

Effect of Guidelines Based Practice on Dialysis Complications in Patients on Permanent Hemodialysis

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ABSTRACT

Background: Hemodialysis patients experienced a number of issues that led to early session termination, decreased waste removal, and ultimately decreased dialysis effectiveness. The dialysis unit's nursing staff struggles to care for these patients. An updated practice guideline is needed to provide the proper interventions to lower complications and improve patient outcomes. Long-term maintenance hemodialysis has also changed the way that patients with end-stage renal failure are treated, reducing the risk of death.

Objective: To assess the effect of guidelines based practice on dialysis complications in patients on permanent hemodialysis.

Methodology: A single group quasi experimental conducted in Sheikh Zayed Hospital Lahore Punjab Pakistan from 1 June to 15 August 2022, data was collected Through the use of a self-structured tool from 30 people receiving hemodialysis for at least six months. The validity and reliability of the tool were initially assessed. A systematic instruction workshop was offered to care providers following the pre data, and the previously described criteria were reassess.

Result: According to this study, there were 60% men and 40% female, had age between 30 to 39 (43.3%) and mostly 70% belong to urban area. The McNemar test evaluated the reduction between the pre- and post-dialysis fatigue, headache, vomiting, nausea, breathlessness and cramps with statistical significance ($P < 0.05$).

Practical implication: Patients receiving hemodialysis must need a complete nursing care in order to reduce dialysis induced complications.

Conclusion: The significant reduction of dialysis complication after conducted dialysis on guideline base; it is recommended that dialysis be performed in accordance with the most recent clinical guidelines to improve hemodialysis procedures and boost hemodialysis efficacy.

Keywords: Hemodialysis, Guidelines based practice and Dialysis Complications

INTRODUCTION

Hemodialysis (HD) is a method of removing excess waste products such as creatinine, urea, and water from the blood of end-stage kidney disease patient. Hemodialysis is the most common renal replacement therapy (RRT) in Pakistan and around the world. Over 2 million people worldwide undergo hemodialysis. According to a recent study for hemodialysis patients who receive 14 to 17% hospitalization annually. The estimated number of hemodialysis patients will rise to 3 500 000 by 2020⁽¹⁾.

Inadequate hemodialysis can increase illness complications, length of stay, and patient costs. In Pakistan the annual cost of hemodialysis is estimated 4,669 dollar, almost four times greater than per person income of 1,260 dollar per year. Now a day single session of hemodialysis costs 3,000 to 8,000 rupees, bring about in an average cost of 550,000-700,000 Rupees per year⁽²⁾.

Most studies suggest that in Pakistan, end-stage chronic kidney disease (ESKD) is a young stage disease with a median age of 44 years for patients approaching ESKD; comparing this report to US having median age of 63 due to the lack routine medical care in Pakistan. Approximately 10% of patients with ESKD are on dialysis, and the majority of them die within 3 months of starting dialysis⁽³⁾.

In Pakistan High mortality rate of 40.6%, especially in Punjab, where the study was conducted, first year mortality in Hemodialysis patients is very high (35% in all males and females, 39.7% in males and 37.6% in females⁽⁴⁾). While crude 1-year mortality rates in Hemodialysis patients were 6.6% in Japan, 15.6% in Europe, and 21.7% in the United States⁽⁵⁾. Hemodialysis can improve the standard of living and extend life, however hemodialysis provides only 10% of normal kidney function⁽⁶⁾. Also causes serious complications; some of the highlighted recurrent clinical conditions as intra-dialytic hypotension, intra-dialytic hypertension, Hyperkalemia, edema and organ failure during dialysis sessions. Uncontrollable high blood pressure and edema are the main risk factor developing heart disease⁽⁷⁾. The

prevalence of hypertension during dialysis is 15% to 50% of patients receiving hemodialysis treatment⁽⁸⁾.

Over the past decade, there has been increasing evidence that blood pressure (BP) and body volume status are important regulators in maintaining treatment outcome in dialysis patients⁽⁹⁾. Increase in extracellular volume development Intra-dialytic hypotension (IDH), undesirable symptoms, and inadequate organ perfusion⁽¹⁰⁾. Pays attention to volume-related symptoms and nursing staff as a central topic and focus of ongoing research⁽¹¹⁾.

