https://doi.org/10.29309/TPMJ/2026.33.11.10488 www.theprofesional.com

ORIGINAL ARTICLE

Factors contributing to unplanned initiation of dialysis in chronic kidney disease patients: A prospective analysis.

Sumbul Shaikh[1], Ruqaya Qureshi[2], Kiran Nasir[3], Murtaza Dhrolia[4]

ABSTRACT… Objective: To determining risk factors for unplanned initiation of dialysis in advanced chronic kidney disease (CKD) patients. **Study Design:** Prospective Observational study. **Setting:** The Kidney Center, Karachi, Pakistan. **Period:** September 2024 to May 2025. **Methods:** Adults (≥18 years) with stage 5 CKD initiating maintenance haemodialysis were analyzed. Planned dialysis was defined as elective initiation via arteriovenous fistula (AVF) / arteriovenous graft (AVG), or planned catheter, while unplanned initiation referred to urgent inpatient dialysis. Demographic, clinical, laboratory, and vascular access data were recorded. Statistical analyses was performed taking p<0.05 as significant. **Results:** Of 73 patients, 23 (31.5%) initiated dialysis electively, and 50 (68.5%) unplanned. Overall, the mean age was 53.9±14.6 years, and 39 (53.4%) were male. Diabetes mellitus was significantly more frequent in unplanned dialysis patients (60.0% vs 30.4%, p=0.019). Late referral (<1 month) was significantly associated with unplanned dialysis (p<0.001). Unplanned dialysis patients had lower albumin (p=0.024), and higher potassium (p=0.001) levels. AVF use was 82.6% in elective vs none in unplanned dialysis patients (p<0.001). Logistic regression identified diabetes (OR 3.4), late referral (OR 2.9), hyperkalaemia (OR 2.4), volume overload (OR 7.7), and AKI on CKD (OR 42.7) as major risk factors for unplanned dialysis. **Conclusion:** The unplanned initiation of dialysis in advanced CKD is strongly associated with diabetes mellitus, late referral, inadequate dialysis education, hypoalbuminaemia, hyperkalaemia, metabolic acidosis, volume overload, and acute kidney injury on CKD.

Key words: Albumin, Chronic Kidney Disease, Diabetes Mellitus, Dialysis, Potassium.

Article Citation: Shaikh S, Qureshi R, Nasir K, Dhrolia M. Factors contributing to unplanned initiation of dialysis in chronic kidney disease patients: A prospective analysis. Professional Med J 2026; 33(10):2174-2181. https://doi.org/10.29309/TPMJ/2026.33.11.10488

INTRODUCTION

Chronic kidney disease (CKD) is a major public health problem with a steadily rising prevalence worldwide. The progressive decline in renal function increases the risk of cardiovascular events and ultimately leads to end-stage renal disease (ESRD).[1-3] Early anticipation, diagnosis, prevention, and management of CKD-related complications such as metabolic acidosis, anemia, and bone mineral disorders are crucial, along with timely preparation for renal replacement therapy (RRT) in line with KDIGO guidelines.[4]

Patients with stage 4 CKD require proper counseling and an integrated approach to prepare them for RRT. Specialized multidisciplinary clinics (MDCs) have been shown to play an important role in addressing these needs by offering comprehensive care and patient education.[5] However, despite follow-up in such clinics, many patients still initiate dialysis unexpectedly during hospitalization.[6] Studies have consistently linked urgent dialysis initiation with poorer outcomes, including a higher likelihood of starting hemodialysis (HD) rather than peritoneal dialysis and dependence on temporary catheters instead of permanent vascular access.[5,6] A Korean study reported that 63.8% of patients initiated HD via temporary catheters[7], which are associated with serious complications such as catheter-related infections, dysfunction, and central vein stenosis. These complications significantly increase morbidity and mortality[8,9], whereas conversion to permanent vascular access reduces mortality risk by approximately 33%.[10]

Data indicate that early referral to a nephrologist improves outcomes through earlier vascular access creation and better preparation for RRT.[11,12] However, early referral does not guarantee optimal dialysis initiation, as many patients still present with acute

1. MBBS, Postgraduate Trainee Nephrology, The Kidney Center, Karachi, Pakistan.
2. MBBS, FCPS (Nephrology), Associate Professor Nephrology, The Kidney Center, Karachi, Pakistan.
3. MBBS, FCPS (Nephrology), Professor Nephrology, The Kidney Center, Karachi, Pakistan.
4. MBBS, FCPS (Nephrology), Professor Nephrology, The Kidney Center, Karachi, Pakistan.

