist, which was utilized to check applied safety measures by healthcare professionals for caring of patients with chronic renal failure [11]. The observational checklist consists of eight domain-preceded practices that cover the nurses' practices while caring for the children in the hemodialysis session.

Ensuring patient safety involves meticulous practices such as cannulating and decannulating arteriovenous fistulas and grafts, managing hemodialysis catheter connections and disconnections, monitoring patients and the dialysis machine during treatment, preparing and administering injectable medications, providing post dialysis care, and maintaining aseptic technique for catheter exit site care.

The checklist was scored by trichotomous Likert scale: never (1 – 1.66), sometimes (1.67–2.33), and always (2.34–3).

The highest score indicates higher safety practice.

Reliability of the Instruments

The CDC guidelines are trusted, valid, and reliable tool, that follow universally accepted standards. The adherence of these standard guidelines can reduce errors and bias, and promote quality performance [12]. The checklist was further refined through a pilot testing to ensure its clarity and comprehensiveness in capturing relevant nursing practices related to the care of children undergoing hemodialysis. The pilot study is a preliminary inquiry to establish the feasibility, costs, duration needed for data collection, and potential negative impacts and improve the research design. The inter-rater method was used to realize reliability (r =0.82).

Data Collection

The structured direct observation method by the researcher used for investigate and check nurses` performance at hemodialysis center for pediatric patients. The researcher observes each participant for each checklist items of three direct observation. The participants were informed on their right to refuse involvement in the study.

Ethical Considerations

This research was approved by the Ethics Committee at the University of Baghdad College of Nursing, and the Scientific Committee at Salah Al-Din Health Department, for demonstrating study adhered to ethical norms. The participants were informed of study purpose and the right of protection their personal data, before their consents were obtained.

Statistical Methods

The statistical analysis for this study was conducted using SPSS version 26. Descriptive statistics were employed to summarize the demographic characteristics of the study participants and to describe the frequency and distribution of nurses' practices. Inferential statistics, including t-tests and ANOVA, were utilized to examine differences in nurses' practices based on selected variables such as age, years of experience, and educational level. These statistical techniques allowed for a comprehensive analysis of the data, enabling the identification of significant relationships and patterns among the variables.

Results

Table 1. Nurses' sociodemographic characteristics.

Classes	Groups	Study sample (48)	
		Frequency	Percent
Age (years)	20 (less than 25 years)	19	39.6
	25 (less than 30 years)	21	43.8
	30 (less than 35 years)	4	8.3
	35 years +7 years	4	8.3
Sex	Male	14	29.2
	Female	34	70.8
Nursing qualification	Nursing preparatory school graduate	18	37.3
	Institute graduate	17	35.5
	Nursing college graduate	13	27.2
Years of hospital nursing experience	Less than one year	4	8.3
	1 year and less than 3 years	22	45.8
	3 years and less than 5 years	9	18.7
	More than 5 years	13	27.2
Years of hemodialysis department nursing experience	Less than one year	6	12.5
	1 year to less than 3 years	30	62.5
	3 years to less than 5 years	8	16.7
	More than 5 years	4	8.3

Participation of nurses in the safety training course	Not sharing	25	51
	One training course	17	32.4
	Two training courses	2	8.3
	More than 3 courses	4	8.3

This table indicating that the predominant age group in the overall nurses is between 25 and less than 30 years with mean age of 24 years with 43% of them. In terms of sex, females dominated with 70.8% and 37.5% of nurses held nursing preparatory school certificate. than half of have nursing experience in hospitals, representing 62.5%. with 1 to 3 years of experience. Finally, 51% of nurses have not participated in dialysis training courses.