Developing countries, including Pakistan, are facing a silent epidemic of end-stage renal disease in the current global burden of chronic kidney disease (ESRD)⁽¹²⁾. A Recent study reported that 150 ESRD cases per million are diagnosed each year, resulting in 16000 new cases each year⁽¹³⁾. There are only a few centers that offer kidney transplantation to the massively arising cases of ESRD. Furthermore long term maintenance hemodialysis has changed the care of terminally ill renal failure patients, and reduces the chances of mortality⁽¹⁴⁾. Nurses are directly involved in the process of hemodialysis; to control the potential complications and improve dialysis outcome⁽¹⁵⁾. Many observational and several interventional studies indicate that; increased dialysis times, slower ultrafiltration rate, standard base assessment of dry weight, guideline recommended dialysate composition and excluding relative factors such as dialysate temperature and position of the patient; reduced the dialysis complication and improve dialysis efficacy⁽¹⁶⁾. Additionally hemodialysis is widely used to treat patients with Chronic Kidney Disease but till to now no baseline study conducted in Pakistan to implement the guideline base hemodialysis practice and evaluate its effect on the patient dialysis indicators and complications. Applying international hemodialysis guidelines may be its will improve dialysis outcome and reduced dialysis complication.

MATERIAL AND METHODS

Method: Quasi-Experimental Study conducted in dialysis unit at Shaikh Zayed Hospital Lahore.

Population: Patient undergoing hemodialysis with a permanent arteriovenous fistulas (AVFs).

Sampling technique: A Purposive sampling technique was used for the recruiting of study participants

Sample size: A total of 30 patients were selected both male and female, having aged 18 to 60, on center-based dialysis and had a kidney GFR of less than 15 milliliters per minute.

Development of instrument: A Self-structure tool was used to assess dialysis complications in hemodialysis patients validated from five experts having qualification Fcps in Nephrology and above 5 year experience in respective field.

Reliability and validity: The self-structure questionnaire was reliable with score of 0.724 on Cronbach's Alpha and content validity index was 0.91.

Data Collection: Data was initially gathered from a study participants. Following that, healthcare providers underwent a structured teaching workshop that lasted for three months. The guidelines for hemodialysis practice were then put into action, and data was collected again after this implementation

Data analysis: Data was analyzed through percentage (%) and frequency distribution table, on the base of Shapiro–Wilk test data was not distributed normally. So a McNemar was used to compare the pre and post data with $P < 0.05$.

RESULTS

Descriptive Statistics: According to Table 1, 60% of the patients were men, compared to 40% of women. 43.3% of the study subjects were between the ages of 30 and 39. This table also included information about the patients' places of residence, showing that roughly 70% of the participants were from urban areas and only 30% were from rural ones. In terms of how long patients had been receiving hemodialysis, 53.3% of patients had been receiving it for at least 5 months, 40% had been receiving it for between 6 and 11 months, and just 6.7% had been receiving it for more than 2 years.

Table 1: Socio Demographic Variables of Hemodialysis Patients

Demographic Variable		n	%
Gender	Male	18	60.0
	Female	12	40.0
Age	18-29	1	3.3
	30-39	13	43.3
	40-49	9	30.0
	50-60	7	23.3
Patient Residency	Urban	21	70.0
	Rural	9	30.0
Duration of HD	1-5 month	16	53.3
	6-11 month	12	40.0
	1-2 year	2	6.7
	>2 year	0	0

Descriptive Statistics analyzed by frequency 'n' and percentage %'

Table 2: Comparison of Hemodialysis Complications pre and post intervention

Complications		Pre				Post				P-value
		No	Yes	n	%	n	%			
Post dialysis Fatigue	No	16	1	17	56.6	28	93.4	0.003		
	Yes	12	1	13	43.4	2	6.6			
Headache	No	12	2	14	46.6	28	93.4	0.001		
	Yes	16	0	16	53.4	2	6.6			
Dizziness	No	11	1	12	40	27	90	0.000		
	Yes	16	2	18	60	3	10			

McNemar Test, Exact. Sig. (2-tailed) $P < 0.05$

This table primarily displayed documented hemodialysis complications such as post-dialysis fatigue, dialysis-induced headache and dizziness, and cramping. The reported effects of dialysis tiredness were 43.4% and 6.6%, respectively, when comparing the pre- and post-intervention phases of a dialysis session ($P=0.003$). With a statistical P value of 0.001, the pre-intervention headache prevalence was 53.4% and the post-guideline base dialysis prevalence was 6.6%. Dizziness was

reported to be 60% after post-guideline base dialysis, but it was reduced to 10% after post-guideline base dialysis. (0.000). Following the implementation of the guideline-based practice, the complication was statistically significantly reduced, according to the results of the $p < 0.05$ statistical test (table 2)