Correspondence Address:
Dr. Sumbul Shaikh
Department of Nephrology, The Kidney Center, Karachi, Pakistan.
sumbulshaikh567@gmail.com

Article received on:
11/02/2026
Date of revision:
17/04/2026
Accepted for publication:
22/04/2026

deterioration or unforeseen complications requiring urgent dialysis.[13] International guidelines suggest that patients with an estimated eGFR<30 mL/min/1.73 m^2 should be counseled on dialysis modalities[14], and the Kidney Disease Outcomes Quality Initiative (KDOQI) recommends arteriovenous fistula (AVF) creation 6–9 months before the anticipated start of HD.[15] Despite these recommendations, acute initiation of dialysis is sometimes unavoidable due to sudden illness or unexpected renal deterioration. Recognition of such circumstances in patients followed at MDCs could enable CKD programs to reduce urgent dialysis starts, minimize preventable hospitalizations, lower costs, and improve morbidity and mortality outcomes. This study mainly aimed at determining risk factors for unplanned initiation of dialysis in advanced CKD patients.

METHODS

This prospective observational study was carried out at the Kidney Center, Karachi, Pakistan during September 2024 to May 2025. All patients who initiated hemodialysis during the study period were evaluated for eligibility. Inclusion criteria were patients of any gender, aged 18 years of above, with a diagnosis of CKD stage-5 requiring initiation of RRT, and initiated maintenance hemodialysis. Exclusion criteria were patients who required dialysis for acute kidney injury (AKI) without underlying CKD, or those who initiated dialysis for acute-on-chronic kidney disease but subsequently recovered renal function and became dialysis-free within a few months. Patients on peritoneal dialysis as the first modality of RRT were also not included. Patients were also excluded if they had incomplete clinical or follow-up data regarding dialysis initiation or vascular access. Planned dialysis was defined as the elective start of hemodialysis in the outpatient setting, usually via a previously created permanent vascular access such as AVF or arteriovenous graft (AVG). Tunneled catheters inserted electively in the outpatient setting as part of a pre-dialysis plan are now explicitly categorized as planned initiation. Unplanned initiation has been further refined to include dialysis started during acute hospital admission without prior access planning. A sample size of 73 was calculated considering the proportion of unplanned dialysis from a study conducted in UK as 15.6%, with 94% confidence level, and 8% margion of error.[16] The study protocol was approved by the Institutional Ethical Review Committee (letter number: 179-NEPH-072024, dated: August 19, 2024). Written informed consent was obtained from all patients or their caregivers. Non-probability, consecutive sampling approach was adopted.

For all enrolled patients, demographic characteristics, clinical history, and comorbid conditions were recorded at the time of their first nephrology referral. The underlying etiology of CKD was categorized such as diabetes mellitus, hypertension, glomerulonephritis, or polycystic kidney disease. Medication use was also documented. Laboratory evaluation included serum creatinine levels at the time of referral to a nephrologist and at the time of hemodialysis initiation. Data relating to vascular access were carefully recorded, including type of access and the date of surgery for permanent access creation. The interval between the first nephrology consultation and the initiation of hemodialysis was calculated, as was the interval between first referral and AVF or AVG surgery. Data were analyzed using IBM-SPSS, version 26.0. Categorical variables were expressed as frequencies and percentages, while continuous variables were summarized as mean with standard deviation or as median with interquartile range (depending on distribution). Comparisons between patients with planned and uplanned dialyssis were performed using the Chi-square test or Fisher's exact test for categorical variables. Continuous variables were compared with an independent sample t-test for normally distributed data, whereas the Mann–Whitney U test was applied for non-parametric data. Logistic regression analysis was employed to determine independent predictors of unplanned dialysis initiation, and odds ratios (ORs) with 95% confidence intervals (CIs) were reported. P-value<0.05 was considered statistically significant.

