Impact of Applying Nursing Guidelines on Nurses' Knowledge and Practice at Hemodialysis Units



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1- ABSTRACT

Background: Hemodialysis is a safe life procedure. On other hand, it causes threatening complications, which can lead to mortality and morbidity. So, nursing guidelines are one of the approaches that help to improve hemodialysis nurse's knowledge and practice which decrease the risk of hemodialysis complications. **Aim:** this study aimed to assess the effect of applying nursing guidelines on nurses' knowledge and practice at hemodialysis units. **Method**: A quasi-experimental design was adopted. **Setting:** The study was carried out at the Mansoura University Hospital hemodialysis unit. **Subject:** A purposive sample of fifty nurses of both male and female who affiliated to hemodialysis units and cared for patients undergoing hemodialysis. **Tools:** There were two tools used; Tool I: Structured Interview Questionnaire and, Tool II: Observational Practice Checklist. **Results:** Finding revealed that there was a positive effect in knowledge and practice level post applying nursing guidelines comparing with pre applying nursing guidelines. **Conclusion:** Study concluded that nurses' knowledge and practice have been successfully improved post applying nursing guidelines. **Recommendations:** Provide periodically evaluate nurses' knowledge and practice to find out what training programs are necessary

Key words: Hemodialysis, Nursing Guideline, Nurses 'Knowledge and Practice

2- Introduction:

Ethics Committee to carry out the proposed study. Every nurse has the option to accept or decline taking part in the study; participation is completely voluntary. Every person enrolled Globally; chronic renal failure (CRF) is a significant health issue. According to estimations, there are 850 million CRF patients worldwide, the majority of whom live in low- and lower-middleincome nations (**Francis et al., 2024**). According to the Egyptian Society of Nephrology, the prevalence of CRF patients who need dialysis is 650 per million populations through the year 2022(**Farag & El-Sayed, 2022**).

Dialysis serves as a substitute for the essential non-endocrine functions of a healthy kidney, which involves eliminating extra fluid and solutes (metabolism waste products, toxins, drugs, or other harmful chemicals). Hemodialysis (HD) and peritoneal dialysis (PD) are the two primary types of dialysis therapy, which are used globally in 89% and 11% of dialysis patients, respectively. (Pstras et al., 2022).

Hemodialysis (HD) is a method of removing excess waste products such as water, urea, and creatinine in instances of end-stage renal failure. Globally, it is the most popular form of renal replacement treatment (RRT). (Ali, Yaqoob, & Aziz 2023).

So that, patients receiving hemodialysis thus procedures require specialized nursing care. As a result, highly qualified staff skilled in hemodialysis techniques are needed. Also, nurses employed in the dialysis unit should comply with the nursing guidelines, which are considered as a starting point for better practice (Wearne, Krause, Davidson, & Brennan, 2020).

Hemodialysis nurse is essential in giving information, care, support, empathy, and psychological counseling, throughout the patient's whole illness (**Machaly, Bahgat, Hassan & Kafl, 2020**)

The HD nurses' educational guidelines provide an environment for enrichment and professional growth. Superior nursing care can improve patients' ability to take action, lessen their sense of powerlessness, and enhance their level of satisfaction. (Besely, Faheim, & Aly, 2020). Therefore, this study was carried out to assess the impact of applying nursing guidelines on nurses' knowledge and practice at hemodialysis units.

2.1 Significance of the Study

Chronic renal failure is now the main cause of morbidity and death, which affects 10%-13% of the world population. Additionally, is a significant global public health concern. (Ammirati, 2020).

According to WHO data published in 2020 Kidney Disease that, hemodialysis patients have greater death rates, compared to other diseases. Nephrology nurses must thus participate in regular educational programs that equip them with the skills and information needed to enhance the quality of care provided to their patients and avoid complications from HD. (Osman, El Banna, Sharaf, & Mohammed, 2021).

2.2 Aim of the study:

It was aimed to assess the effect of applying nursing guidelines on nurses' knowledge and practice at hemodialysis units.