Table 2. Nurses' Practices During Hemodialysis Session Scores (n=48)

Questions	Descriptive statistics			
	Mean	SD	RII	Eval.
Level (1): Arteriovenous fistula/graft cannulation (according to CDC)				
Arteriovenous fistula/graft cannulation (according to CDC) (N=10)	1.7208	0.3659	0.573	M
Level (2): Hemodialysis catheter connection (according to CDC)				
Hemodialysis catheter connection (according to CDC) (N=9)	1.8009	0.2518	0.6	M
Level (3): Nurses practice during the hemodialysis procedure				
Practice during the hemodialysis procedure (N=9)	2.2546	0.3020	0.6411	M
Level (4): Hemodialysis injectable medication preparation (according to CDC)				
Practice for injectable medication preparation (according to CDC) (N=7)	1.2083	0.5089	0.40	L
Level (5): Arteriovenous graft decannulation (according to CDC)				
Practice graft decannulation (according to CDC) (N=10)	1.92501	0.4795	0.643	M
Level (6): Hemodialysis catheter disconnections (according to CDC)				
Catheter disconnections (according to CDC) (N=9)	1.8009	0.2102	0.6	M
Level (7): Nurses practice during post hemodialysis procedure				
Practice during post hemodialysis procedure (N=10)	2.1583	0.3353	0.72	M
Level (8): Catheter exit site care observations (according to CDC)				
Practice-related catheter exit site care observations (according to CDC) (N=12)	1.8194	0.3762	0.6066	M
Overall items (N=74)	1.8762	0.3373	0.6115	M

SD= standard deviation**; RII=** relative importance index**; Eval=**evaluation. **L**=low (1.0-1.66), **M**=moderate (1.67-2.34), and **H=**high (2.35- 3).

Table (2) showed that, the nurses' practice was subpar (low to moderate level). On the other hand, the overall mean score (1.8194) of nurses' practices for caring for children with chronic renal failure.

Table 3. Relationship Between Nurses' Practice and Their Sociodemographic Characteristics

Practice								
Variables		**Sum of squares**	**df**	**Mean square**	**F**	**Sig.**	**T value**	**Ass.**
Age	Between groups	5.676	3	1.892	.895	.461	3.182	N/S
	Within	42.283	20	2.114				

	groups							
	Total	47.958	23					
Sex	Between groups	7.074	1	7.074	3.807	.064	12.71	N/S
	Within groups	40.884	22	1.858				
	Total	47.958	23					
Level of Education	Between groups	16.099	2	8.050	5.306	.014	4.303	S
	Within groups	31.859	21	1.517				
	Total	47.958	23					
Years of hospital nursing experience	Between groups	5.608	2	2.804	1.390	.271	4.303	N/S
	Within groups	42.350	21	2.017				
	Total	47.958	23					
Years of experience in the hemodialysis department	Between groups	3.014	3	1.005	.447	.722	3.182	N/S
	Within groups	44.944	20	2.247				
	Total	47.958	23					
Participation of nurses in the dialysis training course	Between groups	2.762	3	.921	.407	.749	3.182	N/S
	Within groups	45.197	20	2.260				
	Total	47.958	23					

N/S= not significant**, df:** degree of freedom**, sig. T value:** table value.

Table (3) illustrates that, there is no clear relationship between nurses' practice and their other sociodemographic characteristics, except with their educational level.

Discussion

Nurses` Sociodemographic Characteristics

Nurses' role is crucial in preserving vascular access, enhancing patient trust, and empowering patients through education [13]. Many studies highlighted the importance of nurses' practice in enhancing patients' outcomes by providing accurate information, and special training could effective in improving patient's outcomes successfully engaged nurses and patients in their care led increase compliance and satisfaction of both [14].

Table (1) reflected that, females were dominant, comprising almost three-quarters of the total sample. This result is contributed to the policy and registration system of the Ministry of Higher Education and Research prioritizes females for nursing profession. This result is consistent with previous findings in hemodialysis environment that, more than half of study participants were females [15]. However, another study that encouraging nurses to engaged into hemodialysis environment that, the majority of nurses were males [16].