RESULTS

In a total of 73 patients, 23 (31.5%) commenced dialysis electively, while 50 (68.5%) required unplanned initiation. The mean age of patients at initiation was 53.9±14.6 years. There were 39 (53.4%) males, and no significant differences were observed in terms of gender distribution between elective and unplanned dialysis patients (p=0.387).

Diabetes mellitus was significantly more frequent in patients initiating unplanned dialysis compared with the elective dialysis patients (60.0% vs. 30.4%, p=0.019). Smoking showed a trend towards higher prevalence in the elective dialysis (34.8% vs 14.0%, p=0.061). Regarding primary renal disease, diabetic nephropathy accounted for 45.2% cases overall, and was strongly associated with unplanned initiation of dialysis (54.0% vs 26.1%, p=0.045). The timing of nephrology referral was strongly associated with dialysis initiation pattern as patients referred more than one year before dialysis initiation were more likely to start electively (60.9% vs 24.0%), while those referred within one month almost exclusively started unplanned (100%, p<0.001). Table-I is showing comparison of baseline characteristics of patients

Unplanned dialysis patients had significantly lower serum albumin (p=0.024), and higher serum potassium (p=0.001). Haemoglobin levels were relatively low across cases (p=0.334), and platelet counts did not differ significantly (p=0.868) among elective and unplanned dialysis patients. Medication use revealed that diuretics were more commonly prescribed in patients starting unplanned dialysis (91.3% vs 58.0%, p=0.004), whereas the use of RAAS blockers, calcium channel blockers, or beta-blockers showed no significant differences (Table-II).

Regarding education about dialysis and vascular access counselling, 26 (52.0%) patients with unplanned dialysis reported having been advised regarding AVF creation compared with 23 (100.0%) in the elective patients (p<0.001). Knowledge about dialysis was substantially lower among the unplanned patients (44.0% vs. 91.3%, p<0.001). Counselling about renal replacement therapy modalities was significantly less frequent among patients with unplanned dialysis (36.0% vs 65.2%, p=0.020). Patients with fewer nephrology visits in the preceding year were significantly more likely to initiate unplanned dialysis (56.0% vs 30.4%, p=0.042). Vascular access at first haemodialysis differed significantly as 82.6% patients in the elective group started with AVF versus none among unplanned patients (p<0.001) (Table-III).

Overall, the most common indications for dialysis initiation were uraemic manifestations (90.4), volume overload (53.4%), metabolic acidosis (52.1%), and refractory hyperkalaemia (39.7%). Volume overload (68.0% vs 21.7%, p<0.001), refractory hyperkalaemia (50.0% vs 17.4%, p=0.008), and metabolic acidosis (60.0% vs 34.8%, p=0.045) were significantly more common among unplanned dialysis patients. AKI on CKD was strongly associated with unplanned initiation of dialysis (66.0% vs. 4.3%, p<0.001) (Table-IV).

On multivariate logistic regression analysis, several factors were significantly associated with unplanned initiation of dialysis (Table-V). These included diabetes mellitus (OR 3.4, 95% CI 1.2–9.8, p=0.022), fewer nephrology visits in the preceding year (OR 2.9, 95% CI 1.2–8.3, p=0.046), hypoalbuminaemia (OR 0.334, 95% CI 0.125–0.893, p=0.029), hyperkalaemia (OR 2.4, 95% CI 1.4–4.2, p=0.002), metabolic acidosis (OR 2.8, 95% CI 1.0–7.9, p=0.049), refractory hyperkalaemia (OR 4.8, 95% CI 1.4–16.0, p=0.012), volume overload (OR 7.7, 95% CI 2.4–24.3, p=0.001), and AKI on CKD (OR 42.7, 95% CI 5.3–344.5, p<0.001). Adequate knowledge about dialysis (OR 0.075, 95% CI 0.016–0.354, p=0.001) and not using diuretics (OR 0.132, 95% CI 0.028–0.623, p=0.029) were associated with unplanned dialysis.