2.3 Research Hypothesis: Nursing guidelines will have a positive effect on nurses' knowledge and practice at hemodialysis units.

3- Method

3.1 Research Design: A quasi-experimental design was used.

3.2 Setting: This study was completed at the Mansoura University Hospital's hemodialysis unit.

3.3 Subject: A purposive sample of fifty nurses of both female and male who are affiliated to the previously mentioned setting, with diverse ages (18-50years old), different levels of education, and fulfilling the following criteria, providing direct care for patients, agree to participate and have at least one year experience.

3.4 Tools: In this study, two tools were employed to collect data.

Tool I: Structured Interview Questionnaire: This tool was developed based on literature review and a scientific reference to collect required baseline data (Saleh, Ali, & Afifi, 2018; Manandhar, Chhetri, Poudel, Baidya, & Agrawaal ,2017). This tool is divided into two parts:

Part 1: Demographic Characteristics of Studied Nurses: Included personal data as age, gender, education, years in the field and attendance training programs related to hemodialysis.

Part 2: Nurses' Knowledge Questionnaire

It was used to evaluate nurses' knowledge in relation to care provided for hemodialysis patients and consisted of (44) questions such as the definition of chronic renal failure and causes, definition and causes and complications of hemodialysis, nutrition of hemodialysis patients, fistula and vascular access type and care and complication.

The scoring system's answers were: Each right answer received two marks ,while an incomplete answer received one mark, and a wrong or no answer received a zero then summed, turned into a percentage, and divided into good knowledge ($\geq 75\%$), fair knowledge (60 %< 75%) and Poor knowledge (<60%) (Saleh, Ali, & Afifi, 2018).

Tool II: Observational Practice Checklist: It was developed by the researcher after reviewing the recent literatures (Algadi, 2018) to evaluate nurses' performance in light of nursing guidelines. It covered each element of care given by nurses to hemodialysis patients before, during, and after sessions.

The scoring system's two marks were given for done correct and complete practice, one mark for done correct and incomplete practice and zero for done incorrect and incomplete practice then summed, turned into an excellent level of practice (>-75%), a satisfactory level of practice (60-<75 %)and unsatisfactory level of practice (<60%)(**Saleh**, **Ali**, **& Afifi**, **2018**)..

3.5 Data collection:

The time frame for the data collecting was six months starting from November 2021 to April 2022 and it was conducted by using the following step:

Written approval and permission:

An official written approval from the Faculty of Nursing at Mansoura University was directed to responsible authorities of hemodialysis unite at Mansoura University to obtain permission to conduct the study after explanation of the aim and nature of the study

Tool development:

The tool was done after reviewing the most recent relevant literature (Saleh, Ali, & Afifi, 2018; Manandhar, Chhetri, Poudel, Baidya, & Agrawaal, 2017)

Validity:

The tools were tested for appropriateness, completeness, significance, modification, and authorization by five experts, professors, and assistant professors from the Faculty of Nursing, Mansoura University and one specialist professor of nephrology at the hemodialysis unit. They viewed the clarity, relevance, understanding, and applicability of study tools, and necessary modifications were done according.

Reliability:

The reliability test was done using Cronbach's Alpha test to calculate the consistency of the tool. These techniques showed high reliability of the final version of the tool the correlation coefficient was r = 0.93 for tool I and r = 0.87 for tool II

3.6 Pilot study:

Pilot research included five (10%) nurses employed in a hemodialysis unit. It was carried out in order to ensure clarity and the extent to which it can be applied. Modifications were done based on pilot study results. The study sample did not include participants from the pilot study.

3.7 Field work:

The study was completed according to 4 phases:

1-Assessment phase:

The researcher began by introducing herself to the nurses, outlining the purpose of the study, and getting each nurse's verbal consent.