Table 3: Comparison of Hemodialysis Complications pre and post intervention

Complications		pre				post		P-value
		No	Yes	n	%	n	%	
Breathlessness	No	14	0	14	46.6	25	83.4	0.003
	Yes	11	5	16	53.4	5	16.6	
Nausea	No	17	2	19	63.4	28	93.4	0.002
	Yes	11	0	11	36.6	2	6.6	
Vomiting	No	12	1	13	43.4	27	90	0.001
	Yes	15	2	17	56.6	3	10	
Cramps	No	14	2	16	53.4	26	86.6	0.013
	Yes	12	2	14	46.6	4	13.4	

McNemar Test, Exact. Sig. (2-tailed) $P < 0.05$

The result showed that Breathlessness, nausea, vomiting, and cramping were statistically significantly less common during guideline basis dialysis compared to routine base dialysis (pre intervention). Before and after the intervention, 53.4% of people reported having trouble in breathing, 36.6% reported having nausea, and 10% reported having vomiting. In a similar manner, the post-dialysis cramps were statistically significant ($P < 0.05$) before the intervention at 46.6% and after it at 13.4%. (Table 3).

Table 4: Compare Hemodialysis patient's peripheral Edema Score pre and Post intervention; comparing median (M)

Hemodialysis Indicators	Pre			Post			P-Value
	n	%	M	n	%	M	
Edema Grade +1	5	16.7	3	11	26.7	2	0.000
Edema Grade +2	9	20		18	60		
Edema Grade +3	12	40		1	3.3		
Edema Grade +4	4	13.3		0	0		

Wilcoxon Signed Ranks Test, Asymp. Sig. (2-tailed) $P < 0.05$

This result showed that patient's edema score also decreased statistically significantly, with a median difference of 3 pre-intervention and 2 post-intervention and a P value of 0.000. According to Wilcoxon signed ranks with statistical value ($P < 0.05$), there was a statistically significant decrease in the pre and post dialysis edema score between routine base dialysis (pre intervention) and guideline base dialysis (post intervention) (table 4). By comparing median values, it can be seen that following hemodialysis, the mean effective dialysis significantly lowers the edema score by 1 degree.

DISCUSSION

The role of nursing intervention in managing issues and enhancing outcomes for dialysis patients is more crucial than ever. The National Institute for Health and Care Excellence recently accredited the Renal Association's Clinical Practice Guidelines creation process (NICE). The certification is effective as of January 2017 for a period of five years. This recommendation offers both methods for enhancing the efficacy of dialysis as well as a fresh and efficient way to handle difficulties.

This study found that 60% of participants male and 40% were female. Among the study participants 43.3% of them were between the ages of 50 to 60 year. This finding is similar with El-Ballat, El-Sayed⁽¹⁷⁾ consisted of 60.4% males, and 39.6 % females; however the mean age of patients was 52.80 ± 13.82 years. This study finding contradicts with the results of Sharaf⁽¹⁸⁾, reported that mean age of their studied patients was 43.35±9.45 years and found that more than half of their patients were females. The present study findings also revealed that more than half of the studied lived in urban areas 70%. Similarly in the study of Ghaleb and Sharaf⁽¹⁹⁾ the majority of the studied patients were from urban areas 95.3%.

Following the completion of the current study, it was discovered that there was a significant difference after performing

dialysis with updated practice guidelines. The current study found a significant difference between before and after implementing hemodialysis practice guidelines for Headache was reported by 53.4% before and 6.6% after intervention, respectively; vomiting was reported by 56.6% and 10%, muscle cramps by 46.6% and 13.4%, and reported nausea was reported by 36.6% and 6.6% with p<0.05.

This result was in agreement with El-Sheikh study, Headache and muscle cramps were the most common pre-intervention symptoms (33.3% and 30%, respectively), while headache with muscle cramps improved but remained the most common post-intervention symptom. Post intervention, there was no nausea or vomiting, nor was there any headache. There was a significant difference in nausea, headache, muscular cramp, and vomiting before and after nursing intervention⁽²⁰⁾. Decreasing the dialysate temperature intervention is beneficial even in patients who have excessive weight gains^(21,22). In this regard Halle, advised against taking hypertensive medications before dialysis, avoiding eating while on dialysis, treating anemia, and using bicarbonate dialysate solution, which raises blood pressure to prevent hypotension⁽²³⁾.