DISCUSSION

The strong association between diabetes mellitus and unplanned dialysis initiation in this study (60.0% vs 30.4% in the elective group, OR 3.4, 95% CI 1.2–9.8) aligns with results from Brown et al.[17], who reported diabetes in 68.4% of patients starting unplanned dialysis compared with 51.9% of those starting electively. The same pattern was observed by Ahmad et al.[18], where 82% of patients with urgent dialysis starts were diabetic. This consistent finding across different populations underscores the high burden of diabetic nephropathy as a cause of CKD progression, often accompanied by cardiovascular disease and acute complications that precipitate urgent dialysis initiation. The high prevalence of diabetes in unplanned dialysis patients may also reflect challenges with patient adherence, late referral, and accelerated decline in renal function due to poor glycaemic control.

TABLE-I

Comparison of baseline characteristics of patients undergoing hemodialysis (N=73)

Parameters	Elective Start (n=23)	Unplanned Start (n=50)	Total (N=73)	P-Value
Age in years	53±12.7	54.4±15.5	53.9±14.6	0.641
Gender Male	14(60.9%)	25(50.0%)	39(53.4%)	0.387
BMI in Kg/m2	24.4±2.7	25.5±2.3	25.1±2.5	0.093
Comorbidities				
Diabetes mellitus	7(30.4%)	30(60.0%)	37(50.7%)	0.019
Hypertension	22(95.7%)	45(90.0%)	67(91.8%)	0.658
Coronary artey disease	7(30.4%)	12(24.0%)	19(26.0%)	0.561
Dyslipidemia	8(34.8%)	19(38.0%)	27(37.0%)	0.792
Smoker	8(34.8%)	7(14.0%)	15(20.5%)	0.061
Cause of CKD				
CKD of unknown etiology	5(21.7%)	3(6.0%)	8(11.0%)	
Diabetic nephropathy	6(26.1%)	27(54.0%)	33(45.2)	0.045
Obstructive nephropathy	1(4.3%)	-	1(1.4%)	
Autosomal Dominant Polycystic Kidney Disease	2(8.7%)	3(6.0)	5(6.8%)	
Other	9(39.1%)	17(34.0%)	26(35.6%)	
Time from refferal to HD initiation				
> 1 year	14(60.9%)	12(24.0%)	26(35.6%)	
6 months - 1 year	6(26.1%)	7(14.0%)	13(17.8%)	<0.001
3 - 6 months	-	2(4.0%)	2(2.7%)	
< 3 monts	3(13.0%)	5(10.0%)	8(11.0%)	
< 1 month	-	24(48.0%)	24(32.9%)	
Labs at HD initiation				

TABLE-II

Laboratory parameters and medications use in patients at the start of hemodialysis (N=73)

Parameters	Elective start (n=23)	Unplanned start (n=50)	Total (N=73)	P-Value
Labs at HD initiation				
Creatinine (mg/dl)	11.2±2.1	10.6±2.2	10.7±2.1	0.257
Urea (mg/dl)	221.9±48.7	237.8±72.4	232.8±65.9	0.133
Hemoglobin (g/dl)	9.6±2.0	9.1±2.2	9.3±2.1	0.334
Albumin (g/dl)	3.7±0.6	3.4±0.5	3.5±0.5	0.024
Potassium (mmol/l)	4.5±0.7	5.4±1.1	5.1±1.1	0.001
Platelets (10^9/l)	243.1±63.9	240.5±69.6	238.5±87.2	0.868
Medications				
Use of RAAS blocker	3(13.0%)	2(4.0%)	5(6.8%)	0.317
Use of CCB	18(78.3%)	30(60.0%)	48(65.8%)	0.127
Use of Beta blocker	14(60.9%)	21(42.0%)	35(47.9%)	0.134
Use of Diuretics	21(91.3%)	29(58.0%)	50(68.5%)	0.004
Living alone	6(26.1%)	17(34.0%)	23(31.5%)	0.499