Initial assessment was demographic data such as; (age ,gender ,education, years in the field and engaging in training courses related to hemodialysis....etc.) was collected by using a tool I part

After that, the nurses were asked to fill out Tool I (the Structured Interview questionnaire) at their initial interview in order to determine their knowledge regarding hemodialysis and they were asked to complete part two in tool 1 again after applying the nursing guidelines

Additionally, each nurse was observed individually in morning, evening shift over3 times (pre, during, and after the hemodialysis session) until completing all care and completed Tool II.

2- Planning phase:

Upon the assessment phase's findings (pretest), the education booklet was developed. Which, includes two parts. The first part provided information about everything about renal failure causes and complications and singes, hemodialysis definition and complications. Additionally, second part includes everything related to nursing care for hemodialysis patients pre-, during, and posthemodialysis sessions and patient's health education.

3. Implementation phase

- Nursing guidelines were carried out in 4 sessions, one theoretical (educational) and 3 practical sessions, were planned by researcher for studied nurse.
- The nurses were split into groups of four to six nurses according to nurses'schedule and working hours, each group took 4 sessions and each session lasted about 30-45 minutes.
- The researcher employed a variety of instructional strategies as lecture, and discussion, as well as presented by using a booklet, laptop, and using simple, brief, and clear words.

The first session covered the following; kidney anatomy, function of kidney, type of renal failure, signs of renal, type of dialysis, definition of hemodialysis, mechanism of hemodialysis, vascular access types, care, and complications.

The second session covered the following: all nursing practices provided for hemodialysis patient before hemodialysis session such as preparation patient, nurses preparation and hemodialysis machine preparation

The third session consisted of all items of nursing practices provided for hemodialysis patient during hemodialysis sessions such as asses vital signs, asses vascular access, dealing with hemodialysis machine alarms and hemodialysis complications.

The fourth session: it consisted of all items of nursing practices provided for hemodialysis patient post hemodialysis session.

4. Evaluation phase

Each nurse in the studied nurses was interviewed post-applying nursing guideline sessions by using Tool I part 2 and Tool II. To evaluate the impact of nursing guidelines on nurses knowledge and practice at hemodialysis. The results were compared to pre test results.

3.8 Ethical Considerations

Initial approval was received by the Mansoura University Faculty of Nursing's Research in the study gave verbal consent. Data coding ensured anonymity and confidentiality; participants had the option to withdraw from the study at any time; subjects were guaranteed that their data would not be used for research purposes without consent; the data was collected solely for the purpose of the study; and the full sample required for the study will be used until it has been analyzed.

3.9 Statistical analysis:

The collected data were organized, tabulated, and statistically analyzed using SPSS software. The normality distribution was tested through Shapiro-wilk test and the normality assumption was rejected (p<0.05). Therefore, the categorical variables were represented as frequency and percentage. Whereas ordinal and nonparametric continuous variables were presented as median and interquartile range (IQR). The Wilcoxon Signed Ranks Test was used to compare the differences between two non-parametric continuous variables and ordinal variables (pre & post). The Marginal Homogeneity Test was conducted to compare the differences between categorical variables (more than two categories pre & post).A Chi square test and fisher exact test were used to test relationship between categorical variables .Statistically significant was considered at p-value $\leq 0.05 \& 0.01$.

4-Results

Table (1) Presented that, more than threequarter of the sample were male (78%), and more than half of them (58%) were in the age group of eighteen to thirty years old. Concerning the level of education more than two-fifths of nurses (42%) have a bachelor's degree. As regards years of experience, almost two-thirds (68%) had more than three years' experience. Additionally, more than half of them (54%) did not attend sessions regarding hemodialysis

Figure (1) illustrates that knowledge levels of the studied nurses regarding hemodialysis preand post-applying nursing guidelines the majority (96.0%) of studied nurses had good knowledge level post applying nursing guidelines compared to pre-applying nursing guidelines more than onethird (38.0%) had a good level.

Figure (2) illustrates the practice levels of the studied nurses regarding hemodialysis pre and post-applying nursing guidelines the majority (96.0%) of studied nurses had good practice levels post applying nursing guidelines compared with pre-applying nursing guidelines less than one-fifth (16.0%) had good level.

