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Authors

Berkowitz, Jacob
Akbulgic, Oguz
Kalantar-Zadeh, Kamyar
[et al.](#)

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PREDICTING DECLINE IN RESIDUAL RENAL UREA CLEARANCE VIA MACHINE LEARNING:

Jacob Berkowitz¹, Oguz Akbilgic², Kamyar Kalantar-Zadeh¹, Elani Streja¹. ¹Harold Simmons Center for Kindey Disease Research and Epidemiology, orange, CA, United States; ²Loyola University Chicago, Maywood, IL, United States

In hemodialysis patients the decline of residual kidney function (KRU) over the first year is associated with negative outcomes such as higher death risk. Several studies have identified biomarkers which are associated with higher risk of steeper KRU decline. However, identification of the most important predictors with use of classification-based predictive modeling has not yet been done.

We retrospectively reviewed a cohort of 7,205 patients who initiated in-center hemodialysis from 2007 to 2011 and had available KRU data at both baseline and immediately after the one-year mark. We classified patients as having a drop in KRU if they experienced a 20% or more decrease over the year-long period.

In our hemodialysis cohort, mean age was 62 ± 14 years, 65% were men, 25% were African American, 69% had diabetes, and mean baseline albumin was 3.64 ± 0.42 g/dL. Median (interquartile range) baseline KRU was 3.83 (6.00 – 2.27). A KRU decline of at least 20% was observed in 61.97% of patients. The final XGBoost model yielded an overall accuracy of 69% with an AUC of 0.72. A variable importance analysis on the final XGBoost model revealed the baseline KRU and presystolic blood pressure were the two most important predictors of KRU decline.

We showed that machine learning can predict hemodialysis patients at risk for exhibiting more than a 20% decline in KRU with moderately high accuracy. Our predictive models could aid patients and clinicians in determining the best course of treatment.