TABLE-III

Education about the hemodialysis and angio access status of the patients (N=73)

Variables	Elective Start (n=23)	Unplanned Start (n=50)	Total (N=73)	P-Value
AVF advice	23(100%)	26(52.0%)	49(67.1%)	<0.001
Knowledge about hemodialysis	21(91.3%)	22(44.0%)	43(58.9%)	<0.001
RRT modalities were discussed	15(65.2%)	18(36.0%)	33(45.2%)	0.020
Nephrology visits in last one year	7(30.4%)	28(56.0%)	35(47.9%)	0.042
Angio Access at 1st HD				
AVF	19(82.6%)	-	19(26.0%)	<0.001
Perm Catheter	3(13.0%)	7(14.0%)	10(13.7%)	
Temporary catheter	1(4.3%)	43(86.0)	44(60.3%)	

TABLE-IV

Indication of the start of Hemodialysis (N=73)

Variables	Elective Start (n=23)	Unplanned Start (n=50)	Total (N=73)	P-Value
Uremiic manifestation	22(95.7)	44(88.0%)	66(90.4%)	0.421
Metabolic acidosis	8(34.8%)	30(60.0%)	38(52.1%)	0.045
Refractory Hyperkalemia	4(17.4%)	25(50.0%)	29(39.7%)	0.008
Volume overload	5(21.7%)	34(68.0%)	39(53.4%)	<0.001
AKI over CKD	1(4.3%)	33(66.0%)	34(46.6%)	<0.001

TABLE-V

Multivariate logistic regression analysis for determining risk factors of Unplanned HD (N=73)

Risk Factors	Odds Ratio	95% CI		P-Value
		Lower	Upper	
Diabetes mellitus	3.4	1.2	9.8	0.022
Nephrology visits in last 1 year	2.9	1.2	8.3	0.046
Knowledge about HD	0.1	0.1	0.3	0.001
Use of Diuretics	0.1	0.1	0.6	0.029
Hypoalbunemia	0.3	0.1	0.9	0.029
Hyperkalemia	2.4	1.4	4.2	0.002
Metabolic acidosis	2.8	1	7.9	0.049
Refractory Hyperkalemia	4.8	1.4	16	0.012
Volume overload	7.7	2.4	24.3	0.001
AKI over CKD	42.7	5.3	344.5	<0.001

Diabetes should be considered a priority marker for pre-emptive intervention, with intensive education, early vascular access creation, and tighter coordination between nephrologists and diabetologists to reduce late presentation and emergency dialysis.[19]

Late referral emerged as another critical determinant of unplanned dialysis initiation, as 100% of patients referred within one month of dialysis initiation started unplanned, while 60.9% of those referred more than a year earlier started electively (OR 2.9, 95% CI 1.2–8.3). Similarly, Hassan et al.[20], in a systematic review of 48 studies, identified late referral in five as a consistent predictor of unplanned dialysis. Arulkumaran et al.[21], also demonstrated that acute systemic illness superimposed on CKD was more common in those with shorter follow-up before dialysis initiation. Hughes et al.[22], showed that even patients followed by nephrologists for more than 12

months often experienced suboptimal starts due to missed opportunities for vascular access creation. The convergence of evidence indicates that late referral and inadequate predialysis preparation remain globally pervasive problems.[23]

Education about haemodialysis and vascular access was found to be significantly deficient among unplanned starters in this study. Only 52.0% reported having received AVF advice and 44.0% had knowledge about dialysis, compared with 100.0% and 91.3% respectively in the elective dialysis patients. This echoes findings from Brown et al.[17] A study from Qatar[24] also noted that patients who did not receive dialysis education or vascular clinic follow-up were more likely to require urgent dialysis. In a systematic review, Hassan et al.[20], highlighted lack of dialysis education as a key risk factor across six studies. This reinforces the clinical imperative of structured education programs and multidisciplinary low-clearance clinics.