Table (2) shows that there was no statisticalsignificance for all variables of knowledge levelsexcept between nurses' educational levels and theirknowledge levels post-applying nursing guidelines $\chi 2 / p 0.04$

Table (3): Demonstrated that there was no statistically significant difference for all variables of practice levels except between nurses' educational levels and their practice levels preapplying nursing guidelines $\chi 2/p = 0.01^{**}$.

Table (1). Demographic Characteristics of the Studied Nurses (n=50).

characteristics	n	%	
Age (years)			
18-30	29	58.0	
31-40	12	24.0	
40-50	9	18.0	
Gender			
Female	11	22.0	
Male	39	78.0	
Education			
Diploma	10	20.0	
Technical nursing	16	32.0	
Bachelor degree	21	42.0	
Postgraduate studies	3	6.0	
Years of experience in field			
1 year	6	12.0	
1-3 years	10	20.0	
≥3 years	34	68.0	
Training regarding hemodialysis			
No	27	54.0	
Yes	23	46.0	



Figure (1). Knowledge Levels of the Studied Nurses Regarding Hemodialysis Pre- and Post-Applying of Nursing Guidelines



Figure (2). Practices Levels of the Studied Nurses Regarding Hemodialysis Pre- and Post-Applying Nursing Guidelines

Table (4). Re	elationship Betwee	1 Overall Studied	Nurses' Knowledge an	nd Their Demographic	Data $(n=50)$.
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	•	Knowledge levels before applying nursing guidelines							Knowledge levels after applying nursing guidelines								
Characteristics		poor knowledge		fair knowledge		good knowledge		or χ2 / p	Poor knowledge		fair knowledge		good knowledge		FE or χ2 / p		
		n	%	n	%	n	%	-	n	%	n	%	n	%			
Age																	
•	18-30	2	6.9	15	51.7	12	41.4		0	0.0	1	3.4	28	96.6			
•	31-40	0	0.0	7	58.3	5	41.7	FE /0.48	0	0.0	1	8.3	11	91.7	0.98		
•	>40	2	22.2	5	55.6	2	22.2	70.40	0	0.0	0	0.0	9	100.0	/0.61		
Geno	ler																
•	Male	3	7.7	21	53.8	15	38.5	0.03/	0	0.0	1	2.6	38	97.4	0.95		
•	Female	1	9.1	6	54.5	4	36.4	0.98	0	0.0	1	9.1	10	90.9	/0.33		
Education																	
•	Diploma degree	2	20.0	5	50.0	3	30.0		0	0.0	0	0.0	10	100.0			
•	Technical degree		6.3	10	62.5	5	31.3	3 75/	0	0.0	1	6.3	15	93.8	8 23		
 Bachelor degree postgraduate studies 		1	4.8	10	47.6	10	47.6	0.71	0	0.0	0	0.0	21	100.0	/0.04*		
		0	0.0	2	66.7	1	33.3		0	0.0	1	33.3	2	66.7			
Expe	rience																
•	1 year	0	0.0	1	16.7	5	83.3	- 101	0	0.0	0	0.0	6	100.0			
 1-3 years 		1	10.0	5	50.0	4	40.0	6.43/	0 0.0	0.0	0	0.0	10	100.0	0.98		
-	> 3 years	3	8.8	21	61.8	10	29.4	0.17	0	0.0	2	5.9	32	94.1	/0.61		
Atter	Attending training program																
	• No	0	0.0	16	59.3	11	40.7	5.11/	0	0.0	1	3.7	26	96.3	0.01		
	• Yes	4	17.4	11	47.8	8	34.8	0.08	0	0.0	1	4.3	22	95.7	/0.91		

