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Predicting 5-Year Risk of RRT in Stage 3 or 4 CKD: Development and External Validation

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Abstract

Background and objectives Only a minority of patients with CKD progress to renal failure. Despite the potential benefits of risk stratification in the CKD population, risk prediction models are not routinely used. Our objective was to develop and externally validate a clinically useful and pragmatic prediction model for the 5-year risk of progression to RRT in stage 3 or 4 CKD.

Design, setting, participants, & measurements We used a retrospective cohort design. The development cohort consisted of 22,460 Kaiser Permanente Northwest members with stage 3 or 4 CKD (baseline 2002–2008). The validation cohort consisted of 16,553 Kaiser Permanente Colorado members with stage 3–4 CKD (baseline 2006–2008). The final model included eight predictors: age, sex, eGFR, hemoglobin, proteinuria/albuminuria, systolic BP, antihypertensive medication use, and diabetes and its complications.

Results In the Northwest and Colorado cohorts, there were 737 and 360 events, and observed 5-year Kaplan-Meier risks of 4.72% (95% confidence interval [95% CI], 4.38 to 5.06) and 2.57% (95% CI, 2.30 to 2.83), respectively. Our prediction model performed extremely well in the development cohort, with a c-statistic of 0.96, an R^2 of 79.7%, and good calibration. We had similarly good performance in the external validation cohort, with a c-statistic of 0.95, R^2 of 81.2%, and good calibration. In the external validation cohort, the observed risk was slightly lower than the predicted risk in the highest-risk quintile. Using the top quintile of predicted risk as a cutpoint gave a sensitivity of 92.2%.

Conclusions We developed a pragmatic prediction model and risk score for predicting the 5-year RRT risk in stage 3 and 4 CKD. This model uses variables that are typically available in routine primary care settings, and can be used to help guide important decisions such as timing of referral to nephrology and fistula placement.

chronic kidney disease renal failure risk assessment
disease progression prognosis clinical prediction rule albuminuria
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Referral and Consultation Renal Insufficiency
renal insufficiency, chronic renal replacement therapy
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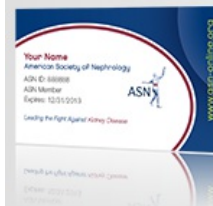
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