The present study demonstrated that vascular access at first haemodialysis was a defining feature distinguishing elective from unplanned starts. All elective patients commenced dialysis through AVF, whereas 86.0% of unplanned starters relied on temporary catheters. This mirrors the Korean cohort reported by Lee et al.[25], where 61.3% of patients used central venous catheters at first haemodialysis, and data from UK[21] reported that over half of patients had acute dialysis starts with temporary access. Ghonemy et al.[24], similarly observed that lack of vascular clinic visits and absence of access planning were strongly predictive of urgent dialysis. The consistency of these findings across settings highlights that vascular access planning remains the most tangible and modifiable intervention point. The integration of vascular surgeons early in CKD care, along with system-level initiatives to reduce surgical delays, could be an effective strategy to reduce unplanned dialysis.

Biochemical parameters in this study provided important insight as hypoalbuminaemia was associated with unplanned initiation (OR 0.334, 95% CI 0.125–0.893), and hyperkalaemia was significantly more prevalent in unplanned starters (OR 2.4, 95% CI 1.4–4.2). Systematic reviews by Hassan et al.[20], and Magadi et al.[26], both reported lower serum albumin and higher potassium and phosphate as common predictors of urgent dialysis initiation. Shimizu et al.[27], in Japan also identified emergent dialysis initiation in patients with hypoalbuminaemia and metabolic derangements as contributing factors. The association of hypoalbuminaemia and metabolic complications suggests that malnutrition-inflammation complex and inadequate metabolic control accelerate the trajectory toward unplanned dialysis.[28] These observations calls for aggressive nutritional assessment, correction of acidosis, and tighter monitoring of electrolyte disturbances in advanced CKD patients.

AKI superimposed on CKD was a strong predictor in this study, with an OR of 42.7 (95% CI 5.3–344.5). This finding resonates with the Japanese cohort[27], where AKI was the leading cause of emergent dialysis initiation, followed by stroke, diabetes, and heart failure. Liao et al.[29], in Taiwan also found AKI, heart failure, and sepsis to be major triggers for unplanned first dialysis. The association between diuretic use and a lower likelihood of unplanned dialysis initiation in this study (OR 0.132, 95% CI 0.028–0.623) provides an interesting perspective. This finding contrasts with the assumption that diuretic use reflects volume overload, yet aligns with evidence suggesting that appropriate diuretic therapy can stabilize fluid balance and delay acute decompensation.[30] The judicious use of diuretics in advanced CKD, alongside dietary sodium restriction, may reduce the risk of acute hospitalizations leading to urgent dialysis starts. Future studies should explore the mechanistic role of diuretic therapy as a potential modifier of unplanned dialysis risk.

The proportion of patients initiating dialysis unplanned in this cohort (68.5%) was higher than that reported in many Western cohorts, such as Brown et al.[17], (41.3%) and Arulkumaran et al.[21], (50.3%), but similar to the figures from Lee et al.[25], in Korea (61.3%). This difference may reflect disparities in healthcare infrastructure, referral systems, and availability of multidisciplinary clinics. In low- and middle-income settings, barriers such as delayed presentation, limited vascular access services, and low health literacy may contribute to higher unplanned dialysis rates.

Regarding limitations, this was a single-centre study with a modest sample size that limits generalisabilit. The reliance on patient self-report for knowledge about dialysis and prior education introduces potential recall bias. This study did not note socioeconomic status, distance from healthcare facilities, health literacy, and access to vascular surgery services. The number of variables included in the regression model relative to the sample size may introduce a risk of overfitting, therefore, these findings should be interpreted cautiously and validated in larger, multicentre studies. Future multicentre studies with larger sample sizes, standardised definitions of unplanned dialysis, and inclusion of socioeconomic and healthcare system factors are required to better elucidate modifiable predictors and to inform targeted interventions.

CONCLUSION

The unplanned initiation of dialysis in advanced CKD is strongly associated with diabetes mellitus, late referral, inadequate dialysis education, hypoalbuminaemia, hyperkalaemia, metabolic acidosis, volume overload, and acute kidney injury on CKD, while adequate knowledge and diuretic use appear to be protective. Reducing unplanned dialysis starts is critical to lowering morbidity, mortality, and healthcare costs, and should remain a central focus of nephrology practice and policy.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Copyright© 22 April, 2026.