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Characteristics		Pra	els pre- guide	g nur	sing	FE or	Practice levels post-applying nursing guidelines						FE or χ2 / p			
		unsatisfactory Satisfactory		ex	cellent	$\chi 2 / p$	unsatisfactory			satisfactory	excellent					
		n	%	n	%	n	%		n	%	n	%	n	%		
Age																
-	18-30	1	3.4	24	82.8	4	13.8		0	0.0	0	0.0	29	100.0		
 31-40 		0	0.0	9	75.0	3	25.0	FE/	0	0.0	1	8.3	11	91.7	2.98/	
•	>40	0	0.0	8	88.9	1	11.1	0.76	0	0.0	1	11.1	8	88.9	0.23	
Gend	ler															
•	Male	1	2.6	32	82.1	6	15.4	0.32/	0	0.0	2	5.1	37	94.9	0.59/	
	Female	0	0.0	9	81.8	2	18.2	0.85	0	0.0	0	0.0	11	100.0	0.44	
Education																
•	Diploma degree	0	0.0	9	90.0	1	10.0		0	0.0	1	10.0	9	90.0		
•	Technical degree	1	6.3	13	81.3	2	12.5	FE/	0	0.0	0	0.0	16	100.0	FE/	
•	Bachelor degree	0	0.0	19	90.5	2	9.5	0.01**	0	0.0	1	4.8	20	95.2	0.73	
•	Postgraduate studies	0	0.0	0	0.0	3	100.0		0	0.0	0	0.0	3	100.0		
Expe	rience															
	1 year	0	0.0	5	83.3	1	16.7		0	0.0	0	0.0	6	100.0	0.001	
	1-3 years	0	0.0	10	100.	0	0.0	FE/	0	0.0	0	0.0	10	100.0	0.98/	
•	> 3 years	1	2.9	26	76.5	7	20.6	0.48	0	0.0	2	5.9	32	94.1	0.01	
Attending training Program																
•	No	1	3.7	24	88.9	2	7.4	FE/	0	0.0	1	3.7	26	96.3	0.01/	
•	Yes	0	0.0	17	73.9	6	26.1	0.12	0	0.0	1	4.3	22	95.7	0.91	

Table (5). Relationship between overall studied nurses' practice and their demographic data (N=50)

5- Discussion

Hemodialysis nurses need innovative nursing guidelines to be consistent with the fundamental principles of caring, honesty, diversity, and excellence. Which offers an environment for professional development and enrichment. It is essential to carry out innovative educational programs to give them access to chances for lifetime learning. Nephrology nurse educators and clinical practice partners must work together to build new models of progression that shift the role of HD nurses to graduate degrees at a lower cost in order to prepare a more educated and diverse workforce. (**Besely, Faheim, & Aly, 2020**).

Concerning studied nurses' demographic characteristics, the findings expressed that above half of the nurses under study were in the age range of eighteen to thirty years. This is in the line with Ali, Mahammad, El-mohsen & Ali, (2018) who discovered that the studied nurses' average age was between eighteen to twenty-eight years. This result is inconsistent with the study conducted by **Abdo**, **Ramadan**, **Tosson & Al-Fadhli**, (**2020**) who report that above half were aged between thirty-one to thirty-five. This difference may be due to job descriptions that necessitate the young nurses for directly with patients when older nurses handle managerial duties.

The results indicated that over three-quarter of sample were males. Similarly, **Alnawafleh**, **Mohamd & Al-Nwafleh**, (2018) stated that above two third of the studied nurses were male. However, the result disagrees with the study conducted by **Mohammed& Baeez**, (2023) who found that nearly two third of studied nurses were female. This may be because of males work more than females during this period because it was the coronavirus pandemic and a period of isolation. In terms of education, baccalaureate degrees were held by more than two fifth of studied nurses. This outcome was consistent with the research conducted by **Osman, El Banna, Sharaf,** and **Mohammed, (2021)** which stated that more than three quarter of the sample were baccalaureate degree. Inconsistent with **Abdo, Ramadan, Tosson** & **Al-Fadhli, (2020)** who found that over half of the studied nurses had diploma degrees. According to researcher's view, this difference could be because there is a national direction to appoint bachelor-nursing graduates in dialysis units to raise the standard of care given to patients undergoing hemodialysis who require professional health care with a highly skilled and highly educated.

