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Optimal Timing for Dialysis Preparation in CKD

Geo Neul Park, Seon Min Kim, Yoonwon Choi, Jin Kuk Kim, Moo Yong Park, Soo Jeong Choi, Byung Chul Yu
Department of Internal Medicine-Nephrology, Soonchunhyang University Bucheon Hospital, Korea, Republic of

Objectives : Determining the timing for preparing dialysis is a clinical challenge. Since unplanned dialysis initiation is associated with increased morbidity and mortality, predicting the optimal timing for dialysis initiation is important. This study aimed to develop a predictive model for determining the appropriate timing for dialysis preparation in patients with Chronic kidney disease (CKD).
Methods : We included patients with CKD who were followed at the nephrology clinic for at least one year, progressed to end-stage kidney disease, and initiated hemodialysis between January 2011 and June 2024. Patients with prior renal replacement therapy or those who discontinued hemodialysis within 3 months were excluded. A multiple linear regression (MLR) model was developed to predict the estimated glomerular filtration rate 6 months before dialysis initiation (eGFR_6M), which is considered the appropriate time to prepare for dialysis, such as vascular access formation.
Results : A total of 507 patients (299 males, mean age 61±14 years) were included. The mean duration from the first nephrologist visit to the initiation of HD was 69.0±52.7 months. Significant variables identified in the univariate analysis were selected for the MLR. In the MLR, sex, impaired mobility (requiring absolute assistance with mobility), Diabetes mellitus (DM), Cardiovascular disease (CVD), dementia, ejection fraction (EF), blood urea nitrogen (BUN), and phosphorus (P) were significant variables (Table 1). The following equation describes the prediction model: eGFR_6M = 10.720 – 0.124*(female) + 0.113*(impaired mobility) +0.087*(DM) + 0.111*(CVD) + 0.086*(Dementia) + 0.140*(60-EF) - 0.345*(if BUN>60) - 0.176*(if P >5.5) The adjusted R^2 was 0.325, and the Durbin-Watson statistic was 2.009. The scatter plot and Q-Q plot confirmed that the assumptions of normality, homoscedasticity, and linearity were met (Figure 1).
Conclusions : The predictive model developed in this study may serve as a valuable tool for clinical nephrologists in planning dialysis preparation and vascular access formation, thereby improving patient outcomes.

Table1.jpg

Variable	B	SE	β	*t*-value	*p*-value
Intercept	19.120	1.674		11.425	**<0.001**
Sex (Female)	-1.280	0.440	-0.124	-2.907	**0.004**
Impaired mobility	1.660	0.633	0.113	2.622	**0.009**
Diabetes mellitus	0.903	0.453	0.087	1.992	**0.047**
Cardiovascular disease	1.150	0.460	0.111	2.499	**0.013**
Dementia	1.951	0.986	0.086	1.979	**0.049**
Echocardiography_EF	-0.068	0.021	-0.140	-3.195	**0.002**
BUN >60 mg/dL	-3.528	0.481	-0.345	-7.332	**<0.001**
Phosphorus >5.5 mg/dL	-2.564	0.660	-0.176	-3.885	**<0.001**

Table1.jpg