REFERENCES

1. Xie Y, Bowe B, Mokdad AH, Xian H, Yan Y, Li T, et al. **Analysis of the Global Burden of Disease study highlights the global, regional, and national trends of chronic kidney disease epidemiology from 1990 to 2016.** Kidney International. 2018 Sep 1; 94(3):567-81.
2. Lundström UH, Gasparini A, Bellocco R, Qureshi AR, Carrero JJ, Evans M. **Low renal replacement therapy incidence among slowly progressing elderly chronic kidney disease patients referred to nephrology care: An observational study.** BMC Nephrol. 2017; 18:59.
3. Evans M, Grams ME, Sang Y, Astor BC, Blankestijn PJ, Brunskill NJ, et al. **Risk factors for prognosis in patients with severely decreased GFR.** Kidney International Reports. 2018 May 1; 3(3):625-37.
4. Stevens PE, Levin A. **Kidney Disease: Improving global outcomes chronic kidney disease guideline development work group members. Evaluation and management of chronic kidney disease: synopsis of the kidney disease: Improving global outcomes 2012 clinical practice guideline.** Ann Intern Med. 2013; 158(11):825-30.
5. Lee H, Manns B, Taub K, Ghali WA, Dean S, Johnson D, et al. **Cost analysis of ongoing care of patients with end-stage renal disease: The impact of dialysis modality and dialysis access.** American Journal of Kidney Diseases. 2002 Sep 1; 40(3):611-22.
6. Buck J, Baker R, Cannaby AM, Nicholson S, Peters J, Warwick G. **Why do patients known to renal services still undergo urgent dialysis initiation? A cross-sectional survey.** Nephrol Dial Transplant. 2007; 22:3240-5.
7. Kim HY, Bae EH, Ma SK, Kim SW. **Association between \initial vascular access and survival in hemodialysis according to age.** Korean J Intern Med. 2019; 34(4):867-76.
8. Hoen B, Kessler M, Hestin D, Mayeux D. **Risk factors for bacterial infections in chronic haemodialysis adult patients: A multicentre prospective survey.** Nephrol Dial Transplant. 1995; 10(3):377-81.
9. Combe C, Pisoni RL, Port FK, Young EW, Canaud B, Mapes DL, et al. **Dialysis outcomes and practice patterns study: data on the use of central venous catheters in chronic hemodialysis.** Nephrologie. 2001; 22(8):379-84.
10. Bradbury BD, Chen F, Furniss A, Pisoni RL, Kenn M, Mapes D, et al. **Conversion of vascular access type among incident hemodialysis patients: Description and association with mortality.** Am J Kidney Dis. 2009; 53(5):804-14.
11. Hoffmann M, Binaut R, Maisonneuve N, Bacri JL, Fleury D, Vanhille P, et al. **Patterns of nephrology referral and predialysis management of patients with chronic kidney disease.** Nephrol Ther. 2006; 2(1):15-23.
12. Nakamura S, Nakata H, Yoshihara F, Kamide K, Horio T, Nakahama H, et al. **Effect of early nephrology referral on the initiation of hemodialysis and survival in patients with chronic kidney disease and cardiovascular diseases.** Circ J. 2007; 71(4):511-6.
13. Hemmelgarn BR, Manns BJ, Zhang J, Tonelli M, Klarenbach S, Walsh M, et al. **Association between multidisciplinary care and survival for elderly patients with chronic kidney disease.** Journal of the American Society of Nephrology: JASN. 2007; 18(3):993-9.
14. Lok CE, Huber TS, Lee T, Shenoy S, Yevzlin AS, Abreo K, et al. **KDOQI Clinical practice guideline for vascular access: 2019 update.** Am J Kidney Dis. 2020; 75(suppl 2):S1
15. Mendelssohn DC, Malmberg C, Hamandi B. **An integrated review of "unplanned" dialysis initiation: Reframing the terminology to "suboptimal" initiation.** BMC Nephrol. 2009; 10:22.