Pointing to experience, almost two thirds of nurses in this survey had worked more than three years. Along the same vein **Fanta**, Legesse, & **Legesse**, (2023), it revealed that over half of nurses in the study had years of experience more than four years. Discrepancy with **Elgazar**, **Raghep**, **Mohamed**, and **Mohamed** (2020) who reported that more than two fifth of studied nurses had experience years within one year to less than five years. The researcher believes that experience in sensitive place such as hemodialysis units positively effect in nursing practice and patient outcomes.

In relation to training, it was observed over half of the nurses under study did not attend training courses regarding hemodialysis. Supported with Nagy Azer Azer, Said Mahmod, and Fathy Mohamed (2024) who noticed that the majority of sample didn't attend hemodialysis-related training programs. Inconsistent with the result done by Mohamed, Mohamed Saleh, Mohamed, and Hassan (2023) which stated that almost two-thirds of nurses in the study participate in hemodialysis training courses. This difference may be related to mostly of training courses in hospital carried out the same basic nursery care not according to each department needs.

Considering level of total knowledge, it was clear that most of the nursing under study had good knowledge, with highly statistically significant, post-implementing nursing guidelines. This outcome came in the same line with Besely, Faheim, and Aly (2020) who discovered that most of studies sample had solid knowledge. In contrast, this study was supported by Machaly, Bahgat, Hassan & Kafl, (2020) who reported that the majority of studied sample had good knowledge. This can be because there aren't enough training courses and limited of availability of manual booklet about hemodialysis.

Regarding total nurses' practice level, this result showed that the majority of the nurses under study demonstrated good practice levels after the application of nursing guidelines, which was highly statistically significant. Supported by Elgazar, Raghep, Mohamed & Mohamed, (2020) who reported that the majority of studied nurses reached to satisfactory level of practice post applying to educational programs. Also, similarly to Osman, El Banna, Sharaf and Mohammed (2021) who discovered that following the implementation of educational interventions, four fifth of the nurses in the study attained a high degree of practice. From the perspective of the researcher, these variations are caused by nurses not receiving training in the hemodialysis unit for nurses' practice-related hemodialysis as before, during, and after hemodialysis session.

Concerning the relation between overall studied nurses' and knowledge their **demographic** characteristics, the current study demonstrated that, with the exception of education level in post-applying nursing guidelines, there was no statistically significant relationship between the total investigated nurses' knowledge and their demographic features. . This result was supported bv Abou Elazayiem Bayumi, Elshahat ElGammal, Dardier Hussein Awad and Mohamed Elsayed (2020) who reported that there was a very statistically significant relationship was found between the years of experience and educational level both before and after the implementation of educational program. On the other hand, this result disagrees with Osman, El Banna, Sharaf & Mohammed, (2021) who reported that there was no statistical significant relation between studied nurses' knowledge and their demographic characteristics.

Regarding the relation between the overall studied nurses' practice and their demographic characteristics, the present study illustrated that there were not statistically significant except level of education in preapplying nursing guidelines. Came in line with, Machaly, Bahgat, Hassan & Kafl, (2020) who found that, the practice of the nurses under study and the years of experience prior to the adoption of the evidence-based nursing guidelines differed statistically significantly. In researcher point of view, this relation due to most the research sample was from the bachelor's degree, they have more information and training in college that makes their performance better

6- Conclusion

The current study found that the level of overall knowledge, and practice regarding hemodialysis and patient care post-applying nursing guidelines was highly statistically significant.

7- Recommendation

- Periodically assessment and applying principles of hemodialysis patient care, infection control and how to handle with dialysis machine before session.
- Periodic evaluation of nurses' knowledge and practice to determine the need for the training programs
- Further research: the study should replicate on large sample of nurses in different dialysis units.

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