This result were further supported by mottahedian and his colleagues reported complication was 30% before and 10% after intervention with significant reduction⁽²⁴⁾. Similarly the study conducted by Elrashedy and Mohammed to assess effect of Nursing guidelines to reduce hemodialysis complications shows that, 26.6% and 16.6% respectively with a statistical significance between pre and post data p<0.05⁽²⁵⁾. In a contrast with Wang and Rao study⁽²⁶⁾.

There were no statistical significance between two groups with (p=0.856) after intervention base dialysis. Volume management is essential to the care of hemodialysis patients. It is unknown whether pedal edema serves as a volume marker. The current study show statistically significant reduction pre and post dialysis edema score in between routine base dialysis (pre intervention) and guideline base dialysis (post intervention) tested by Wilcoxon signed ranks with statistical value (P< 0.05). By comparing median 3 pre and 2 post intervention show a significant decreased in the edema score by 1 degree after hemodialysis practice guideline which mean effective dialysis.

CONCLUSION

According to the findings of this study, 43.3% of the patients were male, between the ages of 30 and 39, mostly from urban areas, and had been on permanent hemodialysis for at least five months. This guideline really improves the condition of the patient by reducing dialysis-related complications like dialysis fatigue, headache, nausea, vomiting, breathlessness, and peripheral edema with a significance p less than 0.05. Nurses can carry out interventions like those in this study. Nephrology professionals are the ones who interact with dialysis patients the most and are most familiar with how dialysis machines work. According to the findings of a study, the hemodialysis practice guideline was effective in directing patients to use cool dialysate, reevaluate their dry weight, adopt the Trendelenburg position, use a lower ultrafiltration rate, manage complications brought on by hemodialysis, withdraw blood samples, and receive blood transfusions during dialysis.

REFERENCES

1. Fulker D, Ene-Iordache B, Barber T. High-resolution computational fluid dynamic simulation of haemodialysis cannulation in a patient-specific arteriovenous fistula. *Journal of biomechanical engineering*. 2018;140(3):031011.
2. Imtiaz S, Alam A. Is haemodialysis the most feasible dialysis modality for Pakistan? *Journal of the Pakistan Medical Association*. 2020;1-8.
3. Saeed F, Sardar M, Rasheed K, Naseer R, Epstein RM, Davison SN, et al. Dialysis decision making and preferences for end-of-life care: perspectives

of Pakistani patients receiving maintenance dialysis. *Journal of pain and symptom management*. 2020;60(2):336-45.