Additionally, in this study high percentage of nurses were in their 20s. This result concurs with previous findings discovered that, more than half of nurses age was between 18 and 25 years old [17]. In the same line, with other studies reflected, majority of the study participants age were between 26 and 30 years old [18]. A study conducted by Ismael [19] in Sulaimani City unveiled that almost three-quarters of nurses were under the age of 38 year. In contrast to a prior study conducted by Ahmed [20]

discovered that, the majority of nurses were younger than 25 year. It can be elucidated that the hemodialysis centers require more younger nursing personnel due to the inability of older nurses to handle the workload and obligations in that critical care units.

Concerning the participants' education level, the highest percentage of the participants nurses had preparatory nursing schools and diploma qualification. This finding is agreed with previous reports that, the majority of participants were graduated from secondary nursing school (45%) [6].

The majority of participants were within 1-3 years of experience in the nursing field in hospitals. The present study's findings are corroborated by a study found that, the majority of participants had 1-3 years of experience [21]. However, this result differs from other reports stated that the majority of nurses had more than 5 years of experience [22]. As per hospital policy, nurses are required to work in a rotation system in most departments at the beginning of their employment until they are appointed based on the hospital's needs.

Nurses' Practices of Children Safety

The majority of the participants nurses demonstrated a moderate level of children safety practice and competency. In accordance with Salman and his colleagues [23] exhibited that, the majority of nurses demonstrated a decent degree of compliance for care while caring for patients with hemodialysis.

Consistent with Flayyih [24] study finding unearthed that, more than half of the nurses had poor practice for patient safety postoperatively. Agreeing with Omran & Shawq [25] finding that, more than half of nurses` safety measures for pediatric post-catheterization was at a fair standard [26] .

According to a follow-up study aimed for assessing nurses' practices during intravenous infusion that, nurses were not following the right nursing procedures before, during, and after the infusion [27]. In the same line, another study found nurses needed to enhance their healthcare professionals' awareness and their role in improving patient safety through various strategies like integrating notification into daily practice and strengthening multidisciplinary teams. This analysis revealed a minimal proportion of reporting about nurses' compliance with adverse occurrences. This underscored the need to allocate resources towards the development of the institution's safety culture by augmenting the healthcare staff's understanding of the significance of their contribution to increasing patient safety [28].

In line with another study for evaluating nursing practice towards the pediatric medication process, the study detected that medication errors were caused by an adverse influence on pharmaceutical safety [29]. This can be explained by the fact that many factors can affect the nursing practice, including level of education, workload, lack of training, and the complexity of the state of children with chronic renal failure.

Regarding nurses practices the study found there are unsatisfactory level in caring children in maintenance hemodialysis. The nurses had moderate level in overall level of practices, while the nurses had a low level in the medication preparation in hemodialysis session. This result had agreed with previous study for evaluating nurses practice during hemodialysis session the study found that, the nurses practice had unsatisfactory [30].

The results of the present investigation agreed with a study conducted in Baghdad City on the management of patients with vascular access care. The research disclosed that a significant proportion of nurses exhibited a substandard level of knowledge and proficiency regarding the nursing management of vascular access for patients suffering from chronic renal failure [29].

The relationship between nurses' practices and their sociodemographic characteristics

According to the study's findings, nurses' practice correlated with their educational attainment only, that explain the overall moderate practices and the influence of knowledge base on nurses` performance for safety measures

This result strongly agreed with a study, which expressed that there was a significant relationship between nurses' practice and their level of education [31]. The higher level

of education can increase nurses' awareness and responsibilities during direct care of patients, and improve their quality of care [32].

Conclusion:

In terms of patient safety when caring for children at hemodialysis centers, the majority of nurses' practices scored a moderately high mark, that reflect inadequate applying safety measures.

Recommendation

The study recommended that, hospitals need to launch specific training programs that cover the safety measures, discharge plan and provide instructions on how to care for children with chronic renal failure to boost the understanding of nurses regarding children population. Also, it is necessary to motivate nursing staff to actively update their practice upon standardized guideline, engaging conferences specifically focused on advance care of CKD, and enhancing their abilities.

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