16. Olaitan A, Ashman N, Homer K, Hull S. **Predictors of late presentation to renal dialysis: A cohort study of linked primary and secondary care records in East London.** BMJ Open. 2019; 9(6):e028431.
17. Brown PA, Akbari A, Molnar AO, Taran S, Bissonnette J, Sood M, et al. **Factors associated with unplanned dialysis starts in patients followed by nephrologists: A retrospective cohort study.** PLoS One. 2015; 10(6):e0130080.
18. Ahmad N. **POS-553 Factors Associated with Unplanned Dialysis Starts in Patients followed by Nephrologists: A Prospective Study.** Kidney Int Rep. 2022; 7(2):239.
19. Buades JM, Craver L, Del Pino MD, Prieto-Velasco M, Ruiz JC, Salgueira M, et al. **Management of kidney failure in patients with diabetes mellitus: What are the best options?** J Clin Med. 2021; 10(13):2943.
20. Hassan R, Akbari A, Brown PA, Hiremath S, Brimble KS, Molnar AO. **Risk factors for unplanned dialysis initiation: A systematic review of the literature.** Can J Kidney Health Dis. 2019; 6:2054358119831684.
21. Arulkumaran N, Navaratnarajah A, Pillay C, Brown W, Duncan N, McLean A, et al. **Causes and risk factors for acute dialysis initiation among patients with end-stage kidney disease-a large retrospective observational cohort study.** Clin Kidney J. 2018; 12(4):550-58.
22. Hughes SA, Mendelssohn JG, Tobe SW, McFarlane PA, Mendelssohn DC. **Factors associated with suboptimal initiation of dialysis despite early nephrologist referral.** Nephrol Dial Transplant. 2013; 28(2):392-7.
23. Molnar AO, Nash DM, Emblem J, Bota S, McArthur E, Luo B, et al. **Patient care gaps prior to maintenance dialysis initiation: A population-based retrospective study.** Can J Kidney Health Dis. 2023; 10:20543581231212134.
24. Ghonimi TA, Alkadi MM, Abdellatif MT, Ezzat H, Fouda TA, Elesnawi MA, et al. **Risk factors for unplanned initiation of dialysis in patients with advanced chronic kidney disease: A retrospective cohort study.** Saudi J Kidney Dis Transpl. 2023; 34(6):602-12.
25. Lee KH, Yu BC, Park MY, Kim JK, Choi SJ. **Unplanned Hemodialysis and Related Factors in Chronic Kidney Disease Patients.** J Korea Dialysis Access. 2023; 6(1):23-29.
26. Magadi W, Birnie K, Santhakumaran S, Caskey FJ, Ben-Shlomo Y. **An updated systematic review of the risk factors for unplanned dialysis initiation.** Clin Kidney J. 2024; 17(12):sfae333.
27. Shimizu Y, Nakata J, Yanagisawa N, Shirotani Y, Fukuzaki H, Nohara N, et al. **Emergent initiation of dialysis is related to an increase in both mortality and medical costs.** Sci Rep. 2020; 10(1):19638.
28. Hangai KT, Pecoits-Filho R, Blake PG, da Silva DP, Barretti P, de Moraes TP. **Impact of unplanned peritoneal dialysis start on patients' outcomes-A multicenter cohort study.** Front Med (Lausanne). 2022; 9:717385.
29. Liao CT, Lai JH, Chen YW, Hsu YH, Wu MY, Zheng CM, et al. **Transitions of dialysis status and outcomes after the unplanned first dialysis: A nationwide population-based cohort study.** Sci Rep. 2023; 13(1):12867.
30. Khan YH, Sarriff A, Adnan AS, Khan AH, Mallhi TH. **Chronic kidney disease, fluid overload and diuretics: A complicated triangle.** PLoS One. 2016; 11(7):e0159335.

AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Sumbul Shaikh:** Conceptualization, methodology, investigation, formal analysis, writing.
2	**Ruqaya Qureshi:** Data curation, data analysis.
3	**Kiran Nasir:** Methodology, drafting.
4	**Murtaza Dhrolia:** Critical revisions.