4. Mahmood MBUR, Khan AZ, Ikram T. Comorbidity Burden In End Stage Renal Disease Patients On Maintenance Hemodialysis. *Journal of Medical Sciences*. 2018;26(1):71-6.
5. Asif S, Saleem M, Qayyum A. P1525 90 Day Mortality Data Of Patients Initiating Maintenance Hemodialysis At A Tertiary Care Facility In Pakistan. *Nephrology Dialysis Transplantation*. 2020;35(Supplement_3):gfaa142.P1525.
6. Hamidi m, Roshangar F, Ghafourifard M, Hassankhani H, Sarbakhsh P. A Comparative Study Of The Prevalence Rate Of Common Complications In Routine Hemodialysis, And Linear And Stepwise Sodium- Ultra Filtration Profile In Patients With Chronic Kidney Failure Under Hemodialysis. *Nursing and Midwifery Journal*. 2019;17(6):444-52.
7. Barra ABL, Roque-da-Silva AP, Vasconcellos MS, Lugon JR, Strogoff-de-Matos JP. Association between extracellular volume control and survival in patients on short daily haemodialysis. *BMC nephrology*. 2020;21(1):1-8.
8. McIntyre D, Havas K, Bonner A. Monitoring for intradialytic hypotension: An audit of nursing practice. *Journal of Renal Care*. 2021;47(1):27-33.
9. Flythe JE, Chang TI, Gallagher MP, Lindley E, Madero M, Sarafidis PA, et al. Blood pressure and volume management in dialysis: conclusions from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney Int*. 2020;97(5):861-76.
10. See EJ, Polkinghorne KR. Volume management in haemodialysis patients. Current opinion in nephrology and hypertension. 2020;29(6):663-70.
11. Sarafidis PA, Mallamaci F, Louttradis C, Ekart R, Torino C, Karpetas A, et al. Prevalence and control of hypertension by 48-h ambulatory blood pressure monitoring in haemodialysis patients: a study by the European Cardiovascular and Renal Medicine (EURECA-m) working group of the ERA-EDTA. *Nephrology Dialysis Transplantation*. 2019;34(9):1542-8.
12. Ahmadi F, Toulabi T, Sajadi M, Ebrahimzadeh F. The Effects of Cool Dialysate on Vital Signs, Adequacy and Complications during Hemodialysis. *Iran J Nurs Midwifery Res*. 2021;26(6):487-94.
13. Hamid A, Dhrolia MF, Qureshi R, Imtiaz S, Ahmad A. Clinical characteristics of patients on long-term hemodialysis. *Journal of the College of Physicians and Surgeons Pakistan*. 2019;29(4):328-32.
14. vatandoost s, Mohammadi H, nouri b, mohammadi bolbanabad a, zamani p. RELATIONSHIP BETWEEN DIALYSIS ADEQUACY AND SLEEP QUALITY IN HEMODIALYSIS PATIENTS. *Nursing and Midwifery Journal*. 2018;16(1):30-7.
15. Shirashiani M, Roshandel G, Mollaei E, Khoddam H. Effect of Intermittent Normal Saline Bolus during Hemodialysis on Adequacy of Dialysis. *Journal of Mazandaran University of Medical Sciences*. 2018;28(164):31-40.
16. Huang M, Lv A, Wang J, Xu N, Ma G, Zhai Z, et al. Exercise training and outcomes in hemodialysis patients: systematic review and meta-analysis. *American journal of nephrology*. 2019;50(4):240-54.
17. El-Ballat MA-F, El-Sayed MA, Emam HK. Epidemiology of End Stage Renal Disease Patients on Regular Hemodialysis in El-Beheira Governorate, Egypt. *The Egyptian Journal of Hospital Medicine*. 2019;76(3):3618-25.
18. Sharaf A. The Effects of Nursing Interventions on Intradialytic Muscle Cramps among Patients Undergoing Maintenance Hemodialysis. *International Journal of Scientific Research*. 2020;9:8-21.
19. Ghaleb MA, Sharaf AY. The Effects of Nursing Interventions on Intradialytic Muscle Cramps among Patients Undergoing Maintenance Hemodialysis. *Int J Sci Res*. 2020:8-21.
20. El-Sheikh AA. Effect of Nursing Intervention on Prevention of Intradialytic Hypotension among Hemodialysis Patients. *IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN*. 2017;06(05):87-95.
21. Maheshwari V, Lau T, Samavedham L, Rangaiah GP. Effect of cool vs. warm dialysate on toxin removal: rationale and study design. *BMC Nephrol*. 2015;16:25.
22. KDOQI Clinical Practice Guideline for Hemodialysis Adequacy: 2015 update. *Am J Kidney Dis*. 2015;66(5):884-930.
23. Halle M, Kom, M. , Kamdem, F. , Mouloum, S. , Fouda, H. , Dzudie, A. , Kaze, F. and Ashuntantang, E. Cardiovascular Disease Burden in Patients with Non-Dialysis Dependent Chronic Kidney Disease in Cameroon: Case of the Douala General Hospital. *Open Journal of Nephrology*. 2020;10:171-86.
24. mottahedian tabrizi e l, najafi mehri s , samiey s , einollahi b , babaei gh r , mohammadi e . Effect of programmed nursing care in prevention of hemodialysis complications. *Critical Care Nursing*. 2019;2(2):55-9.
25. Elrashedy N, Mohammed W, Mohammed M, Abdel-Aziz M, Naser MA. Effect of nursing guidelines to reduce complications of acetate and bicarbonate solutions during hemodialysis among acute renal failure patients, Assuit University Hospital. *Life Science Journal*. 2018;11:41-54.
26. Wang M, Rao H, Zhang Y. Effect of predictive nursing on the comfort, illness perception, metabolism of calcium and phosphorus, and complications in hemodialysis patients. *American journal of translational research*. 2021;13:4978-86.