Kidney Failure Risk Equation Prediction in a Real-World Population with CKD

Session Information

- CKD Epidemiology, Risk Factors, Prevention - II
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Category: CKD (Non-Dialysis)

- 2301 CKD (Non-Dialysis): Epidemiology, Risk Factors, and Prevention

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Group or Team Name

- Center for Kidney Disease Research, Education, and Hope (CURE-CKD).

Background

Risk prediction helps to identify patients with chronic kidney disease (CKD) who may benefit from awareness, detection, and intervention to preserve kidney function. The purpose of this study was to externally validate the Kidney Failure Risk Equation (KFRE) using the 4-variable (4-KFRE) and 6-variable (6-KFRE) equations to predict end stage renal disease (ESRD; eGFR

<15 mL/min/1.73 m^2) over 2- and 5-year periods in a real-world population with moderate-to-severe CKD.

Methods

Patients with CKD stages 3 and 4 (N=20,947) were selected from electronic health records data in the CURE-CKD Registry from the UCLA (N=3,599) and Providence (N=17,348) Health systems. Patient demographics (age and sex), estimated glomerular filtration rate (eGFR), and log-normalized urine albumin/creatinine ratio were used for the 4-KFRE. The 6-KFRE was applied to patients who also had diabetes and hypertension.

Results

The prevalence of ESRD was 7% for the 2-year period and 11% for the 5-year period. The performance of the 6-KFRE and the 4-KFRE models was similar (4-KFRE is shown in **Table 1**). Specificity (0.994) reflects the model's ability to predict non-ESRD patients, while sensitivity (0.135) signifies the ability to predict ESRD patients. The area under the precision-recall curve (PR-AUC) was 0.466, and the area under the receiver operating curve (AUC ROC) was 0.853, suggesting accurate KFRE predictions. The model performance improved with lower eGFR.

Conclusion

The KFRE equations depicted high performance when applied to a real-world population with moderate-to-severe CKD. While highly specific for ESRD, it lacked sensitivity, but improved for more advanced CKD stages.

Results from the Four Variable KFRE (UCLA + Providence)

	2-Year Risk of ESRD	5-Year Risk of ESRD
Precision/PPV	0.770	0.696
PR AUC	0.447	0.486
Average Precision	0.447	0.486
Sensitivity	0.070	0.200
Specificity	0.999	0.990
AUC ROC	0.864	0.842
Brier Score	0.052	0.076

KFRE: Kidney Failure Risk Equation; ESRD: end stage renal disease; PPV: positive predictive value; PR AUC: precision recall area under the receiver operating curve